

Linguistics, Part 2

VL Sprachliche Informationsverarbeitung

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Section 1

Language and Linguistics

Language and Linguistics

Morphology

Syntax

Semantics

Pragmatics

Summary

Subsection 1

Morphology

Language and Linguistics

Morphology

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Summary

Morphology

- ▶ How do we create words?

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- ▶ Ambiguity:
 - ▶ Order in which parts of words are assembled

Morphology

- ▶ How do we create words?
- ▶ Ambiguity:
 - ▶ Order in which parts of words are assembled
- ▶ Morphological processes are language-dependent
 - ▶ German: Nominal composition very productive
 - ▶ Rindfleischetikettierungsüberwachungsaufgabenübertragungsgesetz

[Wikipedia](#)

Processes

- ▶ Inflection / Flexion / Beugung: adaptation of words to their context
 - ▶ Within a word class
 - ▶ Conjugation: essen → ich esse / du isst / es isst / wir essen / ...

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 - ▶ Comparison: müde → müder / am müdesten

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 - ▶ frei → Freiheit (adjective → noun)
 - ▶ Mensch → Unmensch (noun → noun)

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 - ▶ frei → Freiheit (adjective → noun)
 - ▶ Mensch → Unmensch (noun → noun)
- ▶ Composition / Komposition: Creation of words by combining existing words
 - ▶ Sprache + Wissenschaft → Sprachwissenschaft
 - ▶ Geburt + Tag → Geburtstag
 - ▶ Fugen-s: Some compound nouns add an additional s
 - ▶ Historically genitive marker, but not always

Subsection 2

Syntax

Language and Linguistics

Morphology

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Summary

Syntax

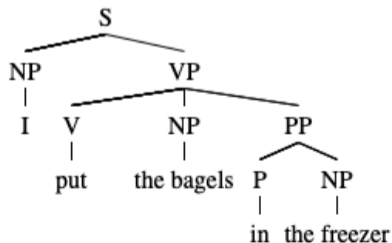
- ▶ Syntax: How are words used to form sentences?
 - ▶ Related to 'grammar'
 - ▶ Two ways to look at syntax
 - ▶ Phrase structure
 - ▶ Dependency (to be skipped)

Phrase Structure

- ▶ Words are not put in any arbitrary order
- ▶ Parts of speech (Wortarten) are not enough to explain sentences

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- ▶ Words are not put in any arbitrary order
- ▶ Parts of speech (Wortarten) are not enough to explain sentences
- ▶ Constituents
 - ▶ Words that are grouped together as a unit
 - ▶ What can appear in diff. positions of a sentence is a constituent
 - (1) I put **the bagels** in the freezer.
 - (2) **The bagels**, I put in the freezer.
 - (3) I put in the fridge **the bagels** (that John had given me).



Phrase Structure

Heads

- ▶ Phrases have heads
- ▶ Heads determine syntactic properties of the phrase
 - ▶ E.g., if the head is in plural, the phrase is in plural

Phrase Structure

Heads

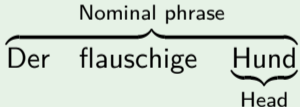
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 - ▶ E.g., if the head is in plural, the phrase is in plural
- ▶ Dependent elements follow the head
 - ▶ Agreement

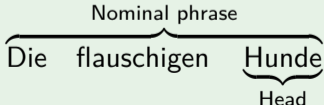
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Examples

(1)  Nominal phrase
Der flauschige Hund bellt .
Head

(2)  Nominal phrase
Die flauschigen Hunde bellen .
Head

Structural vs. Relational Descriptions

Example

Die Regierung besteht auf der neuen Startbahn.

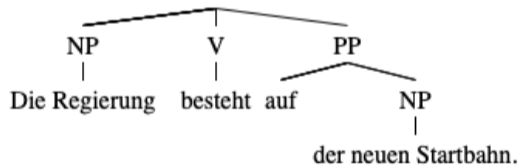
Structural vs. Relational Descriptions

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Phrase structure

Nominal phrase in nominative case, verb, prepositional phrase with dative nominal phrase



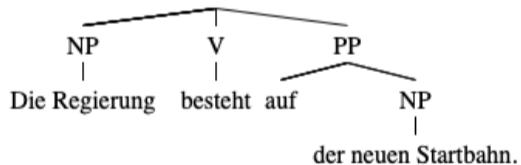
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Syntactic Relations

