Semantic Theory

Week 12: Current Issues in Semantic Theory

Noortje Venhuizen & Harm Brouwer — Universität des Saarlandes — Summer 2022

Exercise 7 - Ex. 1

- **Peter** studies semantics. If a student writes a seminar paper on **this subject**, **he** gives **it** to **his lecturer**.

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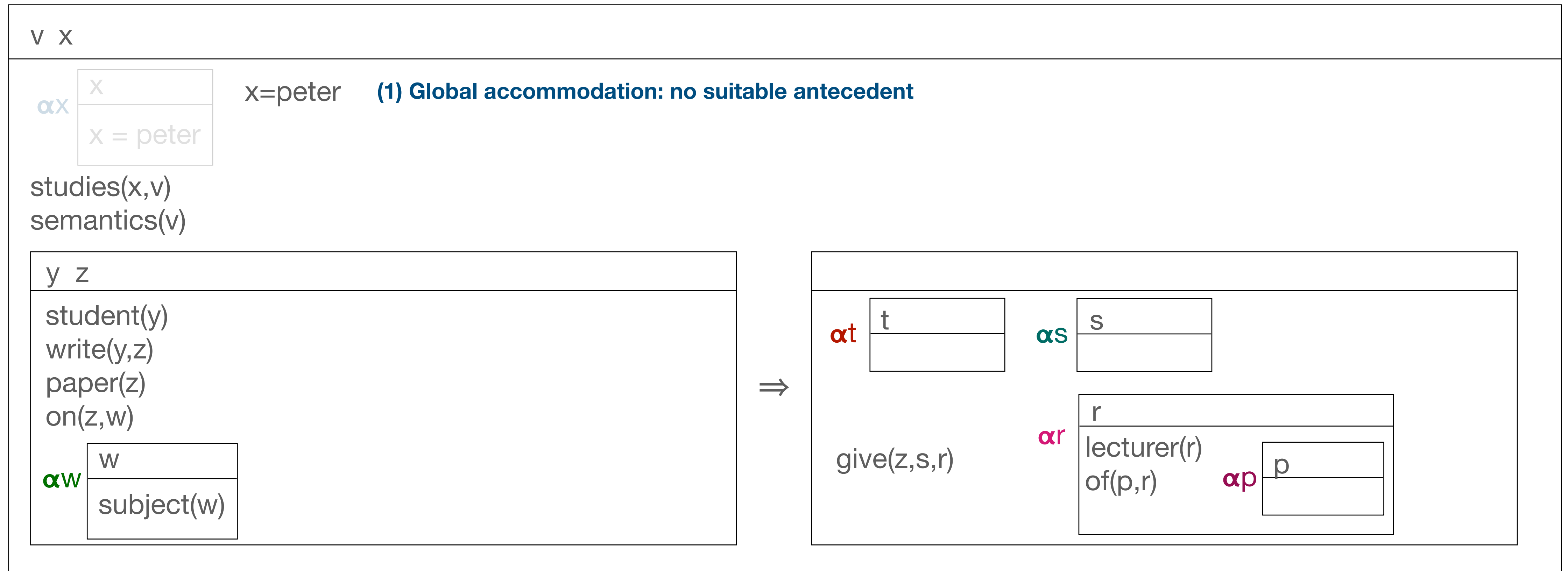DES
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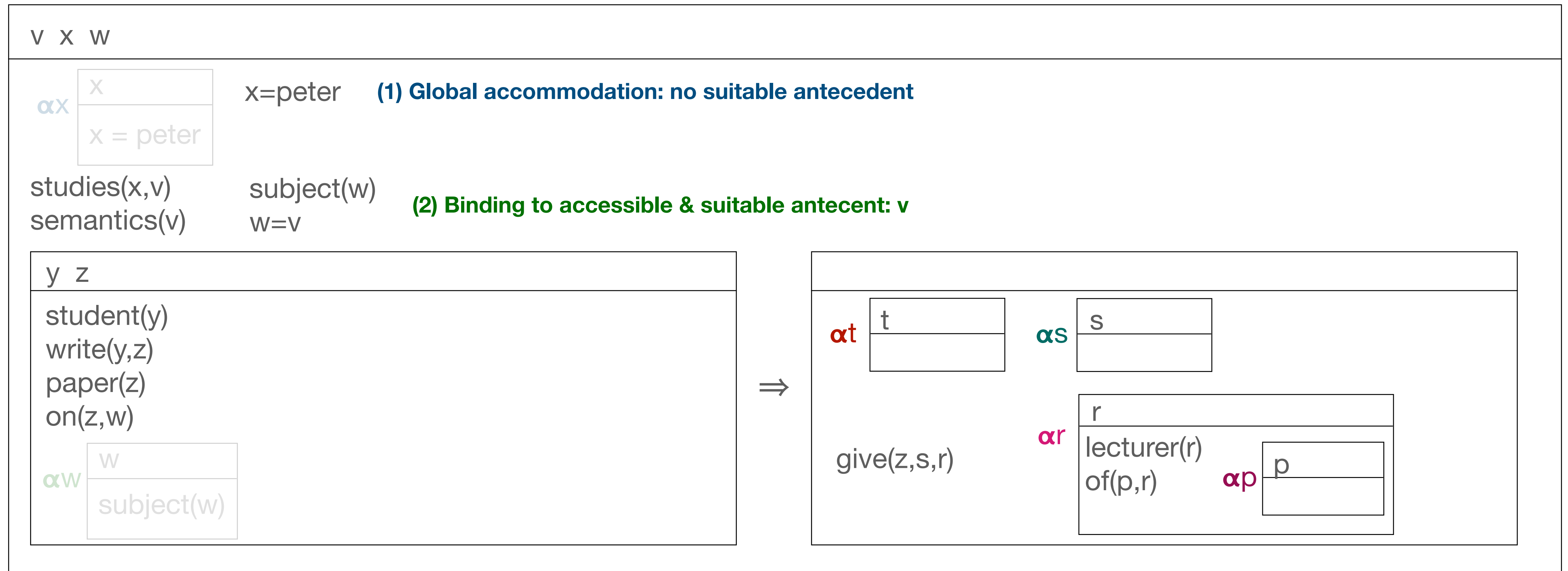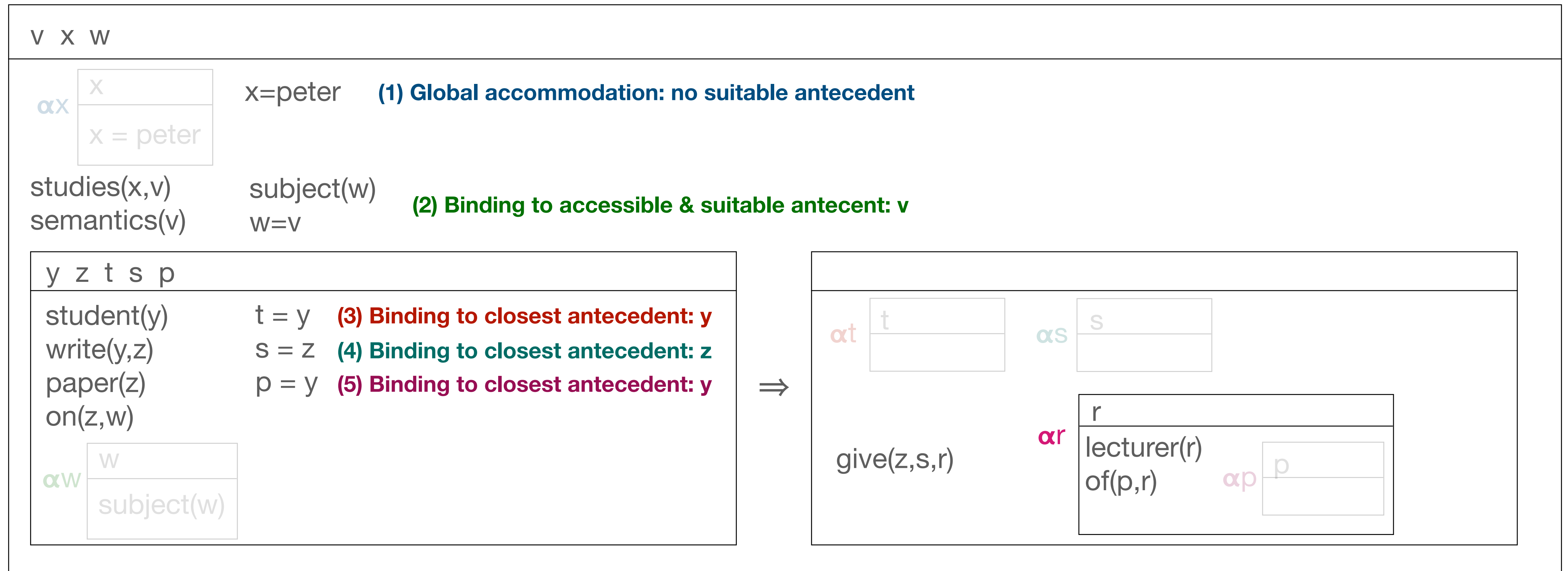# Exercise 7 - Ex. 1

