

Introduction to Semantic Theory

Structural Ambiguity I

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Connecting back to the previous lecture

The **central points** of the previous lecture:

- ▶ Humans have the ability to **derive the meaning of sentences** from the meanings of the words contained in them (→ combinatoric nature of meaning).
- ▶ The **aim of formal semantics** is to model this ability with the help of formal means taken from math and logic.
- ▶ As a formal substitute notion for meaning (which is unobservable), the notion of “**the extension of a word**” is used.

Aim for today

The aim for today: to investigate the combinatoric nature of meaning by looking at ambiguous sentences

- ⇒ They provide a window into what guides the **composition of meaning**.
- ⇒ **We will show:** syntactic structure guides meaning composition

(This lecture follows Sternefeld & Zimmermann 2013, Chapter 3)

Types of ambiguities – I

The following sentence has **two readings**, i.e., two ways in which it can be interpreted:

- (1) *Peter and Mary met at a bus stop next to the bank.*

What are the two readings of (1) and how do they arise?

Types of ambiguities – I

The following sentence has **two readings**, i.e., two ways in which it can be interpreted:

(1) *Peter and Mary met at a bus stop next to the bank.*

What are the two readings of (1) and how do they arise?

The two readings arise from a **lexical ambiguity** of the word *bank*: the financial institution vs. the river bank.

Types of ambiguities – II

Example (2) is also ambiguous.

(2) *John told the girl that Bill liked the story.*

What are the two readings of (2)?

Types of ambiguities – II

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What are the two readings of (2)?

- ▶ John told a girl, namely the one that Bill liked, the story.
- ▶ John told the girl something, namely that Bill liked the story.

Types of ambiguities – II

Example (2) is also ambiguous.

(2) *John told the girl that Bill liked the story.*

What are the two readings of (2)?

- ▶ John told a girl, namely the one that Bill liked, the story.
- ▶ John told the girl something, namely that Bill liked the story.

Do these readings arise because of a lexical ambiguity?

Types of ambiguities – III

Example (2) illustrates a **structural ambiguity**.

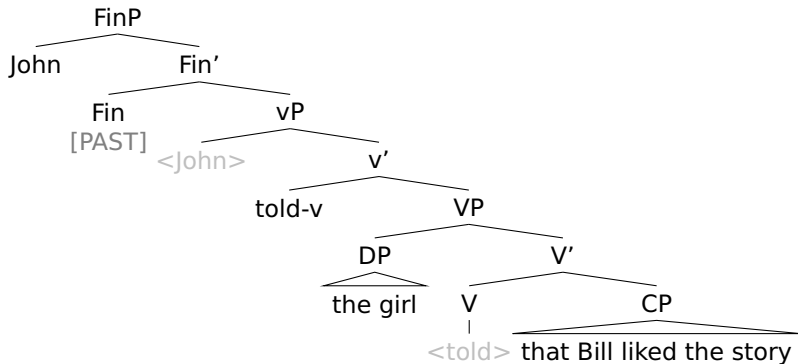
(3) John told [_{VP} [_{DP} the girl [_{CP} that Bill liked]] the story]

(4) John told [_{VP} [_{DP} the girl] [_{CP} that Bill liked the story]]

⇒ The two readings arise because of **two possible syntactic structures** that can be assigned to the string of words.

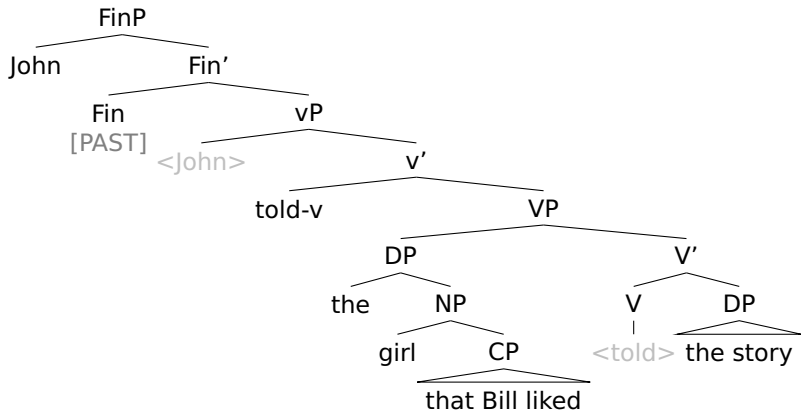
Types of ambiguities – IV

First reading:



Types of ambiguities – IV

Second reading:



Spotting ambiguities

At first glance, most ambiguous sentences will appear unambiguous because context and world knowledge makes on of the possible readings pragmatically more plausible.

Spotting ambiguities requires practice!

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Spotting ambiguities requires practice!

What needs to be trained?

- ▶ **Semantic intuitions:** considering which contexts the sentence can appear in and whether there is a change of meaning
- ▶ **Syntactic intuitions:** getting a feeling for how different phrases can be combined

Paraphrasing

Once an ambiguity is spotted: the available readings need to be made precise. One way to do this is to give **paraphrases** of the readings.

Paraphrases of readings need to be unambiguous and must capture only one of the readings!