Subject, predicate, prepositional object

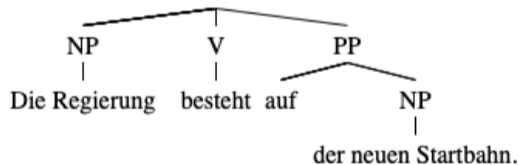
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Related, but
different views

Syntactic Relations

Subject, predicate, prepositional object

Syntactic Relations

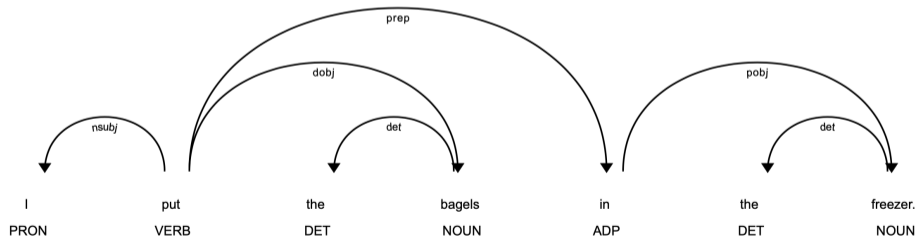
- ▶ Subject, object, predicate, ...
- ▶ Relational terms
 - ▶ 'die Regierung' is subject of 'besteht'
 - ▶ 'auf der neuen Startbahn' is prepositional object of 'besteht'
 - ▶ 'besteht' is predicate of the entire sentence

Dependency Syntax

- ▶ Syntax is a relation between words (and not constituents)
- ▶ Each word is connected to its governor
 - ▶ I.e., the head of the phrase it is in
 - ▶ Arrows can go upwards or downwards, depending on taste ...
- ▶ Predicate of the sentence doesn't have a governor

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Dependency Syntax

- ▶ Often used in computational linguistics
- ▶ Much easier to process, because it's a relation between words
- ▶ Example for conceptual advancement through computational approaches

German Syntax

Peculiarities in German (every language has their share of oddities)

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 - ▶ 'Den Hund hat er gestreichelt.'
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- ▶ Free word order
 - ▶ 'Den Hund hat er gestreichelt.'
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- ▶ Separable verbs
 - ▶ aufstehen: 'Sie steht jeden Tag früh auf.'
 - ▶ *'Sie aufsteht jeden Tag früh'
 - ▶ bestehen: 'Sie besteht die Prüfung.'
 - ▶ *'Sie steht die Prüfung be.'
 - ▶ Mark Twain: 'The Germans have another kind of parenthesis, which they make by splitting a verb in two and putting half of it at the beginning of an exciting chapter and the other half at the end of it. Can any one conceive of anything more confusing than that?'

Subsection 3

Semantics

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Semantics

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- ▶ What is the meaning of a sentence?

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Truth-conditional semantics

Davidson (1967)

- ▶ Meaning: Conditions that make a sentence true
 - ▶ (we're talking about full sentences now)
- ▶ Intuitively: If we know what makes a sentence true, we know something about its meaning

What makes a sentence true?

Example

Margaret Atwood is a writer.

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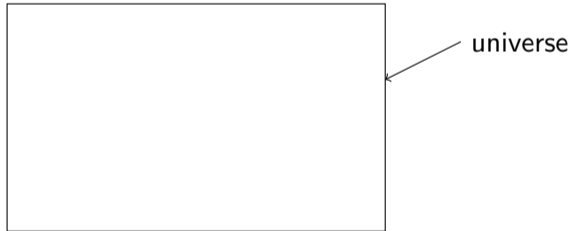


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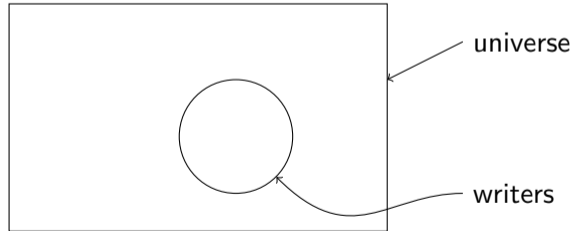


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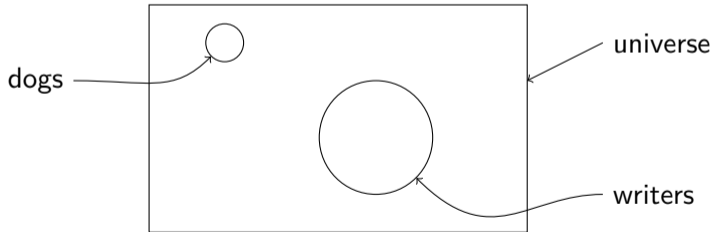