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v x

αx	x
	x = peter

x=peter   **(1) Global accommodation: no suitable antecedent**

studies(x,v)
semantics(v)

y z

student(y)
write(y,z)
paper(z)
on(z,w)

αw	w
	subject(w)

⇒

αt

t

αs

s

give(z,s,r)

αr

r
lecturer(r)
of(p,r)

αp

p

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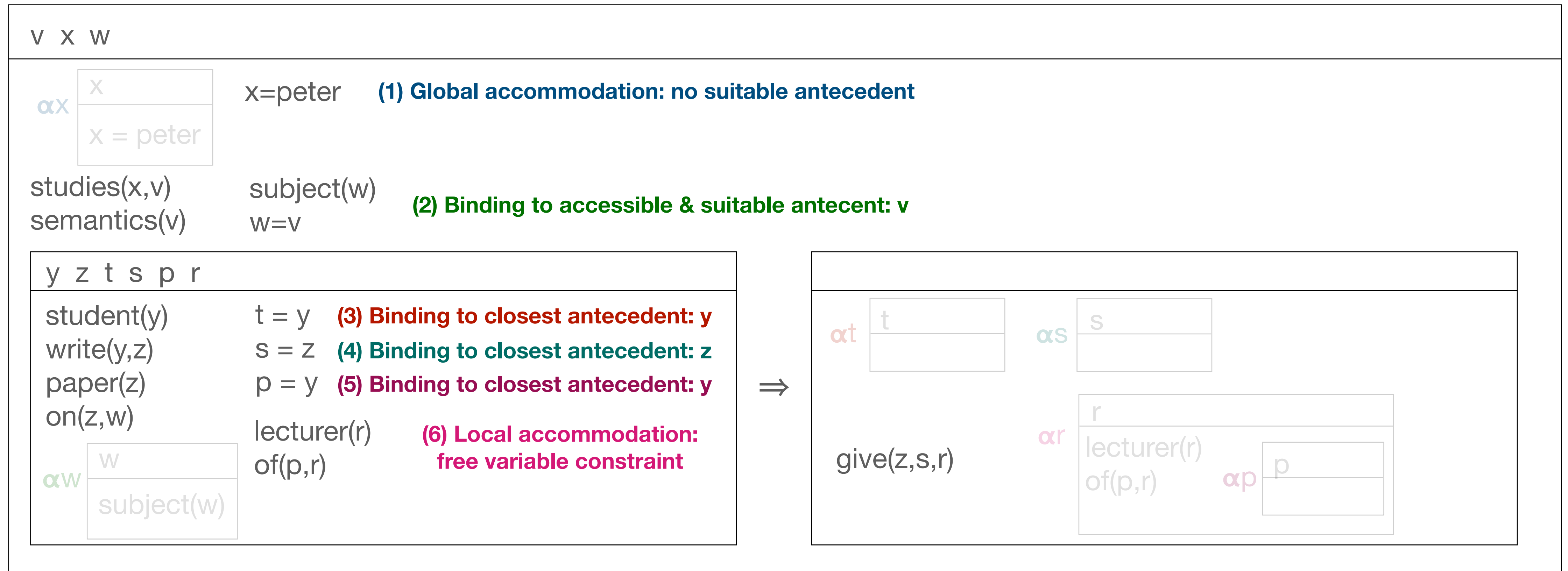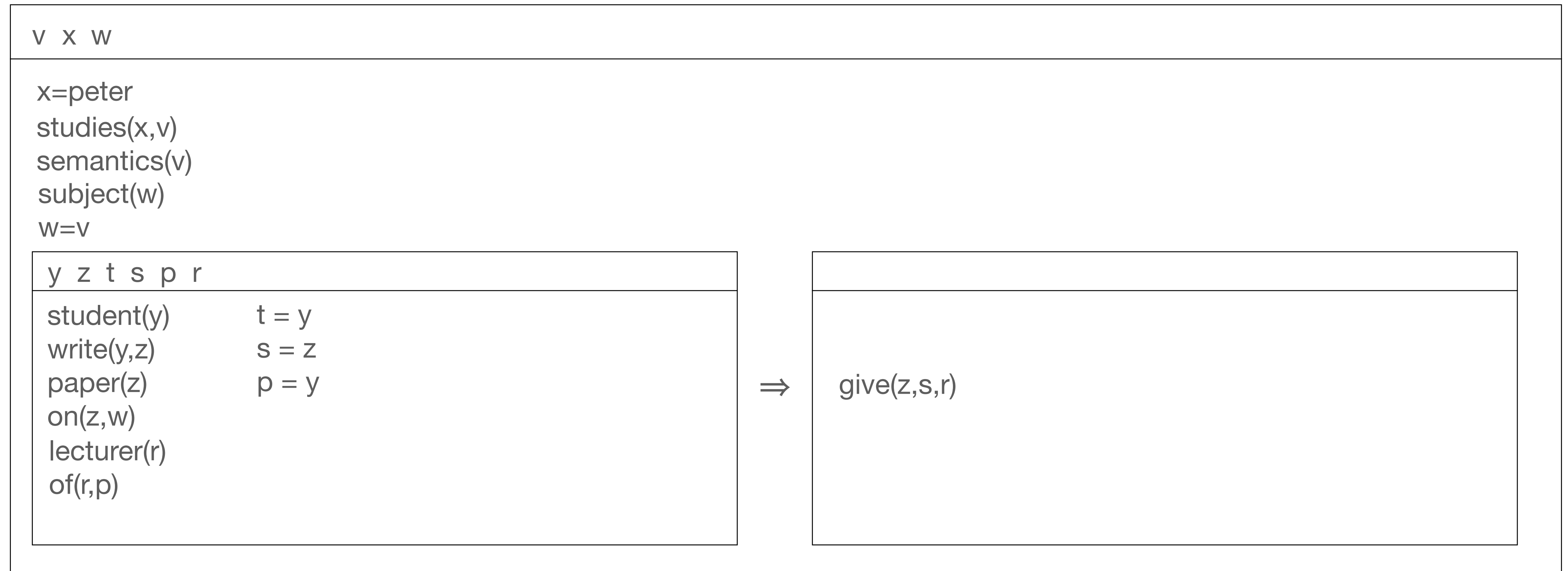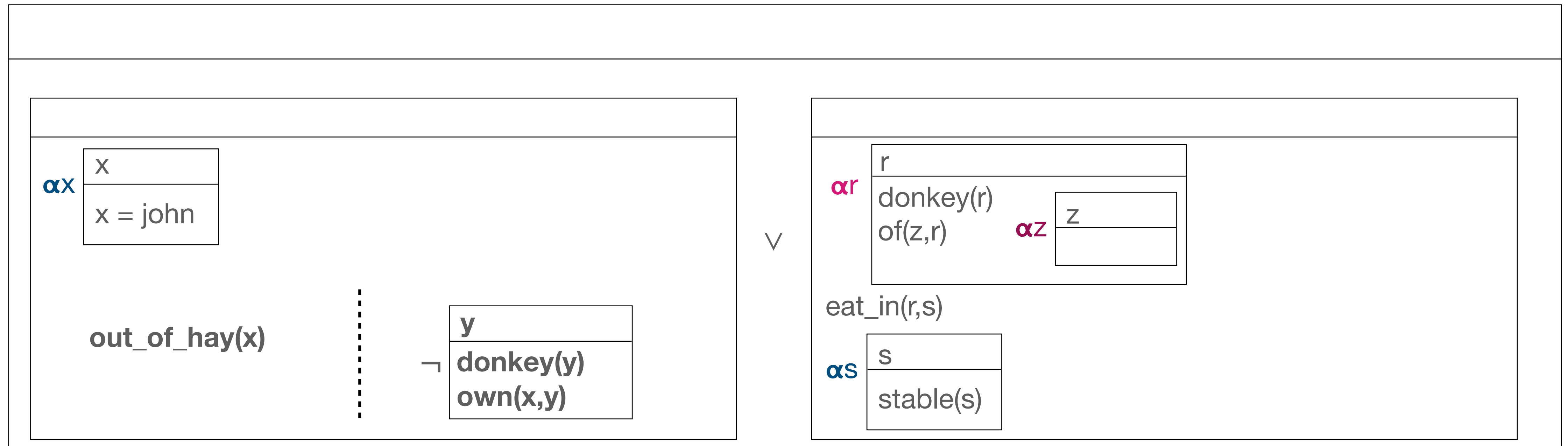
v x w

