

Syntactic Theory

Introduction

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Syntax: What does it mean?

We can view syntax/syntactic theory in a number of ways, two of which are the following:

- ▶ Psychological model: syntactic structures correspond to what is in the heads of speakers and hearers
- ▶ Computational model: syntactic structures are formal objects which can be mathematically treated/manipulated

Syntactic Analysis

- ▶ Focus on collection of words and rules with which we generate
 - ▶ strings of those words (weak generative power)
 - ▶ structures which license strings of those words (strong generative power)
- ▶ Syntax attempts to capture the nature of those rules:
 1. Colorless green ideas sleep furiously
 2. *Furiously sleep ideas green colorless.
 3. *Sally talk to man.
 4. Sally talks to a man.
- ▶ What generalizations are needed to capture the difference between grammatical and ungrammatical sentences?

Why is the Study of Syntax Relevant?

[Sag, Wasow and Bender, 2003]

- ▶ A window on the structure of the mind
 - ▶ Innateness of the language faculty (Chomsky)
 - ▶ Universal Grammar
- ▶ A window on the mind's activity
 - ▶ Cognitive process
 - ▶ Ambiguity management
- ▶ Natural language technologies
 - ▶ Parsing
 - ▶ Generation
 - ▶ Grammar checking

Two Conceptions of Grammar

Prescriptive grammar

Consists of admonitions not to use certain forms or constructions that are common in everyday speech:

- ▶ *Remember to never split an infinitive.*
- ▶ *A preposition is a bad word to end a sentence with.*

However, human language is a phenomenon amenable to scientific investigation, rather than something to be regulated by the decrees of authorities

Standardization has benefits but also limitations.

Two Conceptions of Grammar

Descriptive grammar

- ▶ Observes language and creates conceptual categories for what occurs
- ▶ Consults intuitions of native speakers on *what sounds right*
 1. They saw Pat with Chris.
 2. They saw Pat and Chris.
 3. Who did they see Pat with?
 4. * Who did they see Pat and?

Syntax vs. Grammar

The two terms are in many cases used interchangeably, but

Syntax contrasts with semantics, morphology and phonology, as a term for one dimension of human language.

A *grammar* consists of rules that model (some of) the phenomena observed, including how words and phrases are are put together into larger phrases and sentences.

Grammar Formalisms

Computational grammar formalisms share several properties

- ▶ Descriptive adequacy
- ▶ Precise encoding
- ▶ Constrained formalism

Descriptive Adequacy

Some researchers try to explain the underlying mechanisms, but we are most concerned with being able to describe linguistic phenomena, ideally:

- ▶ Providing accurate structural descriptions for well-formed sentences
- ▶ Giving an explicit encoding of a language
- ▶ Approaching broad coverage, i.e., aiming to describe all of the well-formed sentences possible in a language

Precise Encoding

Mathematical Formalism: formal way to generate sets of strings or structures

Precisely define:

- ▶ elementary structures
- ▶ ways of combining those structures

Such an emphasis on mathematical precision makes these grammar formalism more easily implementable

Constrained Formalism

A formalism must be **constrained**:

- ▶ Linguistic motivation: limits the scope of the theory of grammar
- ▶ Computational motivation: allows us to define efficient processing models

Simplistic Syntactic Theory Example I

List as grammar

A grammar consists of a list of all the well-formed sentences in the language

- ▶ *Some sentences go on and on.*
- ▶ *Some sentences go on and on and on.*
- ▶ *Some sentences go on and on and on and on.*
- ▶ ...

- ▶ Grammar \mathcal{G}_1 is defined by the language \mathcal{L} itself, as a set of strings $\mathcal{G}_1 = \{s_i | s_i \in \mathcal{L}\}$
- ▶ Weak expressive power: cannot enumerate all possible sentences in a language
- ▶ No (useful) structure
- ▶ No generalization over linguistic phenomena

Simplistic Syntactic Theory Example II

Regular Expressions

Regular Expressions, i.e. patterns making use of Kleene star (and Kleene plus), parentheses for optionality, and the vertical bar for alternatives, can be used to describe grammars

- ▶ \mathcal{G}_2 : *Some sentences go on [and on]⁺.*
- ▶ Insufficient descriptive power to capture generalizations

Syntactic Theories to be Reviewed

In this course, we will introduce the following linguistic frameworks

- ▶ Chomskyan Transformational Tradition and Context Free Grammar
- ▶ Head-Driven Phrase Structure Grammar
- ▶ Dependency Grammar
- ▶ Tree Adjoining Grammar
- ▶ Lexical Functional Grammar

with particular focus on LFG and HPSG

Organizational Matters

- ▶ Time: Thursday 16:15 - 17:45, Friday 14:15 - 15:45
- ▶ Location: Seminar Room, C72
- ▶ Office hours: Friday 11:00 - 12:00 (after email contact)
- ▶ Credit Points: 6 CP
- ▶ Course Homepage with schedule:
www.coli.uni-saarland.de/courses/syntactic-theory/2011/
- ▶ Email: danf@stanford.edu, kordoni@coli.uni-sb.de

Lectures, Exercises, and Exam

- ▶ Regular attendance of the lectures is required
- ▶ Exercises need to be submitted within one week, and will be corrected
- ▶ One must “pass” at least half of the exercises to be qualified for the final exam
- ▶ The exam will be written, and last for 120 minutes; exact date TBA

Send us a brief email saying you plan to take this course

- ▶ What is your academic background?
 - ▶ Your major field of study so far
 - ▶ Outside of this field, have you had courses in Linguistics, Computer Science, Psychology, Philosophy?
- ▶ What languages do you speak besides English?

Course schedule: Syntactic Theory

Date	Topic	Lecture	Exercise	Materials
Thu 27.10.11	Introduction	+		slides
Fri 28.10.11	Historic Overview and Transformational syntax	+		slides
Thu 03.11.11	Syntax in the Chomskyan Tradition	+		slides
Fri 04.11.11	Context-Free-Grammar	+		slides
Thu 10.11.11	Typed Feature Structures	+		slides
Fri 11.11.11	Typed Feature Structures		+	Exercise 1
Thu 17.11.11	Head-driven Phrase Structure Grammar	+		slides
Fri 18.11.11	Typed Feature Structures		+	solution
Thu 24.11.11	Head-driven Phrase Structure Grammar	+		slides
Fri 25.11.11	Head-driven Phrase Structure Grammar		+	Exercise 2
Thu 01.12.11	General Revision			
Fri 02.12.11	Head-driven Phrase Structure Grammar		+	solution
Thu 08.12.11	Dependency Grammar	+		slides
Fri 09.12.11	Dependency Grammar		+	Exercise 3
Thu 15.12.11	Dependency Grammar	+		slides
Fri 16.12.11	Dependency Grammar		+	solution
	Holiday break			
Thu 05.01.12	General Revision			
Fri 06.01.12	Tree-Adjoining Grammar	+		slides
Thu 12.01.12	Tree-Adjoining Grammar	+		slides
Fri 13.01.12	Tree-Adjoining Grammar		+	Exercise 4
Thu 19.01.12	Lexical-Functional Grammar	+		slides
Fri 20.01.12	Tree-Adjoining Grammar		+	solution
Thu 26.01.12	Lexical-Functional Grammar	+		slides
Fri 27.01.12	Lexical-Functional Grammar		+	Exercise 5
Thu 02.02.12	Lexical-Functional Grammar	+		slides
Fri 03.02.12	Lexical-Functional Grammar		+	solution
Thu 09.02.12	General Revision			
Fri 10.02.12	General Revision			
Thu 16.02.12	Exam			