Semantic Theory
week 12 – Current issues in semantic theory

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Semantic Theory

Topics covered in this course:

Predicate logic - Type Theory - Lambda Calculus - Generalised Quantifiers - Event Semantics - Plurals and Mass Nouns - Dynamic Semantics - Discourse Representation Theory - Presuppositions

formal semantics

Open questions

I. **What is meaning?**
Truth-conditions vs. context-change potential
vs. answering the Question Under Discussion

II. **Which phenomena should be captured
by a semantic formalism?**
Syntax vs. Semantics vs. Pragmatics

III. **How to validate predictions from formal
semantic theories?**
Experimental approaches, Computational Semantics

Communication as question-answering

The Goal of communication: to determine what the world is like.

But: an exhaustive characterisation of the current state of the world – "The Big Question" (Roberts, 1996) – is too big a task

- What makes certain issues more important to us than others has to do with our goals

- Therefore, we establish certain subgoals, which take the form of issues to be resolved or Questions Under Discussion (QUDs)

- Content that addresses the QUD is called *at-issue* content; all other content is *not at-issue*

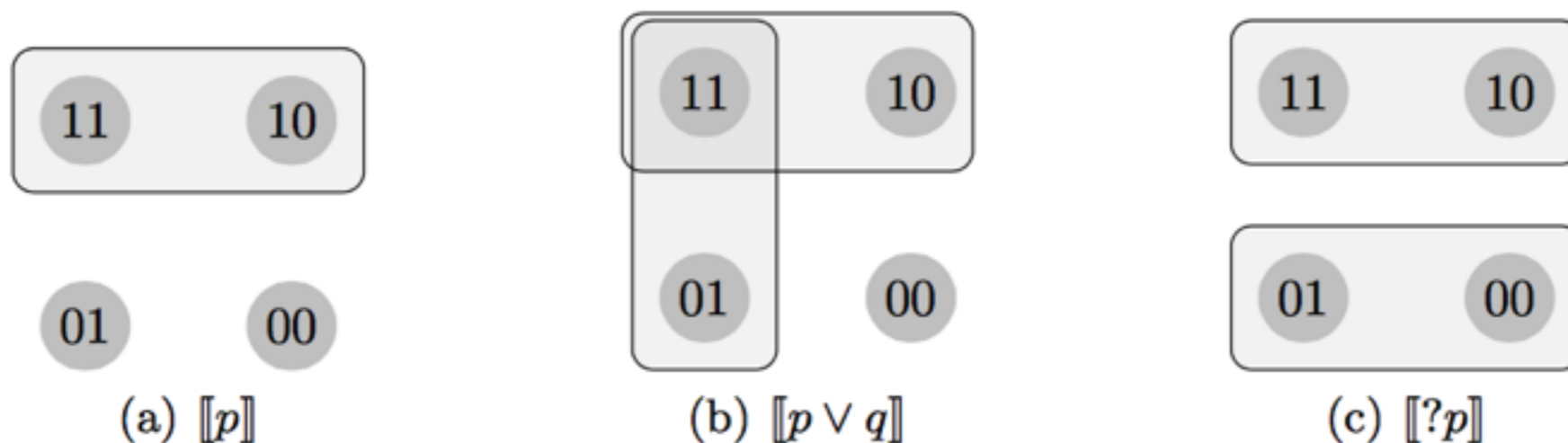Roberts, 1996; 2012; Simons et al. 2010; Tonhauser et al. 2013

Inquisitive semantics

"Meaning is Information EXchange Potential"

(1) $\llbracket$John plays$\rrbracket^{M,w,g} := \{\lambda v.\text{play}(\text{John})(v)\}$ :: $\langle s, t \rangle$

(2) $\llbracket$John or Bill plays$\rrbracket^{M,w,g} := \{\lambda v.\text{play}(\text{John})(v), \lambda v.\text{play}(\text{Bill})(v)\}$

(3) $\llbracket$Does John play?$\rrbracket^{M,w,g} := \{\lambda v.\text{play}(\text{John})(v), \lambda v.\neg\text{play}(\text{John})(v)\}$

(a) $\llbracket p \rrbracket$ (b) $\llbracket p \vee q \rrbracket$ (c) $\llbracket ?p \rrbracket$

(Groenendijk, 2009; Groenendijk & Roelofsen, 2009)

Defining the playing field of semantic theory
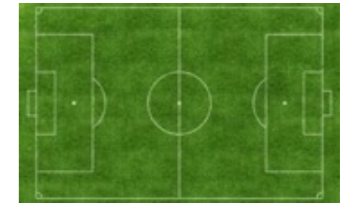
What can/should be captured in a semantic formalism?