αx │ x │   x=peter   **(1) Global accommodation: no suitable antecedent**
   │ x = peter │

studies(x,v)   subject(w)
semantics(v)   w=v   **(2) Binding to accessible & suitable antecent: v**

y z

student(y)
write(y,z)
paper(z)
on(z,w)

αw │ w │
   │ subject(w) │

⇒

αt │ t │   αs │ s │

give(z,s,r)   αr │ r │
                   │ lecturer(r) │
                   │ of(p,r)   │ αp │ p │

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Exercise 7 - Ex. 1

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αx | x |
| x = peter |

x=peter   **(1) Global accommodation: no suitable antecedent**

studies(x,v)   subject(w)
semantics(v)   w=v   **(2) Binding to accessible & suitable antecent: v**

y z t s p

student(y)   t = y   **(3) Binding to closest antecedent: y**
write(y,z)   s = z   **(4) Binding to closest antecedent: z**
paper(z)   p = y   **(5) Binding to closest antecedent: y**
on(z,w)

αw | w |
| subject(w) |

⇒

αt | t |

αs | s |

give(z,s,r)   αr | r |
| lecturer(r) |
| of(p,r) | αp | p |

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Exercise 7 - Ex. 1

- **Peter** studies semantics. If a student writes a seminar paper on **this subject**, **he** gives **it** to **his lecturer**.

v x w

| αx | x
x = peter | x=peter | **(1) Global accommodation: no suitable antecedent** |

studies(x,v)　　subject(w)
semantics(v)　　w=v　　**(2) Binding to accessible & suitable antecent: v**

y z t s p r

student(y)　　　t = y　　**(3) Binding to closest antecedent: y**
write(y,z)　　　s = z　　**(4) Binding to closest antecedent: z**
paper(z)　　　　p = y　　**(5) Binding to closest antecedent: y**
on(z,w)
　　　　　　　lecturer(r)　　**(6) Local accommodation:**
αw | w
subject(w) |　of(p,r)　　　　**free variable constraint**

$\Rightarrow$

αt | t |　αs | s |

give(z,s,r)　　αr | r
lecturer(r)
of(p,r) |　αp | p |

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Exercise 7 - Ex. 1

- **Peter** studies semantics. If a student writes a seminar paper on **this subject**, **he** gives **it** to **his lecturer**.

v x w
x=peter studies(x,v) semantics(v) subject(w) w=v

y z t s p r		⇒	give(z,s,r)
student(y) t = y write(y,z) s = z paper(z) p = y on(z,w) lecturer(r) of(r,p)			

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Exercise 7 - Ex. 2

a. Either **John** is out of hay, or **his donkey** is eating quietly in **the stable**.

b. Either **John** has no donkey, or **his donkey** is eating quietly in **the stable**.

Exercise 7 - Ex. 2

a. Either **John** is out of hay, or **his donkey** is eating quietly in **the stable**.

b. Either **John** has no donkey, or **his donkey** is eating quietly in **the stable**.

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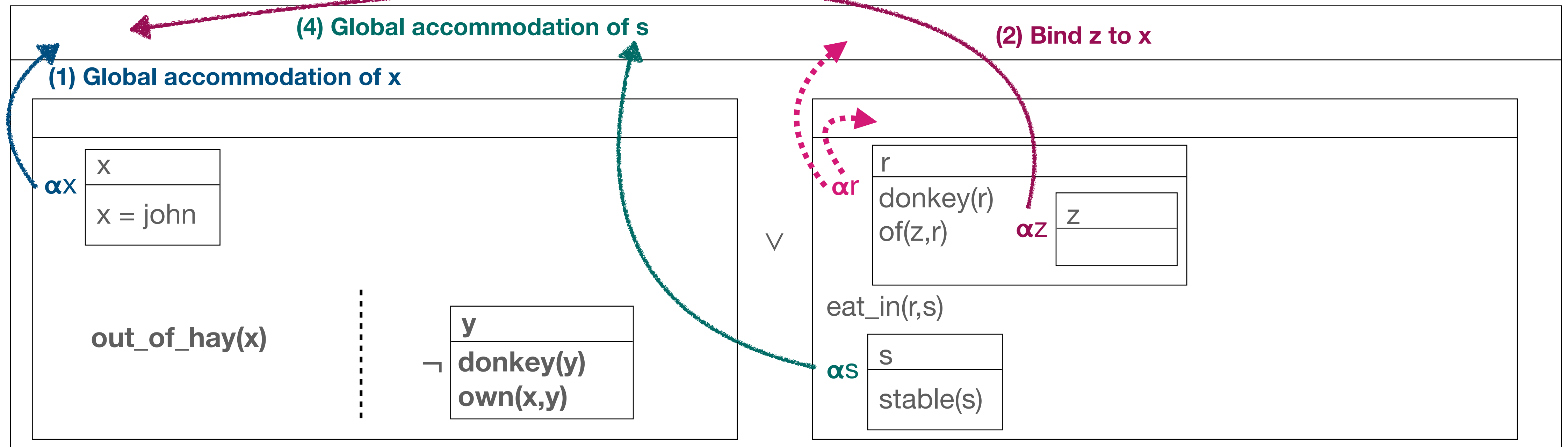
Semantic Theory

Topics covered in this course:

Predicate logic - Type Theory - Lambda Calculus - Generalised Quantifiers - Event Semantics - Dynamic Semantics - Discourse Representation Theory - Presuppositions - Distributional Formal Semantics

formal semantics

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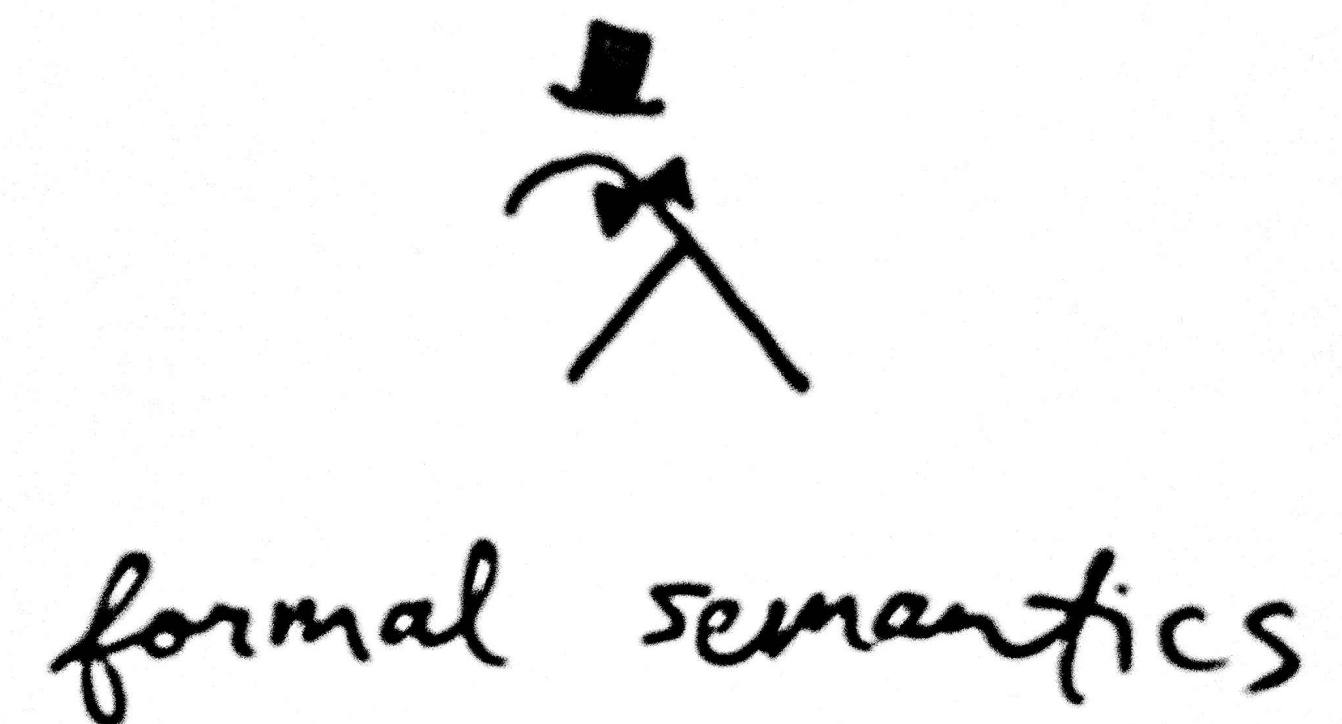
Open questions

Current issues in Semantic Theory

I. What is meaning?

Truth-conditions vs. context-change potential
vs. addressing the Question Under Discussion

II. What should be captured by a semantic formalism?

Syntax vs. Semantics vs. Pragmatics
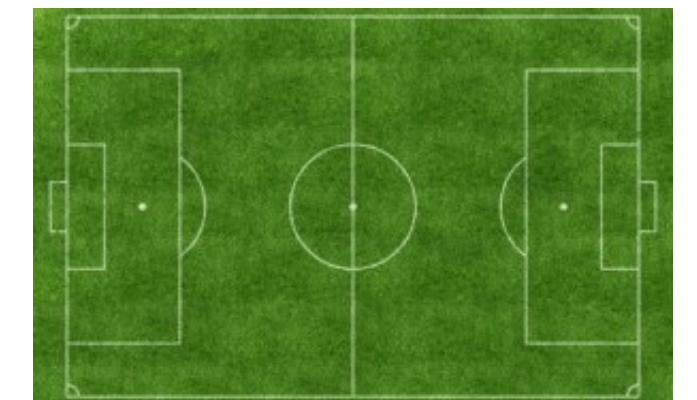
III. How to validate predictions from formal semantic theories?

Experimental approaches, Computational Semantics

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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

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Inquisitive semantics

"Meaning is Information EXchange Potential"

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

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

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

(a) $[\![p]\!]$　　　　(b) $[\![p \vee q]\!]$　　　　(c) $[\![?p]\!]$

Semantic Theory 2022: Week 12

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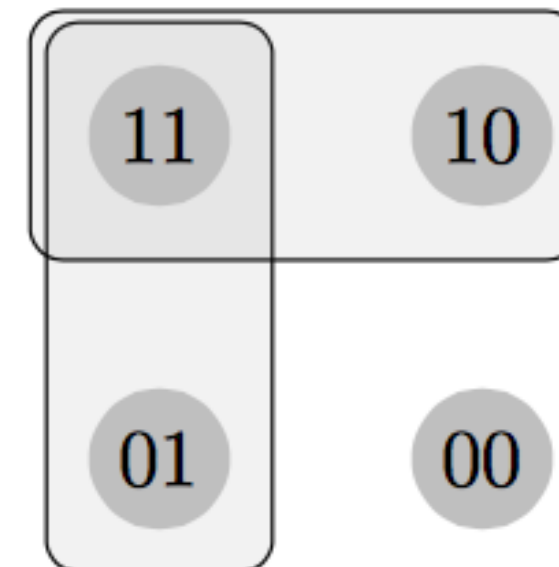
Defining the playing field
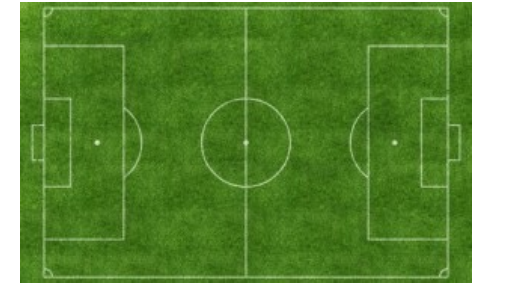
What can/should be captured in a semantic formalism?