To judge whether a paraphrase captures the intended reading and whether two paraphrases capture distinct readings:

(5) **The most certain principle**

If a sentence S_1 is true and another sentence S_2 is false **in the same circumstances** then S_1 and S_2 differ in meaning.

Another example – I

Example (6) is two-way ambiguous.

(6) *Peter put the block in the box on the table.*

What are the two readings of (6) and how do they arise?

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(6) *Peter put the block in the box on the table.*

What are the two readings of (6) and how do they arise?

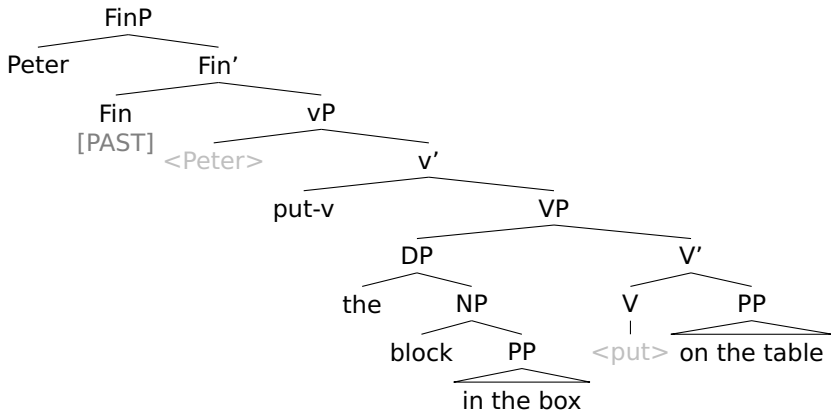
The sentence in (6) is again an example of a structural ambiguity:

(7) Peter put [_{VP} [_{DP} the block [_{PP} in the box]] [_{PP} on the table]]

(8) Peter put [_{VP} [_{DP} the block] [_{PP} in [_{DP} the box [_{PP} on the table]]]]]

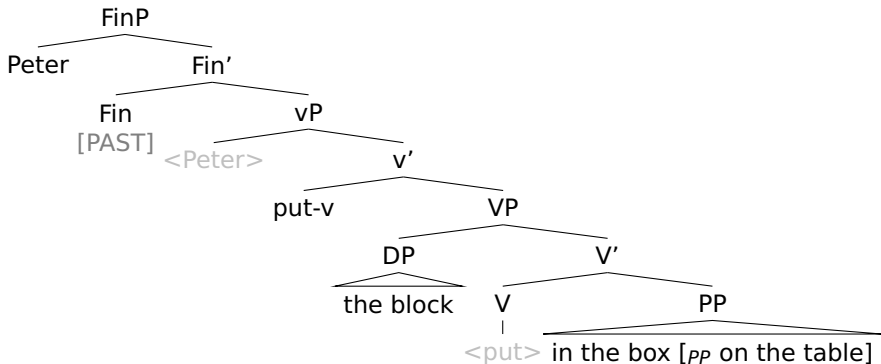
Another example – II

First reading:



Another example – III

Second reading:



Another type of ambiguity?

Can the ambiguity illustrated in (9) be categorized into one of the classes we already know?

(9) *John aß den Brokkoli. Er war nass.*

Another type of ambiguity?

Can the ambiguity illustrated in (9) be categorized into one of the classes we already know?

(9) *John aß den Brokkoli. Er war nass.*

The ambiguity of the second sentence arises from the different possible interpretations of *er*. However, we do *not* want to assume that *er* is lexically ambiguous!

Why?

Referential ambiguities

The example in (9) is a **referential ambiguity**. It arises because the referent of *er* is fixed in the context as either John or the broccoli.

Similar example in English (according to one synt. analysis):

(10) *John ate the broccoli wet.*

Referential ambiguities

The example in (9) is a **referential ambiguity**. It arises because the referent of *er* is fixed in the context as either John or the broccoli.

Similar example in English (according to one synt. analysis):

(10) *John ate the broccoli wet.*

Also in this case, world knowledge and plausibility sometimes excludes one of the readings:

- (11) a. *John ate the broccoli raw.*
b. *John ate the broccoli naked.*

Interim summary

We have seen three types of ambiguities:

- ▶ lexical ambiguities
- ▶ structural ambiguities
- ▶ referential ambiguities

Note: A sentence can be multiply ambiguous because lexical, structural, referential, and other types of ambiguities can occur together!

- (12) *Paul took Peter to a party at one of his friends.
Peter told the girl that he liked a story about a bank.*

The notion of scope – I

For words with functional meaning, there is an important semantic notion – **scope**. The scope of a word determines which other expressions' interpretations are in some sense dependent on the meaning contributed by that word.

If two (or more) expressions with functional meaning co-occur in a sentence, their **scopes usually interact**. Consider (13).

(13) *The doctor didn't leave because he was angry.*

Which two readings does (13) have? Which two functional expressions can you identify that could interact?