The syntax-semantics interface:

- quantification, anaphora, tense and aspect, thematic roles, …
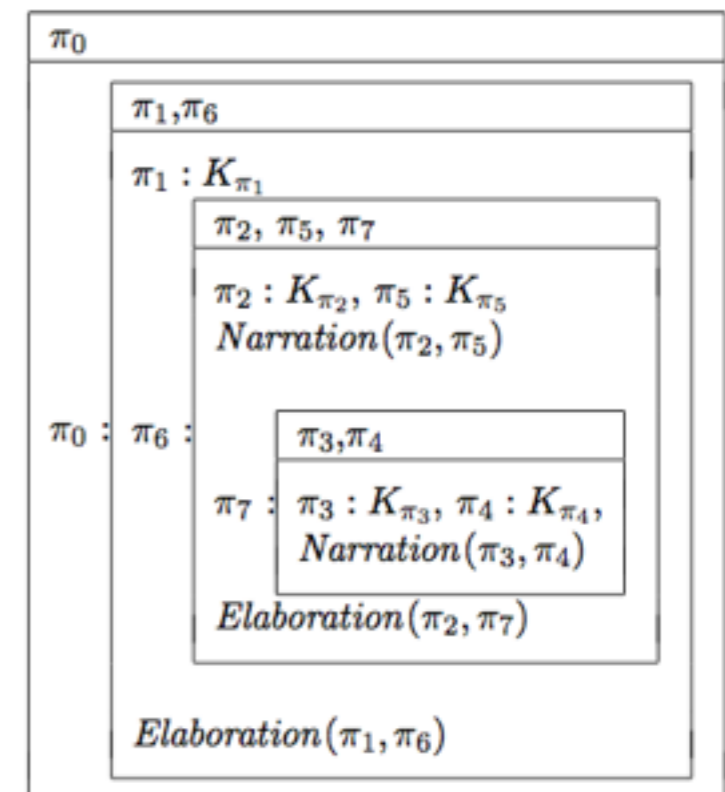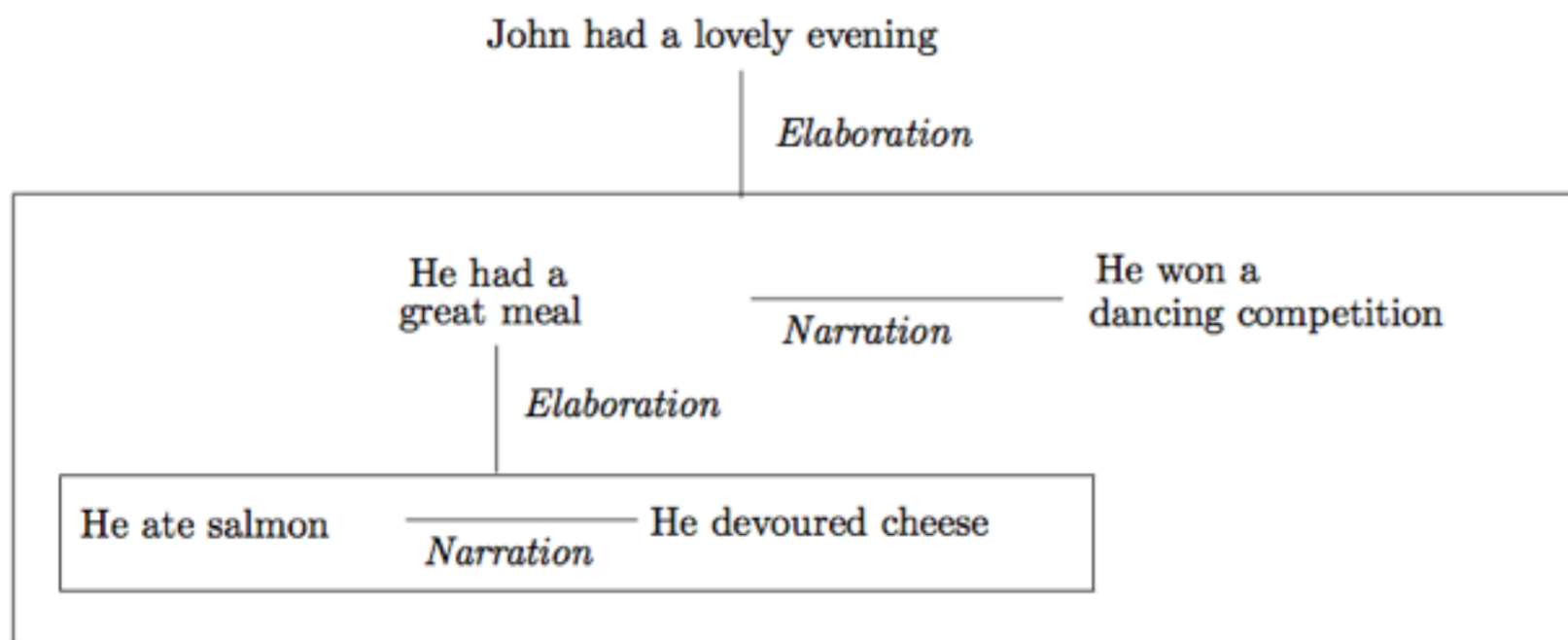
The semantics-pragmatics interface:

