Minimalist Grammar

Weiwei Sun

Institute of Computer Science and Technology
Peking University

April 9, 2019

The goal

Naturally, one seeks the simplest account of U[niversal] G[rammar]. One reason is just normal science: it has long been understood that simplicity of theory is essentially the same as depth of explanation.

Problems of Projection: Extensions Chomsky (2015)

Outline

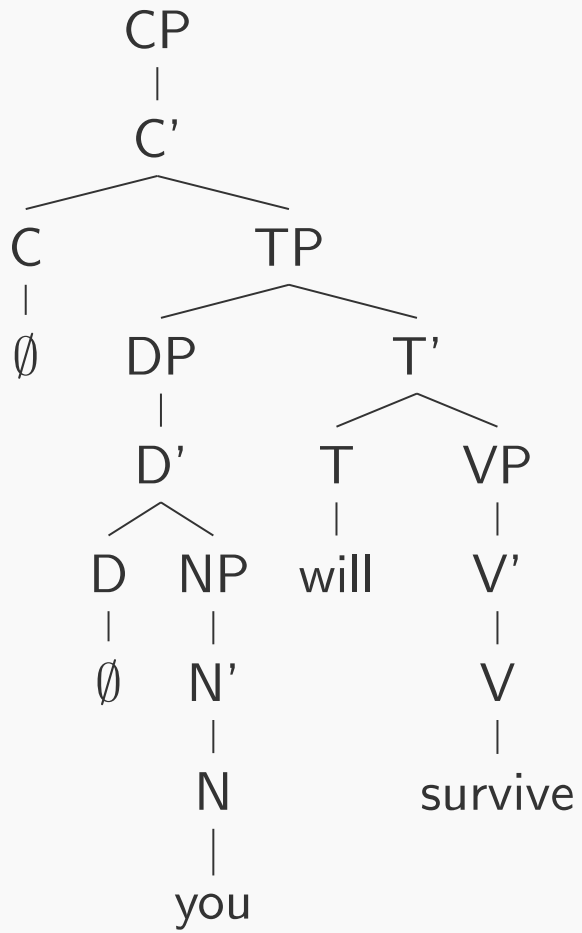
Bare Phrase Structure

Feature Checking

Generalizing Context-Free Grammar

Motivation

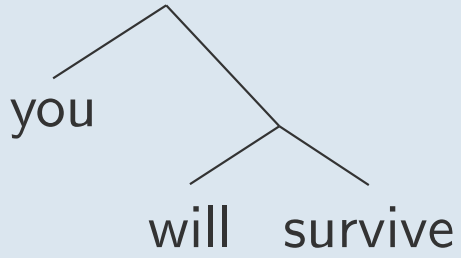
Minimalism To reduce theoretical apparatus to the minimum which is conceptually necessary.



Bare phrase structure

An unlabelled tree diagram encodes constituents, e.g., *will survive*.

The lexical entries comprise sets of features.



The information about category labels and projection levels in a conventional labelled tree diagram is redundant.

Unbounded Hierarchical Recursion

Merge

- Natural languages are capable of generating an unbounded number of hierarchically structured objects recursively.

$\Rightarrow$ There must be rules that put smaller units together with bigger ones without limit.

$\Rightarrow$ There must be at least one rule, like MERGE, that does the putting together.

Binary branching

In some theories, syntactic trees are *binary branching*, meaning that every mother has at most two daughters.

Merge

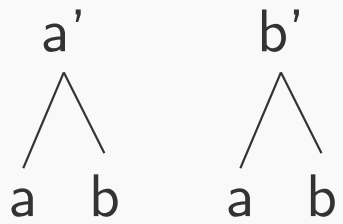
A binary branching tree is built by iteration of the structure-building operation—MERGE.

(1) a. If α is a lexical item then α is an syntactic object (SO).

b. If α is an SO and is an SO then $\textsc{merge}(\alpha, \beta)$ is an SO.

(2) For α, β, SOs, $\textsc{merge}(\alpha, \beta) \rightarrow \{\alpha, \beta\}$

What is the name of the constituents formed by MERGE? Try "x' ("xness")" now.



