

Syntactic Theory

Syntax in the Chomskyan Tradition

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Principles and Parameters

- ▶ An approach to the question of how children acquire language
- ▶ Ideas with roots in the early days of modern generative grammar
- ▶ Emerged in the 1980s; not (meant to be) a specific theory

Previous ideas and observations

- ▶ Despite large variations, languages have many common properties on an abstract level
- ▶ Children learn languages easily, despite the fact that language are highly complex
- ▶ Idea: the common properties of languages are innate, so only variations need to be learned

Principles and Parameters

- ▶ **Universal Grammar** can be defined as:
 - ▶ The set of **principles** that are common to all languages
 - ▶ The initial state of language knowledge for human beings
- ▶ Principles may include **parameters**, which represent settings that may vary from language to language
- ▶ Children 'simply' need to learn the values of relevant parameters to acquire the grammar of their native language

Goals of syntactic research

In this setting, research on syntax should answer the following questions:

- ▶ What are the principles that are part of Universal Grammar?
- ▶ What parameters are there in Universal Grammar, and what are their possible values in individual languages?

Language Acquisition

- ▶ How children learn language is still an open question, but they do
- ▶ Language is a complex system: even after 50 years of extensive work on English, we are far from finished
- ▶ There is not yet agreement on whether this complexity drives us to conclude that we are born with a universal grammar built in, and if so, what this would look like

Government and Binding

- ▶ Government and Binding refers to a specific approach to linguistic theory
- ▶ It followed from Extended Standard Theory in transformational grammar
- ▶ Important differences with previous approach:
 - ▶ More modularity: it actually consists of a set of theories that interact, with Government and Binding being two of them
 - ▶ Focus on principles rather than rules

Component theories in GB

- ▶ \bar{X} Theory
- ▶ θ Theory
- ▶ Case Theory
- ▶ Binding Theory
- ▶ Bounding Theory
- ▶ Control Theory
- ▶ Government Theory

GB theories

- ▶ Each theory studies principles of rules and representations that are a subsystem of UG
- ▶ They may affect different levels of language (D-structure, S-structure or LF)
- ▶ All have in common that they operate on syntactic structures
- ▶ This leads to interactions between the theories that can get quite complex, even if principles are kept simple
- ▶ Hope: if interactions between simple principles may lead to complex properties, this may explain why language is complex but easily learned

The theories of GB: \bar{X} theory

- ▶ \bar{X} Theory forms the basis of syntactic structure in the transformational tradition
- ▶ Government plays a central role in the theory, because it provides the conditions for principles of other theories to apply (e.g. case and θ -assignment, binding)

\bar{X} (X-bar) theory

- ▶ X-bar theory was developed in the 1970s to characterize phrase structures in a more theoretically sound way
- ▶ It addresses several issues:
 1. Capturing stronger generalizations than simple phrase structure grammar (PSG)
 2. Introducing a structural difference between complements and modifiers
 3. Removing a redundancy between lexical contribution and the contribution of PS-rules (cf. Ouhalla 1994)

Redundancy

- ▶ The items that may form a VP are determined both by the subcategorization properties of the verb, and by the phrase structure rules.
- ▶ Is it possible to use only one of the two?
- ▶ We can use subcategorization alone, but then this information must be present at all levels
- ▶ Projection Principle:
“Representations at each syntactic level (i.e., LF, and D- and S-structure) are projected from the lexicon, in that they observe the subcategorization properties of lexical items.”
(Chomsky 1981, p.29)

Generalization

- ▶ Can we define phrase structure rules in a way that captures **cross-linguistic** properties of syntactic structures?
- ▶ Can we define phrase structure rules in a way that lets us capture structural commonalities **language-internally** (e.g. “subject of a sentence” or “an NP” in English)?
- ▶ Can we define phrase structure rules in a way that draws a clear **complement/adjunct** distinction?