- rhetorical structure, implicature, presuppositions, information structure, …

Beyond truth-conditional meaning: Rhetorical Structure

(1) John had a great evening last night. He had a great meal. He ate salmon. He devoured lots of cheese. He won a dancing competition. ??It was a beautiful pink.
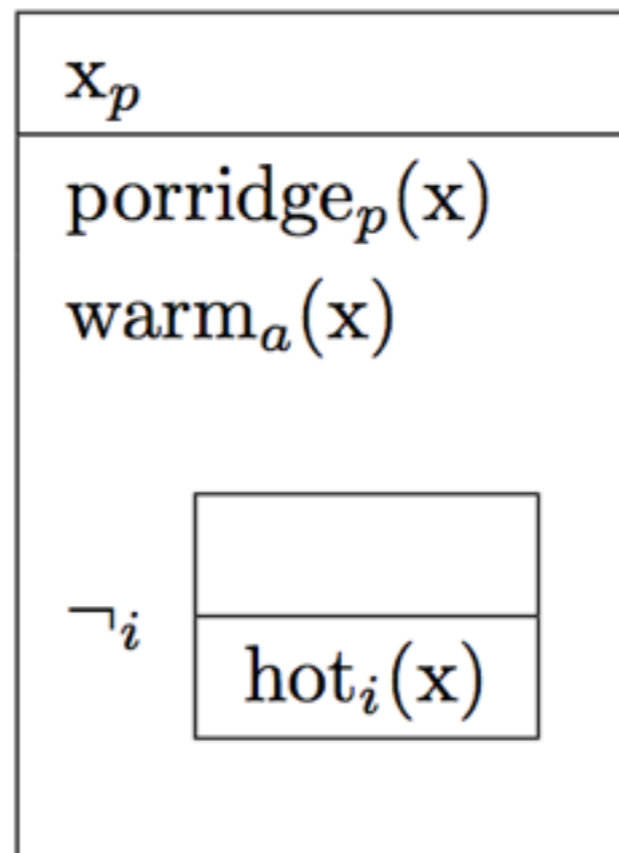

Segmented DRT: DRT with discourse relations

(Asher, 1992; Asher & Lascarides, 2003)

Beyond truth-conditional meaning: Implicature

(1) a. The porridge is warm. As a matter of fact, it is hot.
     b. ?The porridge is warm. As a matter of fact, it is cold.

Layered DRT: DRT with multiple layers of meaning

$$
\begin{array}{|l|}
\hline
\mathbf{x}_p \\
\hline
\mathrm{porridge}_p(\mathbf{x}) \\
\mathrm{warm}_a(\mathbf{x}) \\
\\
\neg_i \begin{array}{|l|}
\hline
\\
\hline
\mathrm{hot}_i(\mathbf{x}) \\
\hline
\end{array} \\
\\
\hline
\end{array}
$$

Geurts & Maier 2003; 2013

8

Beyond truth-conditional meaning: Information structure

(1) John <u>has a sister</u>. He visits her every week.   → *assertion*

(2) John visits <u>his sister</u> every week.   → *presupposition*

(3) John, <u>who has a sister</u>, visits her every week   → *conventional implicature*

Projective Discourse Representation Theory (PDRT): DRT with information structure

PDRT provides a unified, unidimensional treatment of asserted and projected content (including: presuppositions, anaphora, and *conventional implicatures*)

Examples of conventional implicatures

(1) Ames, the former spy, is now behind bars.   appositive

(2) Ames, who stole from the FBI, is now behind bars.   non-restrictive relative clause

