

Semantic Theory

Lecture 1: Introduction

Manfred Pinkal & Stefan Thater
FR 4.7 Allgemeine Linguistik (Computerlinguistik)
Universität des Saarlandes

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Course Overview

- Lexical semantics
- Sentence semantics (compositional semantics)
- Discourse semantics

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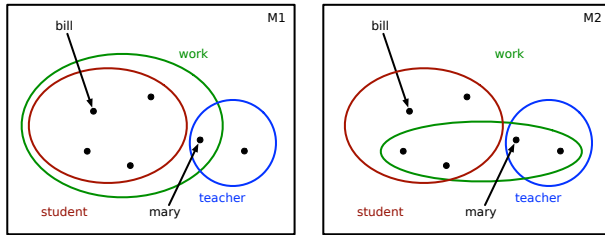
Sentence Meaning

- **Truth-conditional semantics:** to know the meaning of a (declarative) sentence is to know what the world would have to be like for the sentence to be true.
- **Sentence meaning = truth-conditions**
 - $\llbracket \text{Every student works} \rrbracket^{M,g} = 1$ iff. every student works
- **Indirect interpretation** by translating the sentence into some logical formula
 - Every student works $\mapsto \forall x(\text{student}'(x) \rightarrow \text{work}'(x))$

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Every student works

- $\llbracket \forall x(\text{stud}'(x) \rightarrow \text{work}'(x)) \rrbracket^{M,g} = 1$ iff $V_M(\text{stud}') \subseteq V_M(\text{work}')$



- $\llbracket \forall x(\text{stud}'(x) \rightarrow \text{work}'(x)) \rrbracket^{M1,g} = 1$
- $\llbracket \forall x(\text{stud}'(x) \rightarrow \text{work}'(x)) \rrbracket^{M2,g} = 0$

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Central Concepts

- Reference and denotation
- Truth and truth conditions
- Entailment and inference

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Sentence Semantics

- Basic semantics construction
- Quantifier scope
- Generalized quantifiers

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Compositionality

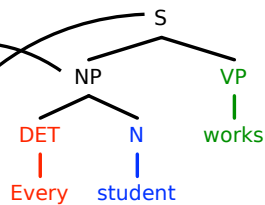
- The principle of compositionality:** *The meaning of a complex expression is a function of the meanings of its parts and of the syntactic rules by which they are combined* (cited from Partee & al., 1993)
- $\llbracket \text{Every student works} \rrbracket^{M,g} = f(\llbracket \text{Every student} \rrbracket^{M,g}, \llbracket \text{works} \rrbracket^{M,g})$

Compositional Semantics Construction

- Semantic lexicon:**
 - every $\mapsto \lambda P \lambda Q \forall x (P(x) \rightarrow Q(x))$
 - student $\mapsto \text{student}'$
 - works $\mapsto \text{work}'$

- Semantics construction:**

- $\lambda P \lambda Q \forall x (P(x) \rightarrow Q(x))(\text{student}')$
 $\Rightarrow_{\beta} \lambda Q \forall x (\text{student}'(x) \rightarrow Q(x))$
- $\lambda Q \forall x (\text{student}'(x) \rightarrow Q(x))(\text{work}')$
 $\Rightarrow_{\beta} \forall x (\text{student}'(x) \rightarrow \text{work}'(x))$



Interpretation of Adjectives

- John is a blond piano player
 - John is blond
- John is a poor piano player
 - John is poor

Quantifier Scope

- (1) *An American flag was hanging in front of every building*
- (2) *Every student speaks two foreign languages*
- (3) *A representative of every company saw most samples*
- (4) *Many computational linguists in three Saarbrücken institutes work on a variety of interesting problems in language technology*

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Monotonicity and Generalized Quantifiers

- (1) a. *Bill got a degree in LST*
b. *Bill got a degree*
- (2) a. *Bill didn't get a degree in LST*
b. *Bill didn't get a degree*

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Monotonicity and Generalized Quantifiers

- (1) *Every master student got a degree in LST*
- (2) *Every master student got a degree*
- (3) *Every student got a degree in LST*
- (4) *Most master students got a degree in LST*
- (5) *Exactly three master students got a degree in LST*

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Discourse Semantics

- Anaphora and Ellipsis
- Discourse Representation Theory (DRT)
- Presuppositions
- Tense and temporal structure

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Anaphora and Ellipsis

■ Anaphora

- (1) *Bill likes his dog. He pampers him.*
- (2) *Bill likes his dog, although he sometimes bites him.*
- (3) *Bill likes his dog, although she sometimes bites him.*

