Principles and Parameters and Government and Binding

Syntactic Theory
Winter Semester 2009/2010

Antske Fokkens

Department of Computational Linguistics
Saarland University

20 October 2009

Outline

Outline

Principles and Parameters

- An approach to the question of how children acquire language
- Ideas started shaping since the early days of modern generative grammar
- The version that is usually referred to was presented in the 80s
- Principles and Parameters is an approach, and not (meant to be) a specific theoretical system

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, 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, the 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?

General views on language acquisition

- How children learn language is still an open question
- The idea that language is a complex system (all syntacticians working on English over the last 50 years still haven't managed to describe it) and children learn this easily is not much disputed
- Researchers do (very much) disagree on whether this implies that we are born with a universal grammar in our mind, and if so, what this would look like

Outline

Introduction

- 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 (Government and Binding being two of them)
  - Focus on principles rather than rules

GB-theories (1/2)

- $\overline{\text{X}}$ Theory
- θ Theory
- Case Theory
- Binding Theory
- Bounding Theory
- Control Theory
- Government Theory

Chomsky (1982: p.6)

GB-theories (2/2)

- 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

This Lecture

- We will have a closer look at $\overline{X}$, later in the semester we will look at Government Theory
- $\overline{X}$ 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)
- They are the only two theories in GB that do not (directly) relate to specific phenomena

X-bar theory: motivations

- X-bar theory was developed in the seventies to design phrase structures in a more theoretically sound way
- It ended up addressing several issues:
  1. stronger generalization than previously used PSG
  2. introducing a structural difference between complements and modifiers
  3. removing a redundancy between lexical contribution and the contribution of PS-rules (mentioned by Ouhalla 1994)

Redundancy

- Redundancy: the items that may form a VP is 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 only subcategorization, but then this information must be present at all levels
- **Projection Principle:**
  "Representations at each syntactic level (i.e., L.F., and D- and S-structure) are projected from the lexicon, in that the 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 allows to capture commonalities in structure within a language (e.g. subject of a sentence or an NP in English)?
- Can we define phrase structure rules in a way that distinguishes complements from adjuncts?

X-bar Theory: definitions

- We can generalize PS-rules as follows:

  $XP \rightarrow ...X...$

- We say that XP is the **maximal projection** of X
- In $\overline{X}$-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 X-bar Convention I

- $\bar{X}$ Convention: a “theory of syntactic categories”
- There are 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”,...,X*^{k}. X^n and X^{n-1} are related through the following PS-rule:

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

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

The X-bar 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': $\begin{bmatrix} +\text{Subj} \\ -\text{Object} \\ +\text{Comp} \\ \dots \end{bmatrix}$'

based on Jackendoff (1977)

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)

The PS-rule's canonical form

- We suppose that elements appearing left or right of X^{n-1} are either major categories or specified grammatic formatives (such as tense)
- The canonical form of the $\overline{X}$ 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)

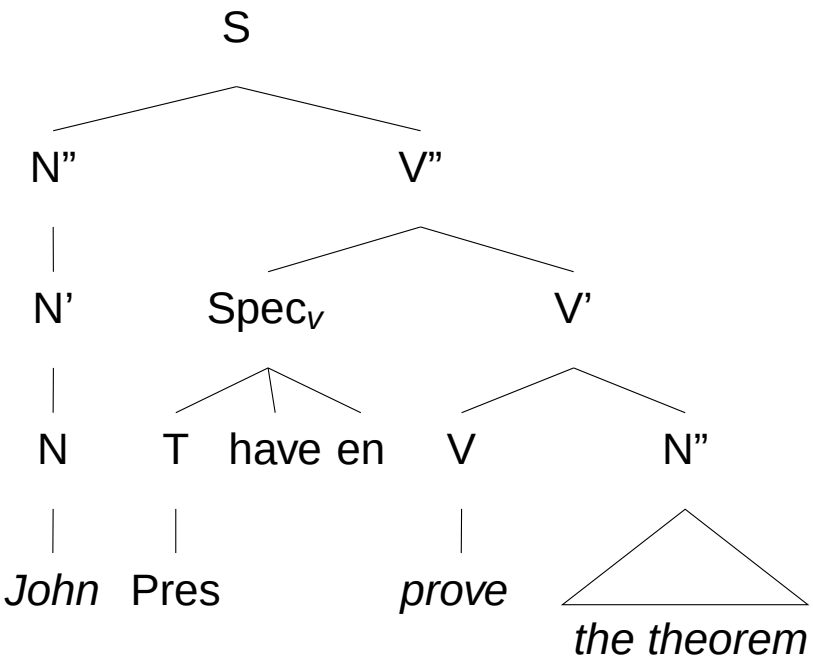
- Language specific rules determine on what side of X different elements may appear