(3) Ames was, as the press reported, a successful spy.   as-clause

(4) Fortunately, Beck survived the descent.   parenthetical

(5) Frankly (speaking), Ed fled.   utterance modifier

(6) I hate your damn dog!   expressive adverb

(7) That bastard Conner got promoted.   epithet

(8) Yamadasensei -ga o -warai-ni nat-ta.   honorific
Yamada teacher - nom hon - laugh - dat be - perf
'Professor Yamada laughed.' honorific

Potts 2003, 2005

Conventional implicatures vs. presuppositions

"Presuppositions are a special case of conventional implicatures, namely, those which, for pragmatic reasons, are presumed to be true already."   Karttunen & Peters (1979)

"Conventional implicatures are distinguished from presuppositions in that they introduce new information, motivating a *multidimensional* approach to meaning."   Potts (2005)

"Presuppositions and conventional implicatures belong to the larger class of not at-issue content."   Simons et al. (2010)

Q: How to provide a unified formal treatment of projection?

Toward a unified treatment of projection

A blind man walks into a bar…

✓ … he/him …	✗ … she/her …
✓ … the (blind) man…	✓ … the policeman …
✗ … the man, who is blind, …	✓ … the man, who has a dog, …
✗ … a man …	✓ … a woman …

} backgrounded

➜ foregrounded

given information   new information

Proposal: Projection phenomena (and asserted content) can be categorised based on their *information status*

Givenness: determines whether the contribution is *given* or *new*

Backgroundedness: determines whether the contribution is at-issue or not.

The information status of semantic content

Type	Given	New	
		backgrounded	*foregrounded*
Anaphora	+	−	−
Strong presuppositions	+	+	−
Weak presuppositions	+	+	+
CIs	−	+	−
Assertions	−	−	+
Indefinites	−	+	+

Information status in DRT

- givenness ~ anaphoric binding

- new information ~ accommodation / informativity constraint

- backgroundedness ~ embedding (?)

How to represent the difference between foregrounded and backgrounded information *without* assuming different levels of meaning?

We need a more explicit notion of information status in DRT

Projective DRT

PDRT is an extension of DRT with an explicit representation of information status; projection variables (*pointers* and *labels*) indicate the *interpretation site* of all referents and conditions

Every man loves a woman.

x		
man(x)	⟹	y
		woman(y)
		loves(x,y)
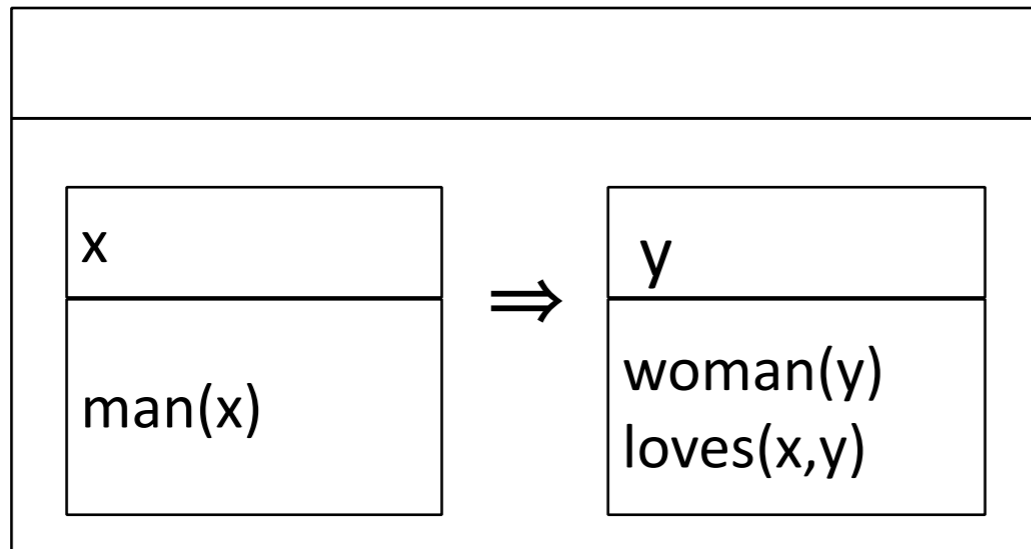
Projective DRT