The syntax-semantics interface:

- quantification, anaphora, tense and aspect, thematic roles, …

The semantics-pragmatics interface:

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

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Beyond truth-conditional meaning
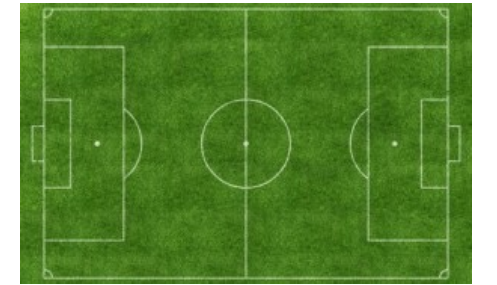
Rhetorical Structure

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
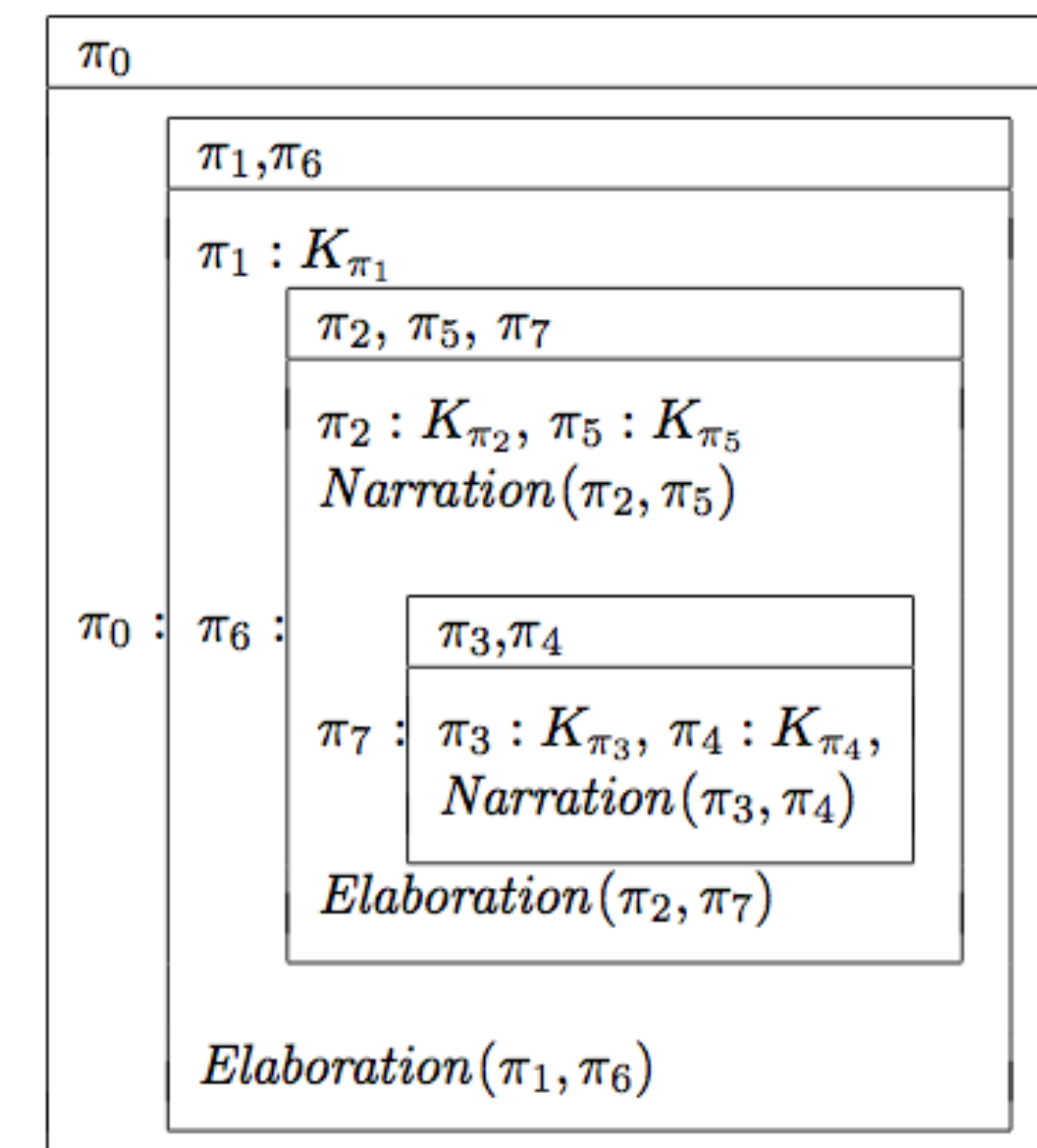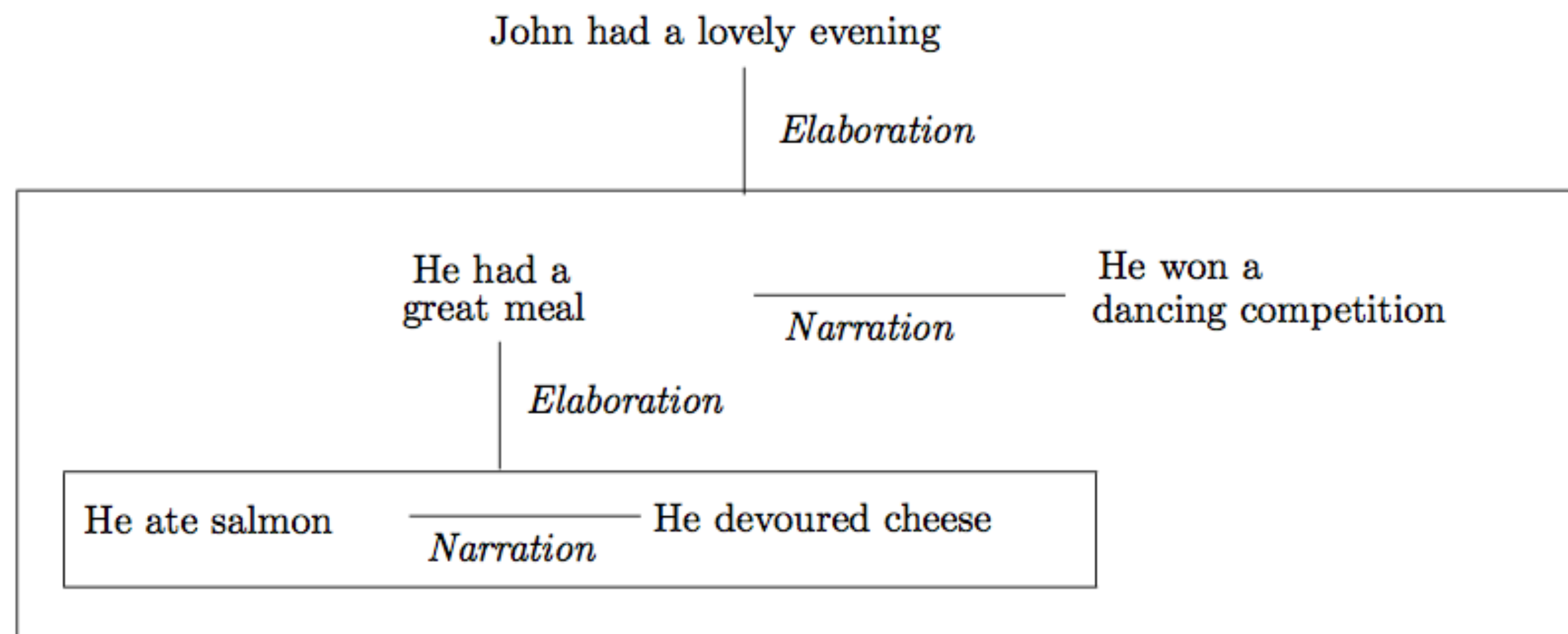
(Asher, 1992; Asher & Lascarides, 2003)