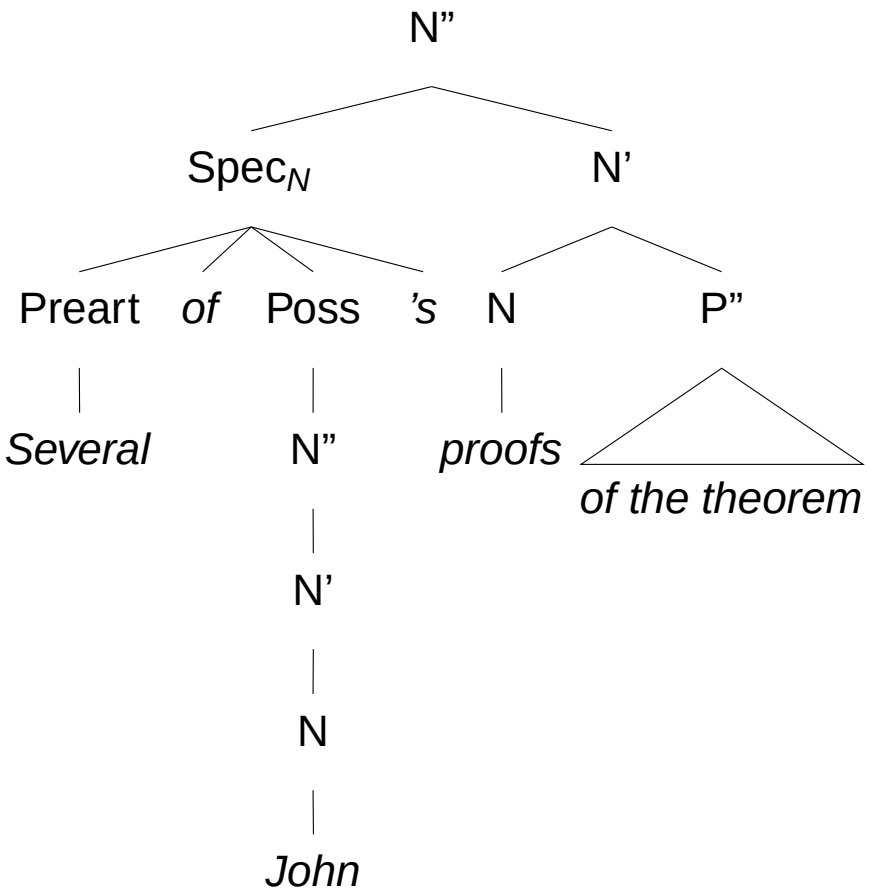
Parallelism between structures (example)

- Important idea in $\overline{X}$ Theory: if there are parallel relations across categories, these categories must be syntactically parallel in 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

based on Jackendoff (1977)