\bar{X} theory: Definitions

- ▶ We can generalize phrase-structure (PS) rules as follows:

$$XP \rightarrow \dots X \dots$$

- ▶ We say that XP is the **maximal projection** of X
- ▶ In \bar{X} -theory X is an obligatory element on the right-hand side of the rule. It is called the **head** of the maximal projection.
- ▶ The maximal projection XP and its head X are different **bar levels** of X

The \bar{X} Convention I

- ▶ A theory of syntactic categories
- ▶ Three major claims;
 1. There is a set of syntactic features in UG defining possible lexical categories. A language selects the lexical categories it uses from UG (in much the same way as it selects phonemes)
 2. Each lexical category X defines supercategories X', X'', \dots, X^k .
 X^n and X^{n-1} are related through the following PS-rule:

$$X^n \rightarrow \dots X^{n-1} \dots$$

The head of X^n may be defined as either X^{n-1} or lexical category X

The \bar{X} Convention II

- ▶ 3. Grammatical formatives are defined as feature complexes and a prime notation:

$$\begin{bmatrix} \alpha F_1 \\ \beta F_2 \\ \dots \end{bmatrix}^i$$

e.g. V': $\begin{bmatrix} +\text{Subj} \\ +\text{Object} \\ +\text{Comp} \\ \dots \end{bmatrix}'$ N': $\begin{bmatrix} +\text{Subj} \\ -\text{Object} \\ +\text{Comp} \\ \dots \end{bmatrix}'$

Bar-levels and properties

- ▶ How many bar-levels does each category have?
 - ▶ This is an empirical question: how many are needed to accurately describe language?
 - ▶ For this overview, we follow Jackendoff (1977) and suppose three bar-levels for each category: X' , X'' and X'''
- ▶ Lexical categories are of type X , maximal projections X'''
For most categories this is XP (for V this is S)

PS-rule canonical form

- ▶ We suppose that elements appearing left or right of X^{n-1} are either major categories or specified grammatical formatives (such as tense)
- ▶ The canonical form of the \bar{X} PS-rule is then:

$$X^n \rightarrow (C_1)...(C_j) - X^{n-1} - (C_{j+1})...(C_k)$$

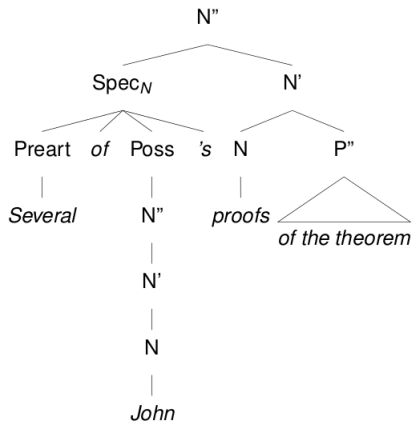
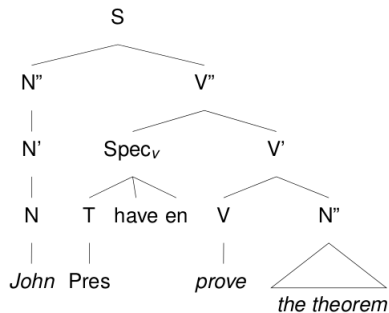
and for all C_i either $C_i = Y'''$ for some lexical category Y , or C_i is a specified grammatical formative.
(Jackendoff 1977, p.36)

- ▶ Language-specific rules determine on which side of X different elements may appear

Parallelism between structures: Example

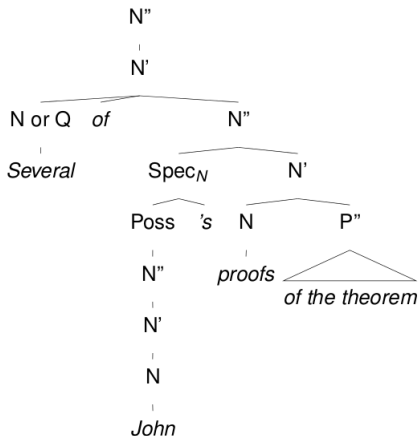
- ▶ Important idea in X Theory: if there are parallel relations across categories, these categories must be syntactically parallel with respect to the relation
- ▶ For instance, the subject of a sentence (V''') and the subject of an NP (N'''):
 1. **John** *has proved the theorem*
 2. **John's** *proofs of the theorem*

Two (old) proposed phrase structures



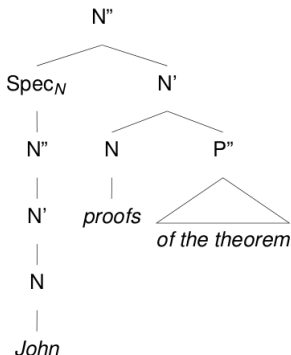
A uniform structure for subjects: Step 1

- ▶ Assumption 1: *several of* is not the specifier, but part of a higher NP:



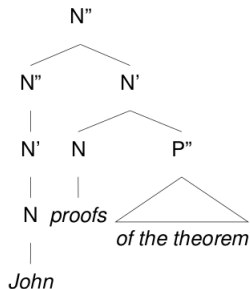
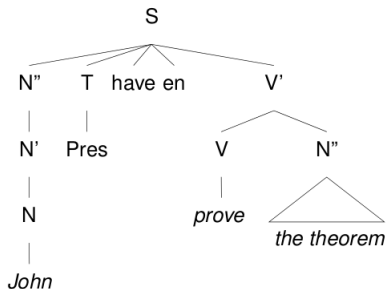
A uniform structure for subjects: Step 2

- ▶ Assumption 2: The 's always occurs with subjects of NPs, also in cases where the subject moved there (consider *the city's destruction by the enemy*)
→ the 's is inserted at the last moment:



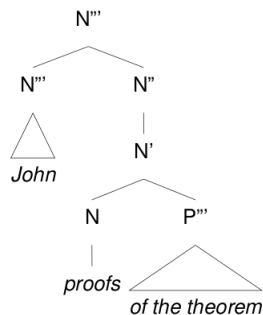
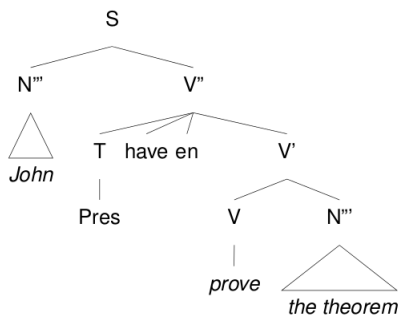
A uniform structure for subjects: Step 3

- ▶ There is no category *Spec*: both $Spec_N$ and $Spec_V$ can be removed:



Final step: three bar levels

- ▶ There are only two bar levels so far: we add one bar-level to *N* and *V*:



Uniform subject structures: remarks

- ▶ In English, the grammatical relation 'subject-of' can now be defined as:

$[N''', [+Subj]]$

- ▶ For motivation of why three bar levels would be preferable, see Jackendoff (1977).

Complements

- ▶ There are three types of constituents that may be combined with a head:
 - ▶ Functional Arguments
 - ▶ Restrictive Modifiers
 - ▶ Nonrestrictive Modifiers
- ▶ \bar{X} Theory assumes that each of these constituents attaches at a different bar level:
 - ▶ X' : Functional Arguments
 - ▶ X'' : Restrictive Modifiers
 - ▶ X''' : Nonrestrictive Modifiers

Functional arguments

How can functional arguments be recognized? Some examples:

- ▶ Functional arguments are subcategorized by their head
- ▶ Tests:
 - ▶ Can the element be omitted?
 1. *I put the book on the table*
 2. **I put the book*
 - ▶ But,
 - ▶ *Sam told Kim a lie* vs *Sam told Kim*
 - ▶ Arguments of nouns and adjectives are typically optional
 - ▶ Certain anaphoric processes (see next slide)

Functional arguments, cont.

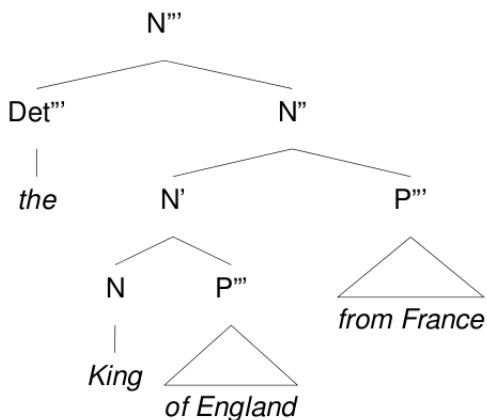
- ▶ Anaphoric processes can be used to identify arguments
- ▶ The anaphor *do so* can be used to contrast between adverbials, but not between functional arguments:
 1. *Kim went to the movies on Thursday, and Sam did so on Friday.*
 2. **Kim put the book on the table, and Sam did so on the chair.*
 3. **Sam told Kim a lie, and Bill did so the truth.*

Functional arguments, cont.