$\{a, \{a, b\}\}$

or

$\{b, \{a, b\}\}$

Question

(3) a. Who did John say that Mary saw t

b. $\{\beta, \{\gamma, \{\lambda, \{\alpha, \beta\}\}\}\}$

Merge

- Only two operations/rules for combining linguistic objects
  - External Merge
  - Internal Merge
- The application of them can apply in any order.

External Merge

External Merge combines two elements.

$$\underline{\text{the}} + \underline{\text{book}} \Rightarrow \underline{\text{the book}}$$

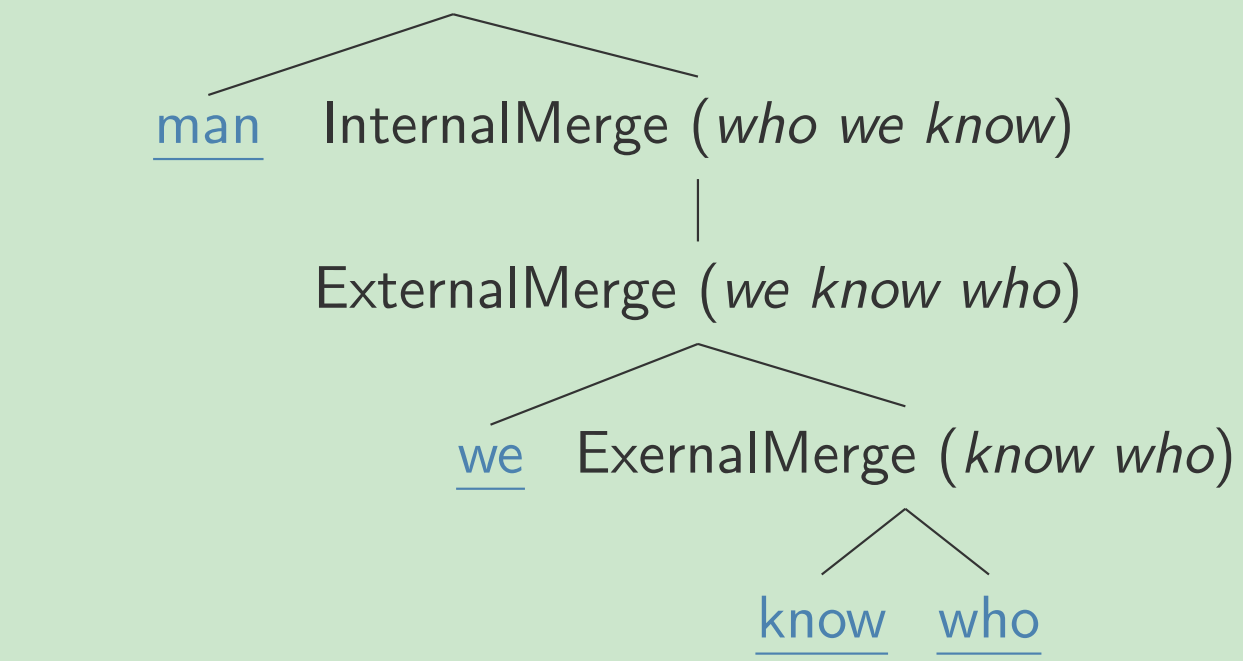
Internal Merge

Internal Merge is used to account for movement. Internal Merge takes some part of one linguistic object and adjoins it to the left of the respective object.

An example

(4) man who we know

The derivation



A consequence: Movement only moves expressions to c-commanding positions.

Internal Merge (or Movement)

(5) a. John asked who$_k$ Mary is talking to t$_k$.

b. I want to know who$_k$ Peter said that Tabitha believes that Susan heard that David thinks that Jonathan will say that Mega an will tell Jenny that Noor saw t$_k$ in Stata.

Movement

Who starts out its life where it receive its theta-role and then moves to the left periphery of the embedded clause.

- Before movement: D-structure, where everything appears where you would expect it to, given the X-bar schema and theta-role considerations.
- After movement: S-structure

Internal Merge (or Movement)

Where

What is the structural relationship between the position of the trace and the target position of movement?

Movement is always to a c-commanding position!

What

Does *who* move as an NP, or as an N^0?

Wh-movement is movement of the entire XP.