The notion of scope – II

The two readings of example (13) arise from the interaction of negation (*not*) and the CP introduced by the causal subordinator *because*:

- ▶ The doctor did not leave, and the reason for not leaving was because he was angry. (*because* CP < *not*)
- ▶ The doctor left, but his reason for leaving was not because he was angry. (*not* < *because* CP)

The notion of scope – II

The two readings of example (13) arise from the interaction of negation (*not*) and the CP introduced by the causal subordinator *because*:

- ▶ The doctor did not leave, and the reason for not leaving was because he was angry. (*because* CP < *not*)
(*because* < *not*): *not* is interpreted in the scope of the CP introduced by *because*. That is, the clause introduced by *because* gives a reason for why something did not happen.
- ▶ The doctor left, but his reason for leaving was not because he was angry. (*not* < *because* CP)

⇒ (13) is an example for a **scope ambiguity**.

The notion of scope – II

The two readings of example (13) arise from the interaction of negation (*not*) and the CP introduced by the causal subordinator *because*:

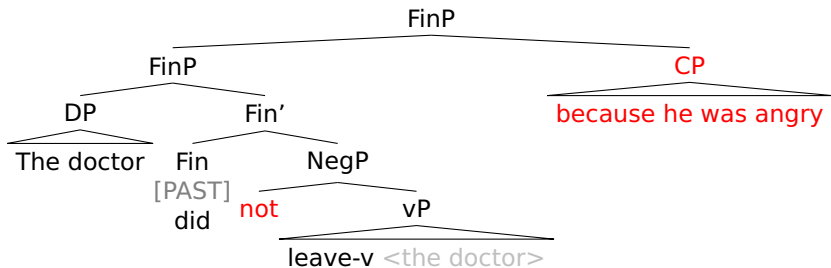
- ▶ The doctor did not leave, and the reason for not leaving was because he was angry. (*because* CP < *not*)
 - ▶ The doctor left, but his reason for leaving was not because he was angry. (*not* < *because* CP)
- (*not* < *because*): *because* and its CP are interpreted in the scope of *not*. That is, *not* negates that the clause introduced by *because* gives a reason for why something happened.

⇒ (13) is an example for a **scope ambiguity**.

The notion of scope – III

Syntactically, the readings arising from the two scope orderings also correspond to two different structures.

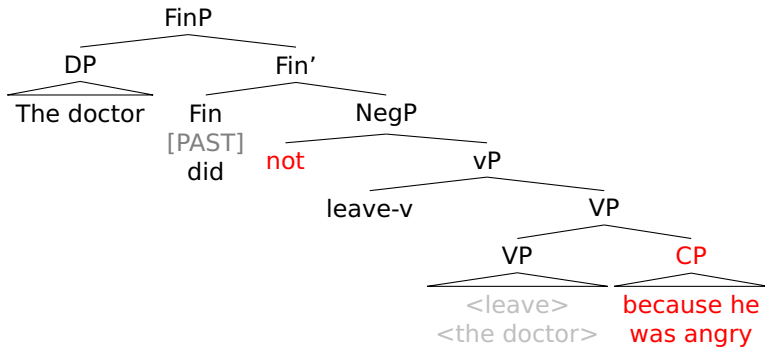
First Reading:



The notion of scope – III

Syntactically, the readings arising from the two scope orderings also correspond to two different structures.

Second Reading:



The Scope–C-command principle

The discussion of how the two readings of example (13) arise suggests a connection between what the scope of a word with functional meaning is and how this is represented in the syntactic structure.

(14) **The Scope–C-command principle**

If an expression X has scope over an expression Y, then syntactically, X c-commands Y.

(15) **C-command**

A constituent X c-commands a constituent Y if the node immediately dominating X also dominates Y.

Another example – I

The following phrase shows a **hybrid** between a scope ambiguity and a structural ambiguity.

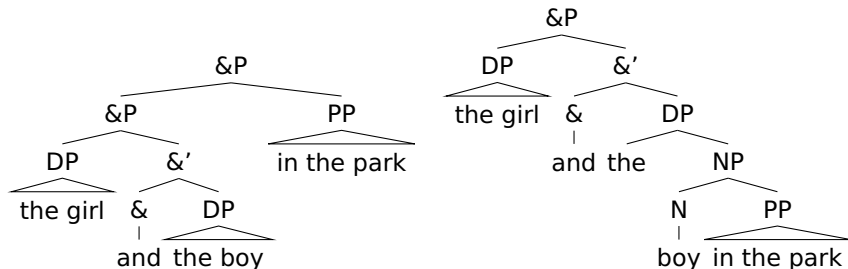
(16) *the girl and the boy in the park*

Which two readings does (16) have? Which two (functional) expressions can you identify that could interact?

Note: Given the scope–c-command principle, scope ambiguities reduce to a special case of structural ambiguities.

Another example – II

The two readings arise from which expressions are coordinated by the conjunction *and* and the syntactic attachment site of the PP headed by *in*.



Summary

There are (at least) four types of ambiguities:

- ▶ lexical ambiguities
- ▶ structural ambiguities
- ▶ referential ambiguities
- ▶ scope ambiguities (→ reduces to a structural ambiguity)

The core underlying assumption regarding the relation between syntactic structure and interpretation:

To each syntactic structure with disambiguated word senses corresponds exactly one interpretation (but not vice versa!).