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Projective DRT
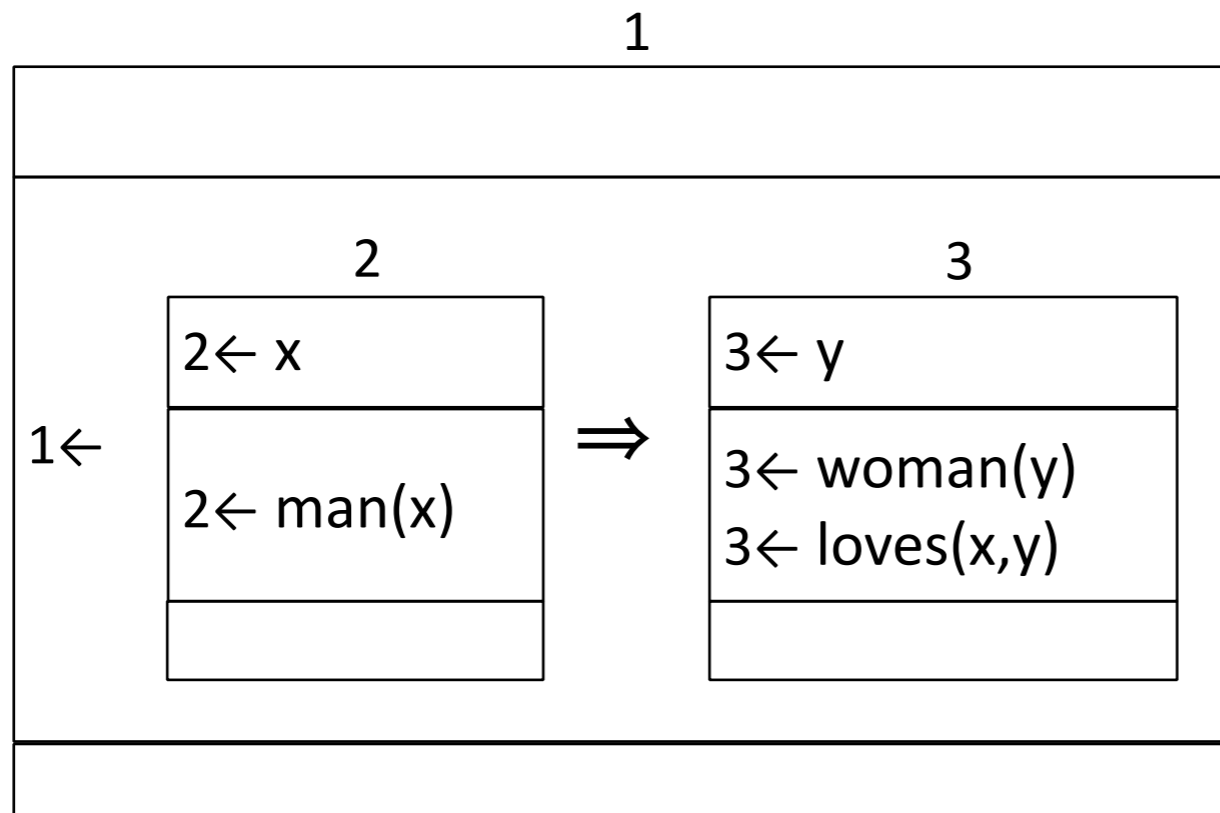
PDRT is an extension of DRT with an explicit representation of information status; projection variables (*pointers* and *labels*) indicate the *interpretation site* of all referents and conditions