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Beyond truth-conditional meaning
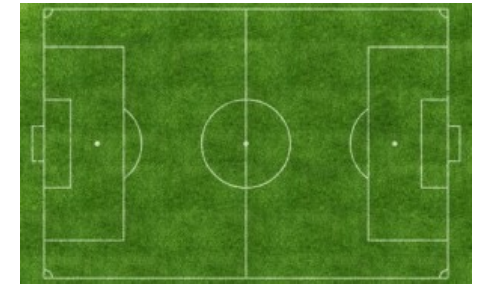
Implicature

(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

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

Geurts & Maier 2003; 2013

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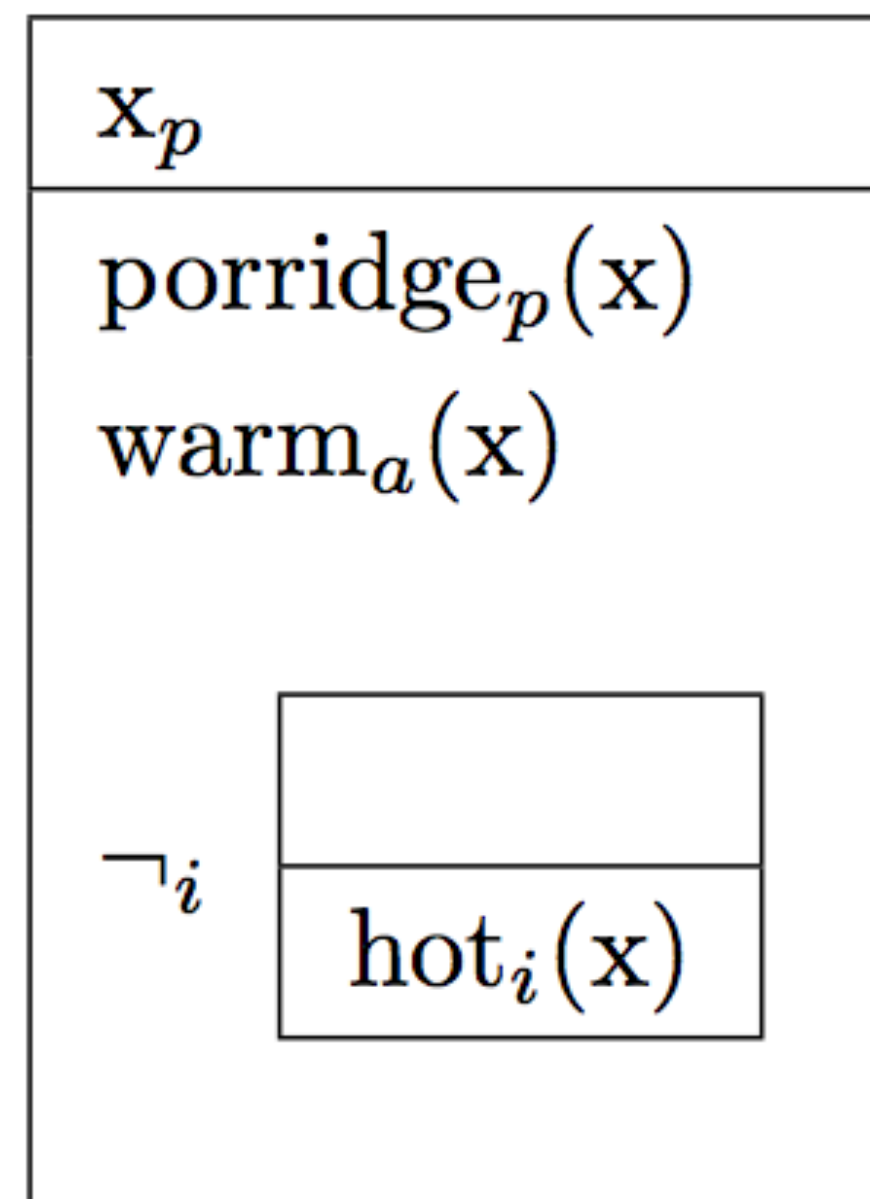
Beyond truth-conditional meaning
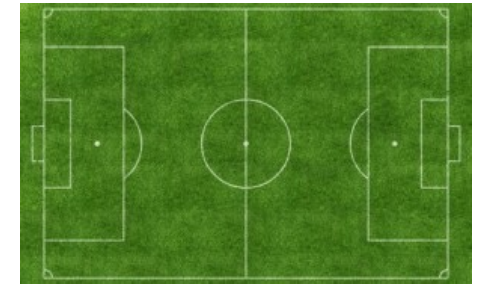
Information structure