■ Ellipsis

- (4) *John loves Mary, and so does Bill.*
- (5) *John loves his wife, and so does Bill.*

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Presuppositions

- (1) *Bill regrets that his cat has died*
- (2) *Bill doesn't regret that his cat has died*
- (3) *Bill's cat has died*
- (4) *Bill's cat hasn't died*
- (5) *Bill owns a cat*
- (6) *Bill doesn't own a cat*

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Information structure

- (1) *Who ate the cake?*
Bill ate the cake.
- (2) *What did Bill eat?*
Bill ate the cake.
- (3) *Only the CEOs of the startup companies were invited to the meeting.*

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Lexical Semantics

- Event semantics
- Thematic roles
- Plurals, mass nouns, collective predicates

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Synonymy

- (1) *Twenty-eight states had reductions in the number of automobile accidents*
- (2) *Twenty-eight states had reductions in the number of car accidents*

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Hyponymy

- (1) a. *A car accident happened yesterday on the highway*
b. *A motor-vehicle accident happened yesterday [...]*
- (2) a. *No car accident happened yesterday on the highway*
b. *No motor-vehicle accident happened yesterday [...]*

Meronymy, Antonymy, ...

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Verb Alternations

- (1) a. *John sold the book for 19.95€*
b. *The book sells for 19.95€*
- (2) a. *Bees are swarming in the garden*
b. *The garden is swarming with bees*
- (3) a. *The window broke*
b. *A rock broke the window*
c. *John broke the window with a rock*

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Inverse Predicates

- (1) a. *John is taller than Bill*
b. *Bill is smaller than John*
- (2) a. *Mary likes John*
b. *John pleases Mary*
- (3) a. *Mary gave Peter the book*
b. *Peter received the book from Mary*
- (4) a. *John sold the car to Bill for 3.000€*
b. *Bill bought the car from John for 3.000€*

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Plurals and Collective Predicates

- (1) a. *The students worked*
b. *All students worked*
c. *Every student worked*
- (2) a. *The students met*
b. *All students met*
c. *Every student met*

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Plurals and Collective Predicates

- (1) *Two students presented a paper*
- (2) *Five students carried three pianos upstairs*
- (3) *500.000 visitors ordered 1.200.000 cups of coffee*

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Further Phenomena

- Polysemy
 - *fast car / fast road / fast driver*
 - *feed rabbit / eat rabbit / wear rabbit*
- Non-literal interpretation: metonymy
 - *The ham-sandwich wants to pay*
 - *I am parked out back and have a flat tire*
- Non-literal interpretation: metaphor

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Exercises & Exam

- **Final exam** takes place on Tuesday, July 19th
 - You have to register until Tuesday, July 5th
- **Exercise sheets:**
 - You have to get at least 50% of the points to be admitted to the final exam
 - Exercise sheets can be done in teams
 - For more details see www.coli.uni-saarland.de/courses/semantics-11

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Literature

- Gamut, Logic, Language, and Meaning, Vol. 2, University of Chicago Press, 1991
- Kamp and Reyle, From Discourse to Logic, Kluwer, 1993

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Schedule

Tuesday		Thursday	
19.04.2011 L Introduction	ST	21.04.2011 L Formal foundations	ST
26.04.2011 L Semantics construction	ST	28.04.2011 Ex Formale foundations	ST
03.05.2011 L Cooper-Storage	ST	05.05.2011 Ex Semantics construction	ST
10.05.2011 L Generalized quantifiers	ST	12.05.2011 Ex Cooper-Storage	ST
17.05.2011 L Lexical semantics	MP	19.05.2011 Ex Generalized quantifiers	ST
24.05.2011 L Lexical semantics	MP	26.05.2011 Ex Lexical semantics	MP
31.05.2011 L Lexical semantics	MP	02.06.2011 (Christi Himmelfahrt)	
07.06.2011 L Lexical semantics	MP	09.06.2011 Ex Lexical semantics	MP
14.06.2011 L DRT	MP	16.06.2011 Ex Lexical semantics	MP
21.06.2011 L DRT	MP	23.06.2011 (Fronleichnam)	
28.06.2011 L Presuppositions	ST	30.06.2011 Ex DRT	MP
05.07.2011 L Presuppositions	ST	07.07.2011 TBA	
12.07.2011 Ex Presuppositions	ST	14.07.2011 Q & A	ST/MP
19.07.2011 Final exam	ST/MP		

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