Every man loves Mary.
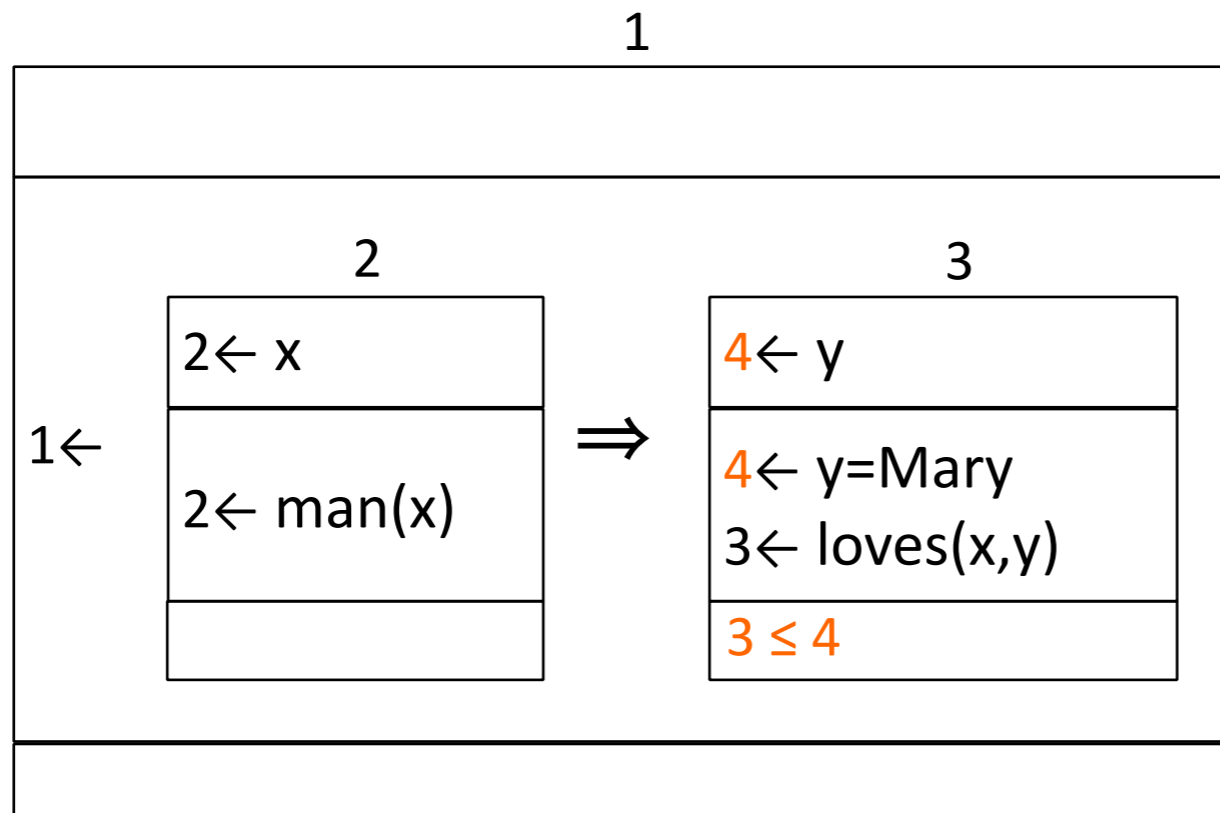
The projection site of unresolved presuppositions is *underspecified*

Anaphora in PDRT

Anaphoric expressions bind their pointer *and* referent to (the context of) their antecedent.

Every man loves himself.
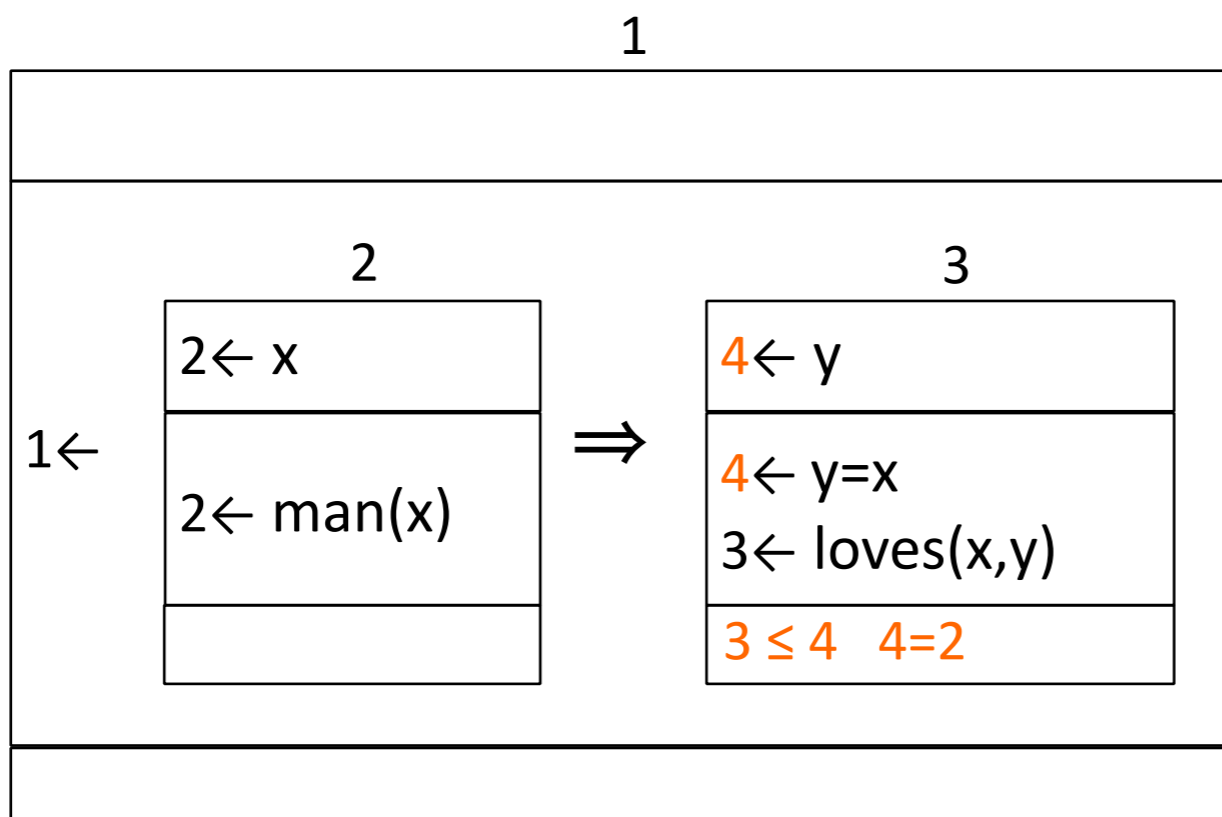
Conventional implicatures in PDRT