Two (old) proposed structures

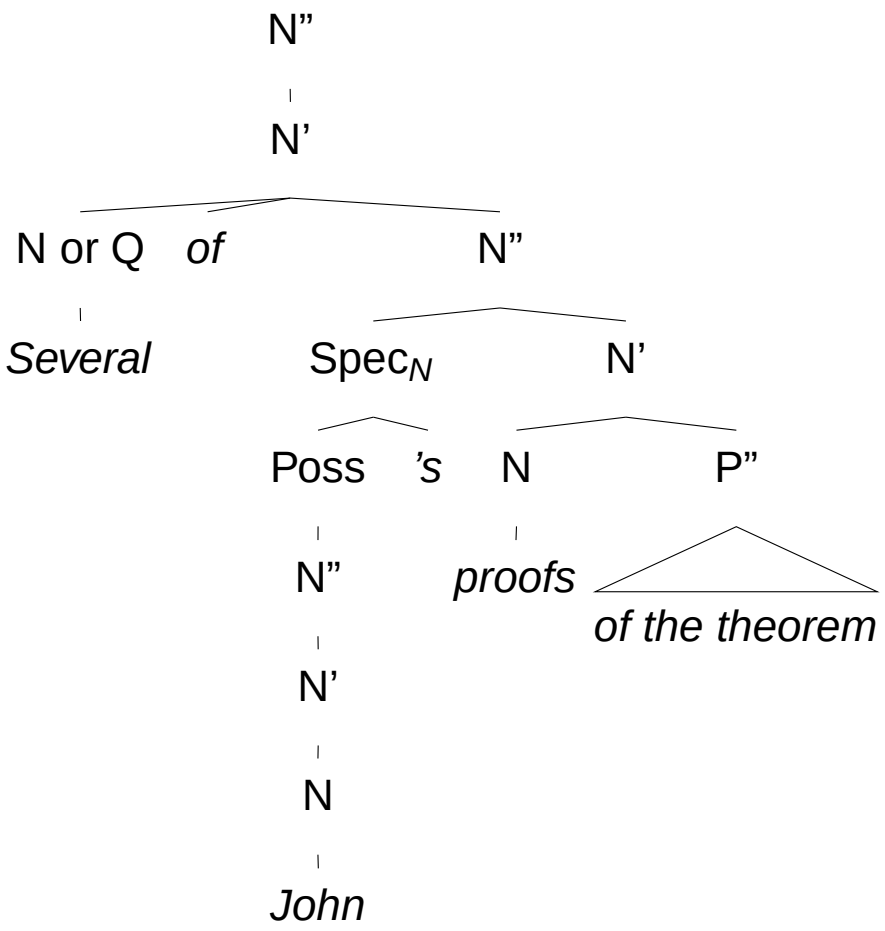




Chomsky’s analysis presented by Jackendoff (1977: p. 38)

A uniform structure for subjects: step 1

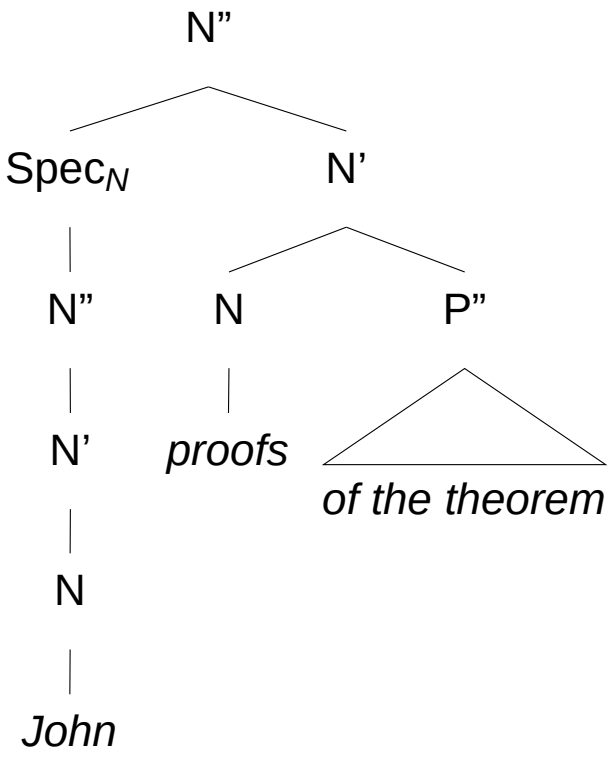
- Assumption: *several of* is not the specifier, but part of a higher NP:



Adapted from Jackendoff (1977: p.40)

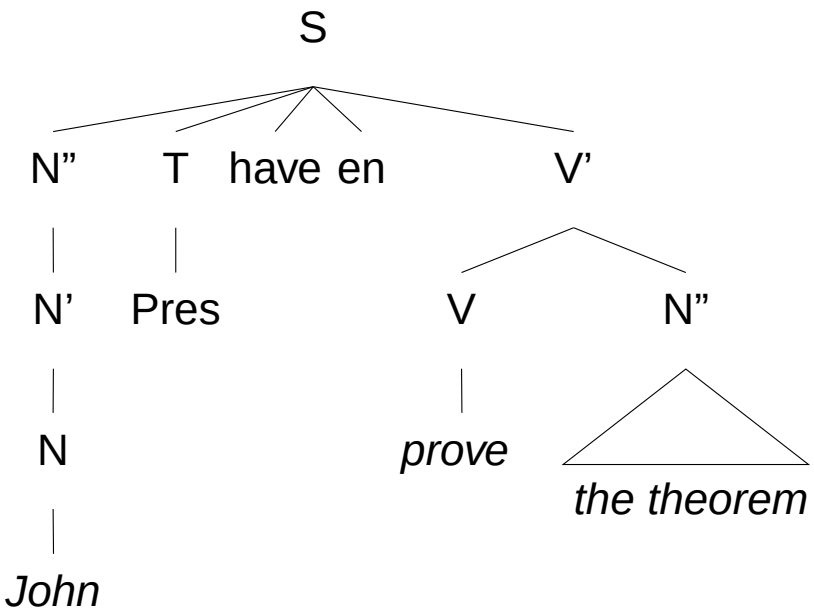
A uniform structure for subjects: step 2

