Semantic Theory
Lecture 1 – Introduction

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Course Overview

- Lexical semantics

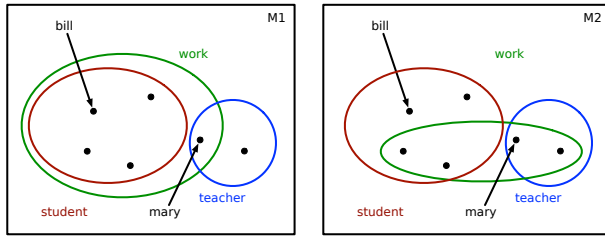- Sentence semantics (compositional semantics)

- Discourse semantics

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**
  - $[\![Every\ student\ works]\!]^{M,g} = 1$ iff. every student works

- **Indirect interpretation** by translating sentences into logical formulas
  - *Every student works* $\mapsto \forall x(student'(x) \rightarrow work'(x))$

Every student works

- $[\![\forall x(stud'(x) \rightarrow work'(x))]\!]^{M,g} = 1$ iff $V_M(stud') \subseteq V_M(work')$

- $[\![\forall x(stud'(x) \rightarrow work'(x))]\!]^{M1,g} = 1$

- $[\![\forall x(stud'(x) \rightarrow work'(x))]\!]^{M2,g} = 0$

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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)

- $[\![Every\ student\ works]\!]^{M,g} =$
  $f_1([\![Every\ student]\!]^{M,g}, [\![works]\!]^{M,g})$

- $[\![Every\ student]\!]^{M,g} =$
  $f_2([\![Every]\!]^{M,g}, [\![student]\!]^{M,g})$

Compositional Semantics Construction

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

- **Semantics construction:**
  - $\lambda P \lambda Q \forall x (P(x) \rightarrow Q(x))(\text{student'})$
    $\Rightarrow_\beta \lambda Q \forall x (\text{student'}(x) \rightarrow Q(x))$
  - $\lambda Q \forall x (\text{student'}(x) \rightarrow Q(x))(\text{work'})$
    $\Rightarrow_\beta \forall x (\text{student'}(x) \rightarrow \text{work'}(x))$
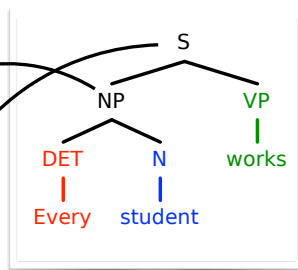
Interpretation of Adjectives

(1) a. *John is a blond piano player*
   b. *John is blond*

(2) a. *John is a poor piano player*
   b. *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*

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*

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*

Discourse Semantics

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

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.*

Presuppositions

(1) *a. Bill regrets that his cat has died*
    b. Bill doesn't regret that his cat has died

(2) *a. Bill's cat has died*
    b. Bill's cat hasn't died

(3) *a. Bill owns a cat*
    b. Bill doesn't own a cat

Information structure

(1) *a. Who ate the cake?*
    b. Bill ate the cake.

(2) *a. What did Bill eat?*
    b. Bill ate the cake.

(3) *Only the CEOs of the startup companies were invited to the meeting.*

Lexical Semantics

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

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*

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, ...

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

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€

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*

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*

States vs. Events

(1) a. *John is running*
    b. *John is building a house*
    c. * *John is knowing the answer*

(2) a. *John ran carefully*
    b. *John carefully built a house*
    c. * *John carefully knew the answer*

(3) a. *John runs (has the habit of running)*
    b. *John recites poems (has the habit of reciting poems)*
    c. *John knows the answer*

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

Exercises & Exam

- **Final exam** takes place on Tuesday, July 24th
    - You have to register until Tuesday, July 10th
- **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-12

Literature

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

Schedule

	Tuesday			Thursday	
17.04.2012	–		19.04.2012	–	
24.04.2012	L Introduction	ST, MP	26.04.2012	L Formal foundations	ST
01.05.2012	Tag der Arbeit		03.05.2012	Ex Formal foundations	ST
08.05.2012	L Semantics construction	ST	10.05.2012	Ex Semantics construction	ST
15.05.2012	L Cooper-Storage	ST	17.05.2012	Christi Himmelfahrt	
22.05.2012	L Lexical semantics	MP	24.05.2012	Ex Cooper-Storage	ST
29.05.2012	L Lexical semantics	MP	31.05.2012	Ex Lexical semantics	MP
05.06.2012	L Lexical semantics	MP	07.06.2012	Fronleichnam	
12.06.2012	L Lexical semantics	MP	14.06.2012	Ex Lexical semantics	MP
19.06.2012	L Generalized quantifiers	ST	21.06.2012		ST
26.06.2012	L DRT	MP	28.06.2012	Ex Generalized quantifiers	ST
03.07.2012			05.07.2012	L DRT	MP
10.07.2012	L Presuppositions	ST	12.07.2012	Ex DRT	MP
17.07.2012	L Presuppositions	ST	19.07.2012	Ex Presuppositions	ST
24.07.2012	Final exam		26.07.2012	–	