Conventional implicatures are represented as "piggybacking on their projecting anchor".

Every man loves Scarlett Johansson, (who is) an actress.
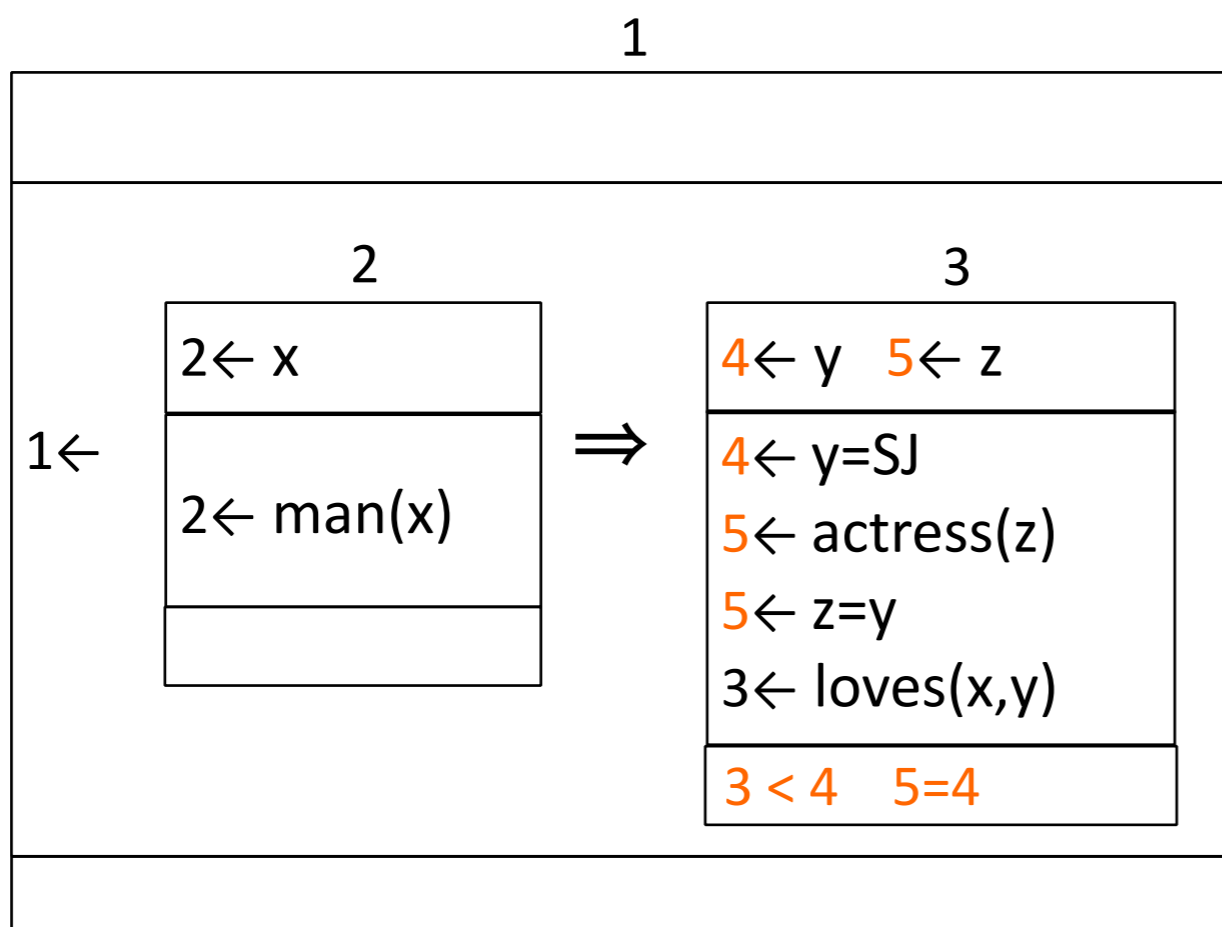
PDRT versus DRT

PDRSs contain the same information as DRSs and more!