- ▶ Similarly, the anaphor *one* in NPs can be used to contrast between modifiers, but not functional arguments:
 1. *John met the King from England, and I the one from France.*
 2. **John met the King of England, and I the one of France.*
- ▶ Order can also be an indicator: In English functional arguments immediately follow their head:
 3. **I met the King from France of England.*

For more criteria, see e.g. Jackendoff (1977)

X' vs. *X''* constituents: *the King of England from France*



V''' vs. V''''

- ▶ V''' sister constituents are restrictive modifiers; they:
 1. are typical VP adverbials and express things such as purpose, manner, instrument, or means
 2. contribute to the meaning of the main assertion
 3. can be in focus, clefted or fall under scope of negation
 - ▶ *John hit the nail softly.*
 - ▶ *It was with the hammer that John hit the nail.*
 - ▶ *We didn't buy this for your benefit.*

Examples from Jackendoff (1977) p.61)

- ▶ They contribute to the truth conditions of the assertion

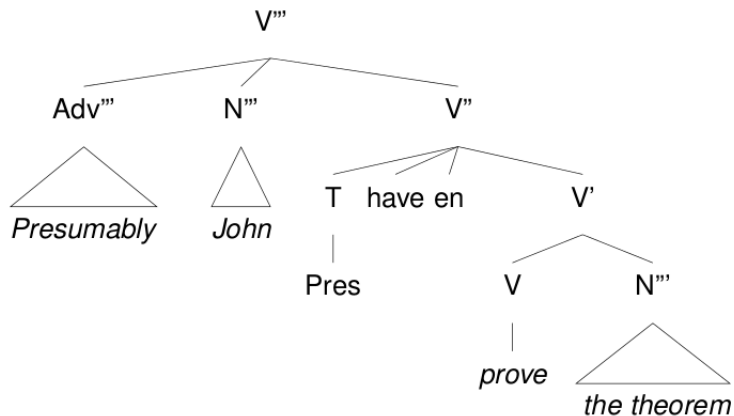
V''' vs. V''''

- ▶ V'''' sister constituents are non-restrictive modifiers; they:
 1. are typical sentential adverbials
 2. add some auxiliary assertion
 3. cannot be in focus, clefted or fall under scope of negation
 - ▶ **John hit the nail softly, of course.*
 - ▶ **It was in my opinion that John hit the nail.*
 - ▶ **John didn't hit the nail, I think.*
- ▶ Similar distinctions apply to N'' and N'''' sister constituents
- ▶ For English, word order supports the idea that X'''' modifiers attach higher than X'' modifiers

X''' modifiers

Presumably, John has proven the theorem

(hypothesized)



Some remarks on X-bar theory

- ▶ X-bar theory is a module of grammar concerned with phrase structure
- ▶ It has been widely adopted in syntactic theory
- ▶ X-bar structure is still used in (some versions of) GB and Minimalism
- ▶ References to it are also found in purely computational linguistic work that are not necessarily focusing on syntactic analysis

Government and Binding: Remarks

- ▶ Government and Binding dominated syntactic research from the 1980s till the end of the century
- ▶ It is still widely used in linguistic research
- ▶ This lecture gave a very limited overview of just one of the component theories: X-bar theory
- ▶ The theory has been successful in describing various cross-linguistic phenomena; i.e. hypotheses have led to predictions that were confirmed by data

Government and Binding: Remarks, cont.

- ▶ For computational purposes, it has the same drawbacks as earlier versions of transformational grammar
- ▶ Again, this is mostly due to the aim of the approach
- ▶ As with Standard Theory, it struggles between descriptive adequacy and explanatory adequacy: when all data is accounted for, the analyses are awkwardly complex

Remarks on syntactic research

- ▶ Often, it is not straightforward to see whether an analysis is really 'proven' to be correct
- ▶ Notably, it can be hard to see what is proven by the data, and what is proven by the data given the theory
- ▶ This becomes increasingly difficult when more phenomena are incorporated in the theory:
 - ▶ In many cases, an analysis can only be shown to be more plausible than an alternative, but this analysis may have an impact on analyses of (seemingly) unrelated phenomena later on
 - ▶ When parts of the theory change, this may have an impact on analyses or allow for alternatives, which may not be noticed initially
- ▶ These challenges (and problems that follow from it) exist in all syntactic theories

What to retain

- ▶ The basic ideas of Principles and Parameters:
 - ▶ Language consists of universal principles and language specific parameters: a child would 'only' need to learn the parameters of the language
- ▶ X-bar syntax
 - ▶ X-bar theory provides conditions on how a phrase structure tree is built
 - ▶ The relation between a head and non-heads in a constituent is reflected in the bar-level it attaches to:
 - ▶ the object of a verb attaches to V'
 - ▶ In Jackendoff (1977), restrictive modifiers attach to V'' , and non-restrictive modifiers to V'''
 - ▶ In other approaches, modifiers attach to VP

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