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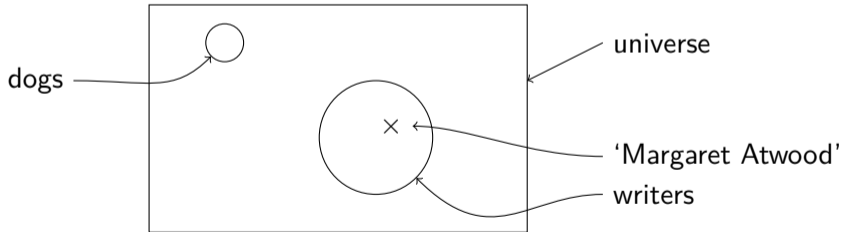


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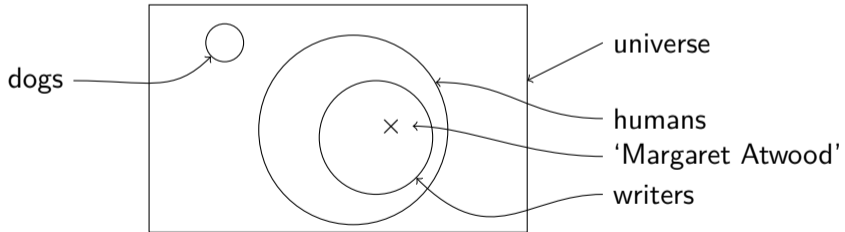


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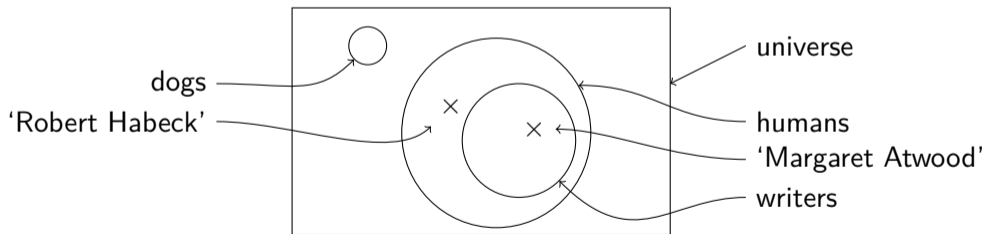


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What makes a sentence true?

Formal representation

First-order Logic

- ▶ $A(x)$, $B(y)$, $C(x, y)$ are statements about x and y
 - ▶ Statements can be true or false, with respect to a universe
 - ▶ $A(x)$ is true, iff $x \in A$

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- ▶ Modus ponens:
 - ▶ $A(x) \Rightarrow B(x)$: If $A(x)$ is true, then $B(x)$ is also true
- ▶ $\exists x : S(x)$ is true, iff there is a x , such that $S(x)$ is true (**existential quantification**)
- ▶ $\forall x : S(x)$ is true, iff for all x , $S(x)$ is true (**universal quantification**)

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 - ▶ $\text{love}(r, j)$ – i.e., there is a set that contains pairs!

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- ▶ Every hippo swims.
 - ▶ $\forall x : \text{hippo}(x) \wedge \text{swim}(x)$ (doesn't work if there are no hippos)
 - ▶ $\forall x : \text{hippo}(x) \Rightarrow \text{swim}(x)$

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 - ▶ $\forall x : \text{hippo}(x) \Rightarrow \text{swim}(x)$
- ▶ A hippo swims.
 - ▶ Indefinite article
 - ▶ $\exists x : \text{hippo}(x) \wedge \text{swim}(x)$

What makes a sentence true?

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Every woman loves a man.

Every man loves a woman.

What makes a sentence true?

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Every man loves a woman.

- ▶ Ambiguous: Is it the same man/woman?
- ▶ Ambiguity can be represented by different scopes of the quantors

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Every woman loves a man.

Every man loves a woman.

- ▶ Ambiguous: Is it the same man/woman?
- ▶ Ambiguity can be represented by different scopes of the quantors
- ▶ $\forall w : \text{woman}(w) \Rightarrow \exists m : \text{man}(m) \wedge \text{love}(w,m)$
- ▶ $\exists m : \forall w : \text{woman}(w) \Rightarrow \text{man}(m) \wedge \text{love}(w,m)$

Subsection 4

Pragmatics

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Summary

Pragmatics

- ▶ Pragmatics: Language and the rest of the world
 - ▶ ‘pragmatic wastebasket’
 - ▶ What semantics can’t explain belongs to pragmatics

Bar-Hillel (1971)