This means that we can translate PDRSs into DRSs (and FOL)

It's not the case that John is ill.

$$\exists x(John(x) \wedge \neg\, ill(x))$$
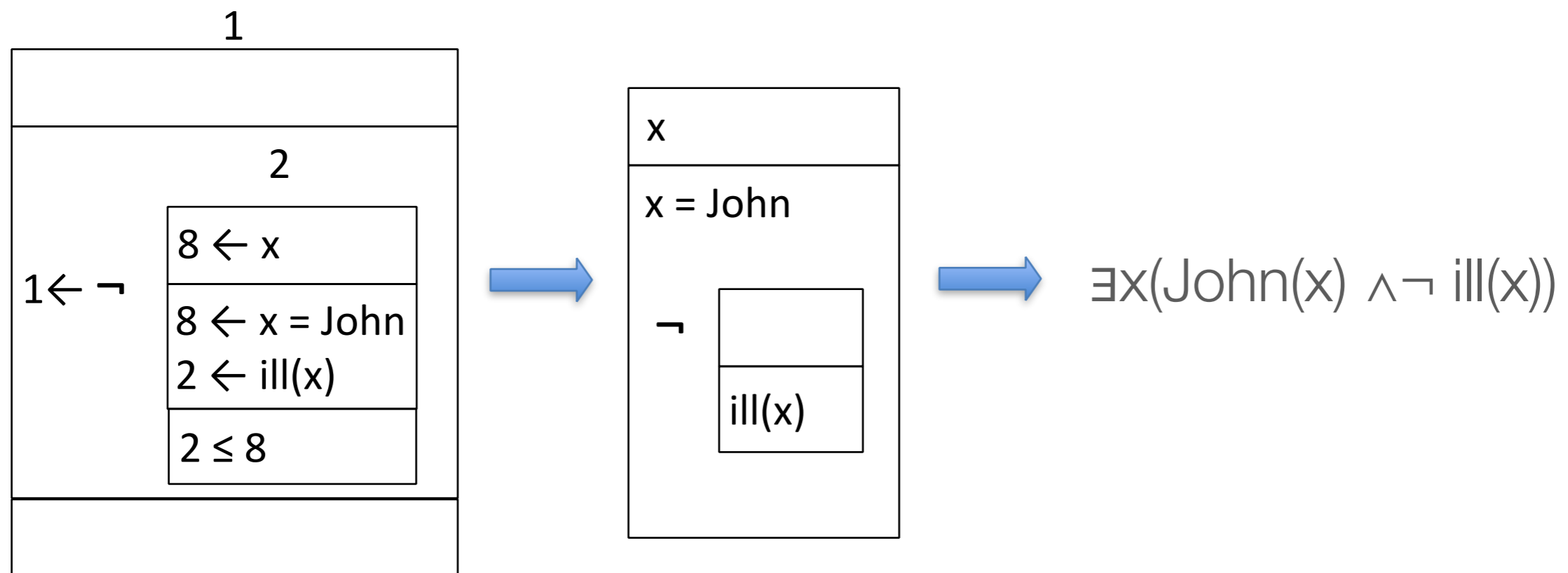
Summary PDRT

- Explicit representation of information structure

- Unified treatment of different types of projection phenomena (presuppositions, anaphora, and conventional implicatures)

- Rich representational structures extend all formal properties of DRT in terms of the accessibility constraints and model-theoretic interpretation

- Projection becomes part of semantic construction; no need for a two-stage resolution procedure

Formal semantics in the real world

How to apply and evaluate formal linguistic theories?

⇒ Testing predictions from formal semantic theories using psycholinguistic methods (questionnaires, eye-tracking, EEG)

- Geurts et al (2010); Chemla et al (2011); Florian Schwarz (ed., 2015), …

⇐ Using implementations of semantic formalisms to perform large-scale computational semantic analyses

- PDRT-Sandbox (Brouwer & Venhuizen, 2013)

- Boxer (Bos, 2008)

- The Groningen Meaning Bank (Basile et al., 2013; Bos et al., 2015)

Groningen Meaning Bank

Corpus of semantically annotated texts – with (P)DRSs!

Links

- Groningen Meaning Bank:
http://gmb.let.rug.nl

- Groningen Meaning Bank Web Demo:
http://gmb.let.rug.nl/webdemo/demo.php