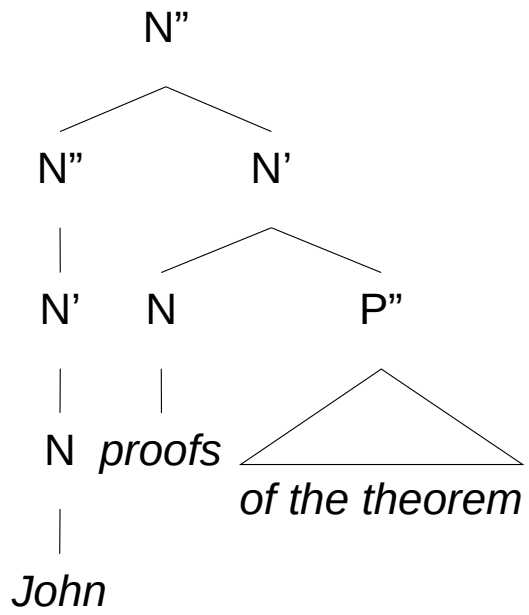
- Assumption 2: note that the *'s* always occurs with subjects of NPs, also in cases where the subject moved there (consider *the city's destruction by the enemy*)
  → *'s* is inserted at the last moment:



A uniform structure for subjects: step 3

There is no category 'Spec': both Spec_N and Spec_V can be removed:

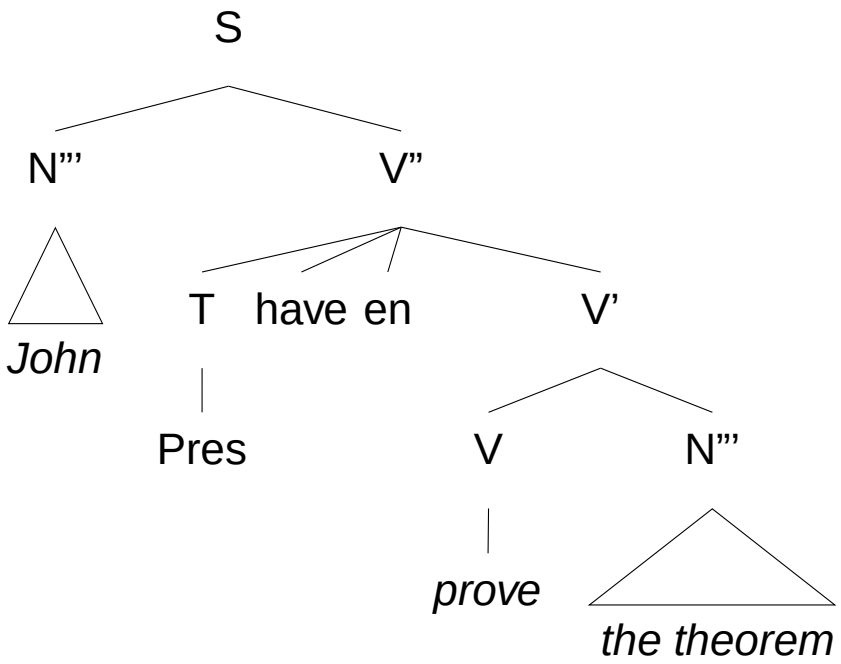


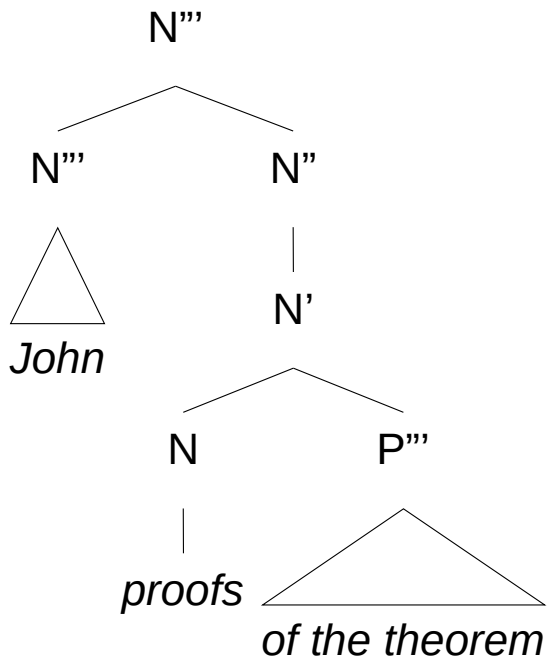


Jackendoff (1977: p.40-41)

Final step: three bar-levels

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





from Jackendoff (1977: p.41)

Uniform Subject Structures, Concluding 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 complements that may be combined with a head:
  - Functional Arguments
  - Restrictive Modifiers
  - Nonrestrictive Modifiers
- $\overline{X}$ Theory assumes that each of these complements attach at a different bar level:
  - X': Functional Arguments
  - X": Restrictive Modifiers
  - X"': Nonrestrictive Modifiers

Functional Arguments (1/3)

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)

based on Jackendoff (1977)

Functional Arguments (2/3)

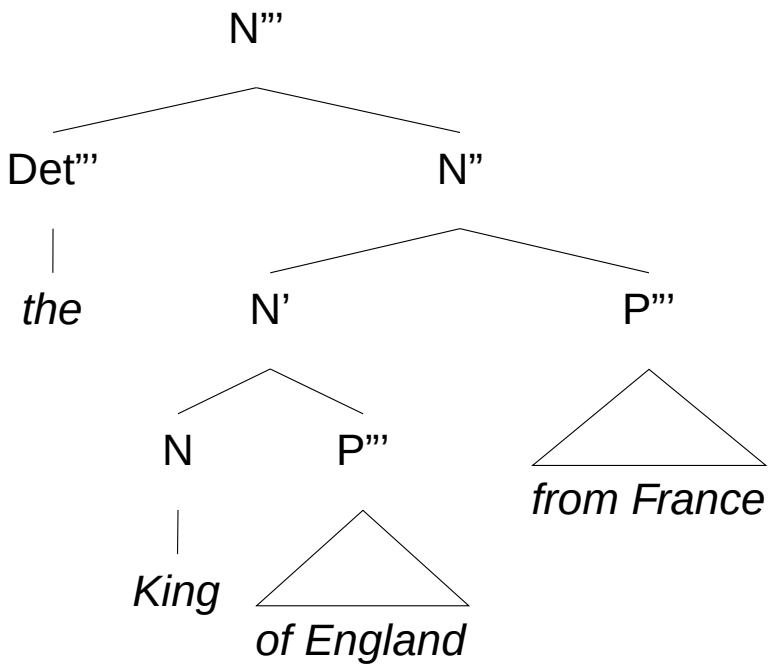
- Anaphoric processes can be used to identify arguments
- The anaphor *do so* can be used to contrast between Adverbials, but not between functional arguments:
  1. Kim went to the movies on Thursday, and Sam did so on Friday.
  2. *Kim put the book on the table, and Sam did so on the chair.
  3. *Sam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

Functional Arguments (3/3)

- Similarly, the anaphor *one* in NPs cannot be used to contrast between 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:
  **I met the King from France of England.*

For more criteria see (among others) Jackendoff (1977)

X’ vs X” complements: *the King of England from France*



based on Jackendoff (1977)

V” versus V”’