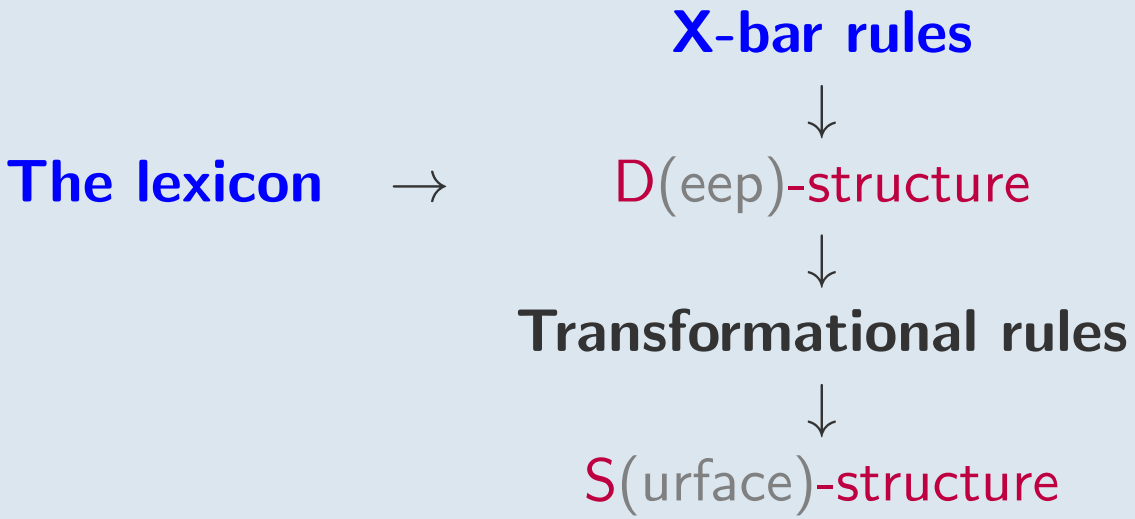
(6) I wonder which of the students you saw

Why

Motivation: Connecting the moved with the position where it would have received its theta-role. To keep the theory constrained.

GB vs. MP

GB



MP

External and Internal Merge (combination and movement) are applied in any order to derive a certain structure.

Outline

Bare Phrase Structure

Feature Checking

Generalizing Context-Free Grammar

do

(7) a. The cat plays with the dog.
b. The cat does not play with the dog.
c. Does the cat play with the dog?

(8) a. The cat went home.
b. The cat did not go home.
c. Did the cat go home?

We have two options:

1. Generate the verb and the inflectional material together and sometimes separate them.
2. Generate the verb and the inflectional material separately and sometimes make them *come together*.

Grammatical features (1)

Aspects of the Theory of Syntax

In the 1970s, Chomsky argued that the categorial distinction between nouns, verbs, adjectives and prepositions can be handled in terms of two sets of categorial features:

(9)

	V	N
verb	+	−
adjective	+	+
noun	−	+
preposition	−	−

Grammatical features (2)

Each functional category seems to be closely related to a corresponding lexical category:

- auxiliaries appear to be related to verbs,
- determiners to adjectives, and
- the complementiser for to the preposition for.

Functional feature

One way of handling both the similarities and differences between substantive categories and their functional counterparts is to use a functionality feature F.

(10)

main verb	$[-\mathrm{N}, +\mathrm{V}, -\mathrm{F}]$
auxiliary verb	$[-\mathrm{N}, +\mathrm{V}, +\mathrm{F}]$
complementiser	$[-\mathrm{N}, -\mathrm{V}, +\mathrm{F}]$
preposition	$[-\mathrm{N}, -\mathrm{V}, -\mathrm{F}]$

Grammatical features (3)

Selectional properties

Different verbs select (i.e. take) different types of complements

- the auxiliary might selects/takes an infinitive complement,
- the progressive auxiliary is selects a progressive participle complement, and
- the perfect auxiliary has selects a perfect participle complement, etc.

The selectional properties of words can be described in terms of selectional features.

Feature checking

Case: Assignment

The standard mechanics of Case Theory in GB assumes that

1. on lexical insertion DPs have no Case and
2. Case is acquired through the course of the derivation.