Pragmatics

- ▶ Pragmatics: Language and the rest of the world
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 - ▶ What semantics can't explain belongs to pragmatics
- ▶ Pragmatic phenomena
 - ▶ Deixis

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Levinson (1983)

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 - ▶ Deixis: Person: I/time: now/place: here
 - ▶ Conversational implicature
 - ▶ Grice: The co-operative principle Grice (1975)

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 - ▶ E.g., the maxim of Quantity
 - (i) make your contribution as informative as is required for the current purposes of the exchange
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 - (i) make your contribution as informative as is required for the current purposes of the exchange
 - (ii) do not make your contribution more informative than is required
 - ▶ Presupposition
 - ▶ Speech acts
 - ▶ ‘I hereby christen this ship the H.M.S. Flounder.’ Austin (1962)
 - ▶ Change of the state of the world
 - ▶ Conversational structure

Presupposition

Implicit assumptions about the world

Example

- (1) John managed to stop in time.
- (2) John stopped in time.
- (3) John tried to stop in time.

Presupposition

Implicit assumptions about the world

Example

- (1) John managed to stop in time.
- (2) John stopped in time.
- (3) John tried to stop in time.

From (1), we can infer (2) and (3).

Example

- (4) John didn't manage to stop in time.

From (4), we cannot infer (2), but (3).

Presupposition

- ▶ Entailments are cancelled under negation
- ▶ Presuppositions remain stable

Presupposition

- ▶ Entailments are cancelled under negation
- ▶ Presuppositions remain stable
- ▶ Where does the presupposition come from?
 - ▶ The word 'manage' – let's replace it by 'try'

Example

(5) John tried to stop in time.

(6) John didn't try to stop in time.

(5) is not presupposed by (6).

Presupposition triggers

- ▶ Some words trigger presuppositions
- ▶ Trigger words have been collected and categorized

Presupposition triggers

- ▶ Definite descriptions
 - ▶ John saw/didn't see the man with two heads
 - there exists a man with two heads

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 - ▶ John saw/didn't see the man with two heads
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 - ▶ John forgot/didn't forget to lock the door
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 - ▶ Before Strawson was even born, Frege noticed/didn't notice presuppositions
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- ▶ Temporal clauses
 - ▶ Before Strawson was even born, Frege noticed/didn't notice presuppositions
 - Strawson was born
- ▶ Comparisons and contrasts
 - ▶ Marianne called Adolph a male chauvinist, and then HE insulted HER
 - For Marianne to call Adolph a male chauvinist would be to insult him
- ▶ ...

Presupposition properties

- ▶ So far: Presuppositions
 - ▶ are implicit assumptions about the world
 - ▶ survive under negation
- ▶ Now:
 - ▶ Defeasibility

Presupposition

Defeasibility

- ▶ Presuppositions can be cancelled/prevented/defeated

Presupposition

Defeasibility

- ▶ Presuppositions can be cancelled/prevented/defeated
- ▶ By background knowledge (that John didn't to a PhD)
 - (1) John regrets that he did a PhD
 - John did a PhD
 - (2) At least John won't have to regret that he did a PhD.
 - ↯ John did a PhD

Presupposition

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- ▶ By the meaning of the sentence
 - (3) Sue cried before she finished her thesis.
 - Sue finished her thesis
 - ▶ 'before' triggers a presupposition

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- ▶ By the meaning of the sentence
 - (3) Sue cried before she finished her thesis.
 - Sue finished her thesis
 - ▶ 'before' triggers a presupposition
 - (4) Sue died before she finished her thesis.
 - ↯ Sue finished her thesis

Presupposition

Defeasibility

- ▶ By more context
 - (1) He isn't aware that Serge is on the KGB payroll
 - Serge is on the KGB payroll

Presupposition

Defeasibility

- ▶ By more context
 - (1) He isn't aware that Serge is on the KGB payroll
 - Serge is on the KGB payroll
 - (2) A: Well we've simply got to find out if Serge is a KGB infiltrator
B: Who if anyone would know?
C: The only person who would know for sure is Alexis; I've talked to him and he isn't aware that Serge is on the KGB payroll. So I think Serge can be trusted
 - ↗ Serge is on the KGB payroll
- ▶ A specific discourse context can override a presuppositional inference

Section 2

Summary

Summary

- ▶ Linguistics: Scientific study of language(s)
- ▶ Syntax, semantics, pragmatics, ...: Different levels of abstraction over the text/speech
- ▶ Pipeline idea: Output of one level used as input for the next
 - ▶ Error-prone and complex systems
 - ▶ “End-to-End-systems” are now popular
- ▶ Ambiguity on every level