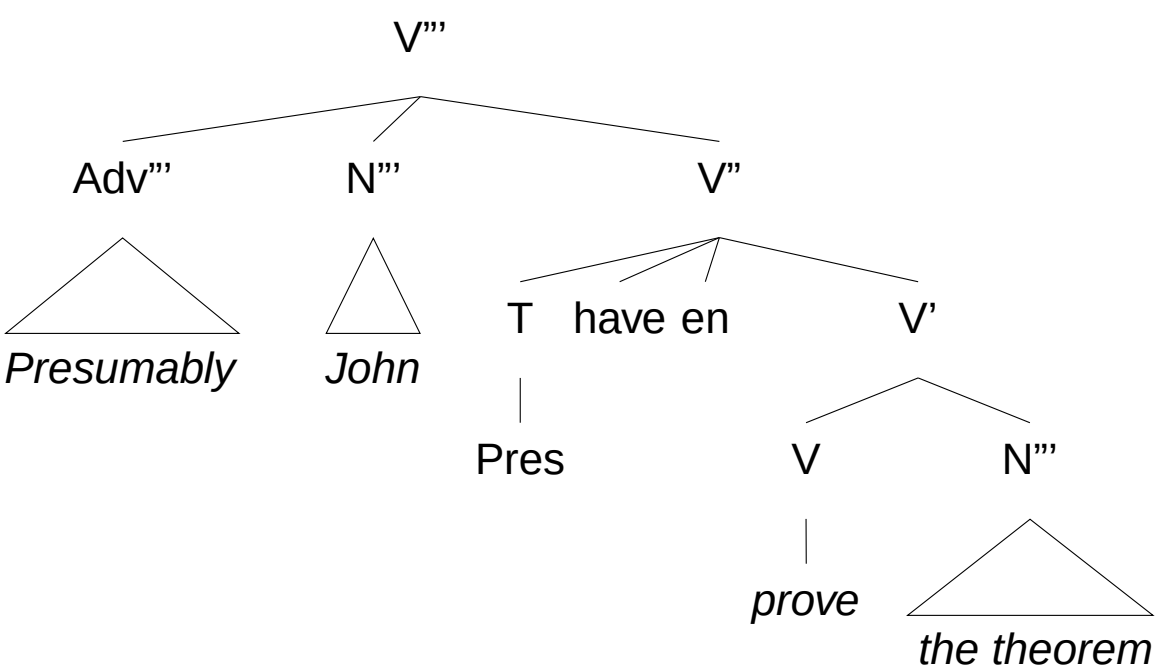
- V” complements are restrictive modifiers, they:
  1. are typical VP adverbials and express things such as purpose, manner, instrument, or means
  2. contribute to the meaning of the main assertion
  3. can be in focus, clefted or fall under scope of negation
     - John hit the nail *softly*.
     - 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” versus V”’

- V”’ complements are nonrestrictive 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” complements
- For English, word order supports the idea that N”’ complements attach higher than N” complements

X”’ complements: *Presumably, John has proven the theorem*



(hypothesized)

Some remarks on X-bar Theory

- X-bar theory is a module of grammar concerned with the Phrase Structure of grammar
- 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 (1/2)

- Government and Binding has dominated syntactic research from the 80s till (approx) 2000
- It is still widely used in linguistic research
- This lecture gave a ***very limited*** overview of X-bar theory
- The theory has been successful in describing various cross-linguistic phenomena, i.e. hypotheses have lead to prediction that were confirmed by data

Government and Binding, remarks (2/2)

- 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 Standard Theory, it struggles between descriptive adequacy and explanatory adequacy: when all data is accounted for, the analysis is (implausibly) complex

Remarks on Syntactic research

- Often, it is not straight-forward 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 is only been 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
- These challenges (and problems that follow from it) exist in all syntactic theories

What to retain from this lecture

- The basic ideas of Principle 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, e.g.
    - the object of a verb attaches to V'
    - In Jackendoff (1977), restrictive modifiers to V", and non-restrictive to V"'
    - In other approaches, modifiers attach to VP

Bibliography I

- Chomsky, Noam (1981). *Lectures on Government and Binding*. Berlin: Mouton.
- Chomsky, Noam (1982). *Some Concepts and Consequences of the Theory of Government and Binding*
- Chomsky, N. and Lasnik, H. (1993) Principles and Parameters Theory, in *Syntax: An International Handbook of Contemporary Research*, Berlin: de Gruyter.
- Haegeman, Liliane (1991). *Introduction to Government and Binding Theory*. Oxford: Blackwell Publishers.
- Jackendoff, Ray (1977). $\bar{X}$ *Syntax: A Study of Phrase Structure*. Cambridge Massachusetts: MIT Press.
- Ouhalla, Jamal (1994). *Introducing Transformational Grammar*. New York: Oxford University Press.
- Sag, Ivan A., Thomas Wasow and Emily M. Bender (2003). *Syntactic Theory*. A Formal Introduction. Palo Alto: CSLI Publications.