(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

$$
\begin{array}{|c|}
\hline
\multicolumn{1}{c}{1} \\
\hline
2 \leftarrow x \quad 3 \leftarrow y \\
\hline
2 \leftarrow x = john \\
3 \leftarrow sister(y) \\
3 \leftarrow of(y,x) \\
1 \leftarrow visit\_weekly(x,y) \\
\hline
1 \leq 2 \quad 1 < 3 \quad 3 = 2 \\
\hline
\end{array}
$$

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Formal semantics in the real world

How to apply and evaluate formal linguistic theories: **Data ⇔Theory**

⇒ Using implementations of semantic formalisms to perform (large-scale) computational semantic analyses

- Boxer (Bos, 2008); PDRT-Sandbox (Brouwer & Venhuizen, 2013)

- The Groningen Meaning Bank (Basile et al., 2013; Bos et al., 2017)

⇐ 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), …

Groningen Meaning Bank

A corpus of DRSs

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Distributional Formal Semantics
Neurocomputational modeling of experimental data

Semantic Theory: from past to present (and future?)

1900   1960   1970   1980   1990   2022   2027?
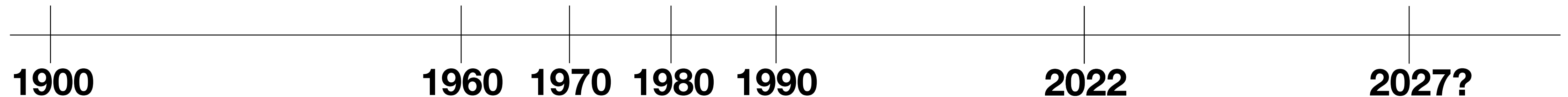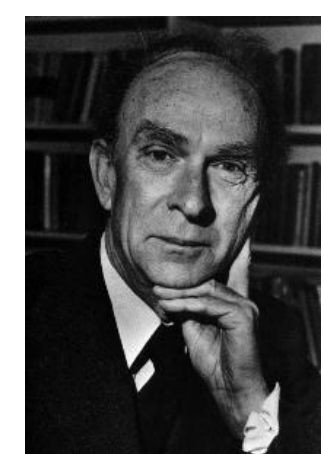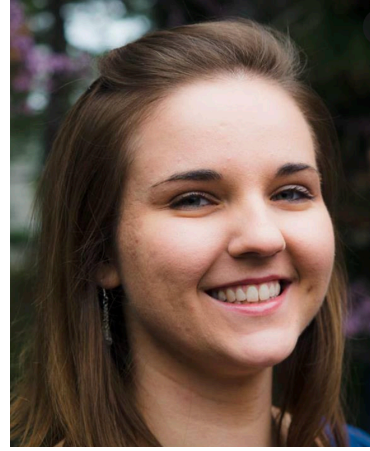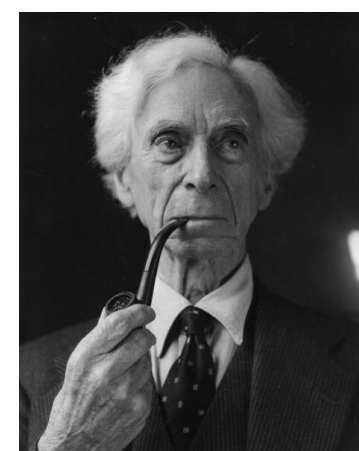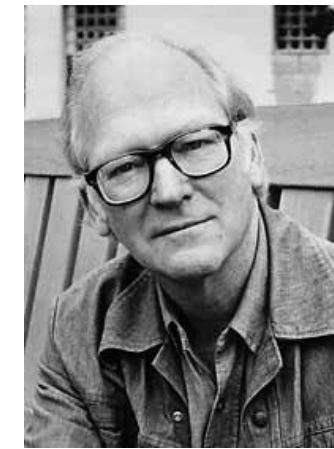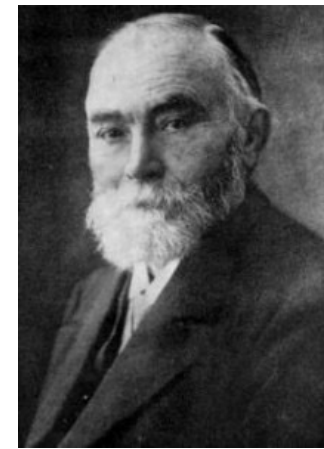
But first.. the exam!

- Exam date: **Wednesday July 20**, 10am (sharp!)

- Location: Room -1.05 (C7.2, basement)

- Make sure you are registered for the exam

- You can find a practice exam and an example of the supplementary materials on MS Teams.

- Next **Tuesday**: Exam Q&A. Take a look at the practice exam, previous exercises, and the slides — Prepare questions!

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Links

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

- Parallel Meaning Bank:
  http://pmb.let.rug.nl

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

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