Case: Checking

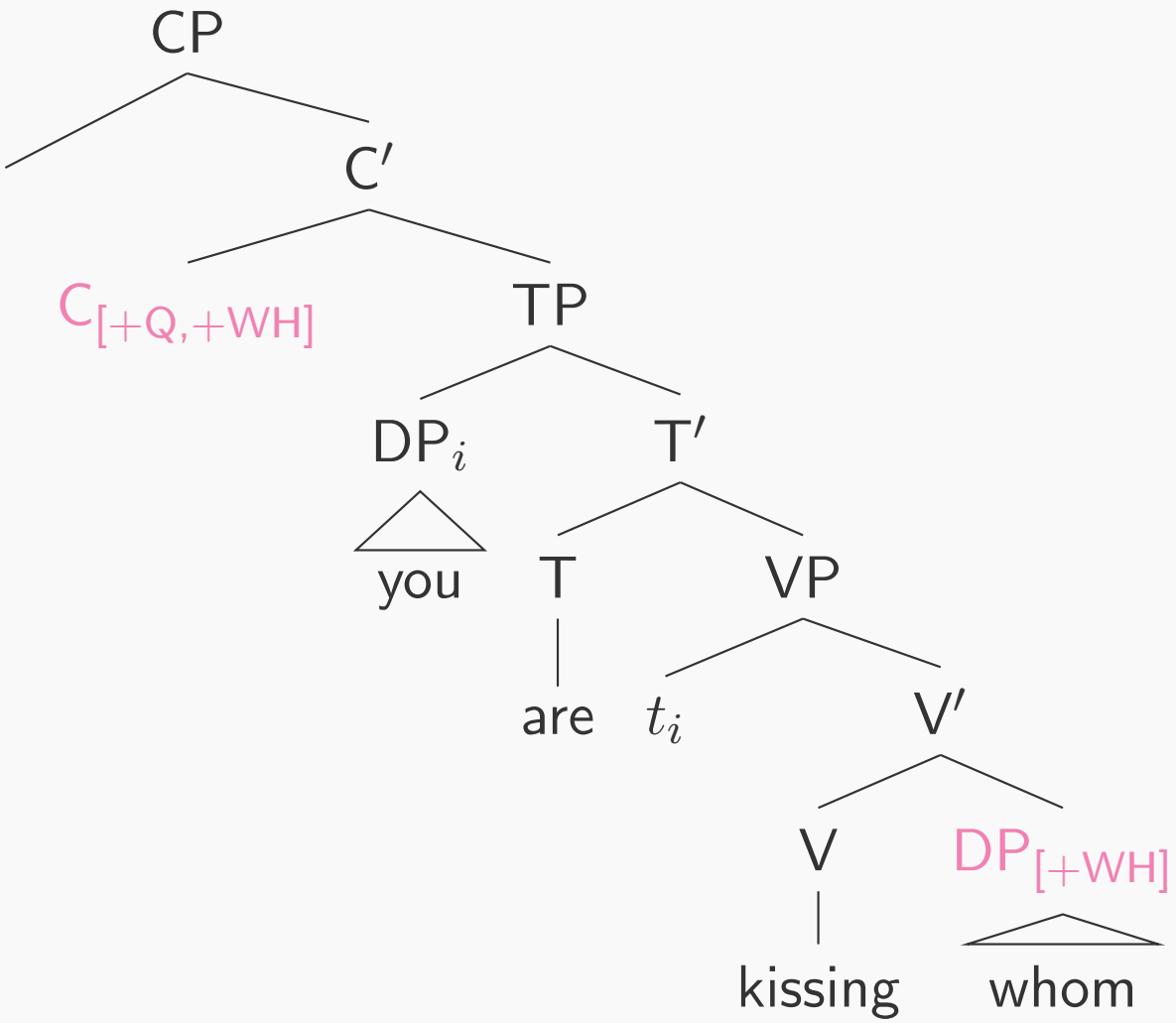
What happens if we assume that

1. DPs have Case-features at DS and
2. the appropriateness of these features is checked derivationally

(11) a. DS: $[_{\mathrm{TP}}\ \Delta$ was $+\ \mathrm{T}_{\mathrm{NOM}}\ [_{\mathrm{VP}}$ seen $\mathrm{she}_{\mathrm{NOM}}\ ]]$

b. SS: $[_{\mathrm{TP}}\ \mathrm{she}_{\mathrm{NOM}}$ was $+\ \mathrm{T}_{\mathrm{NOM}}\ [_{\mathrm{VP}}$ seen $]]$

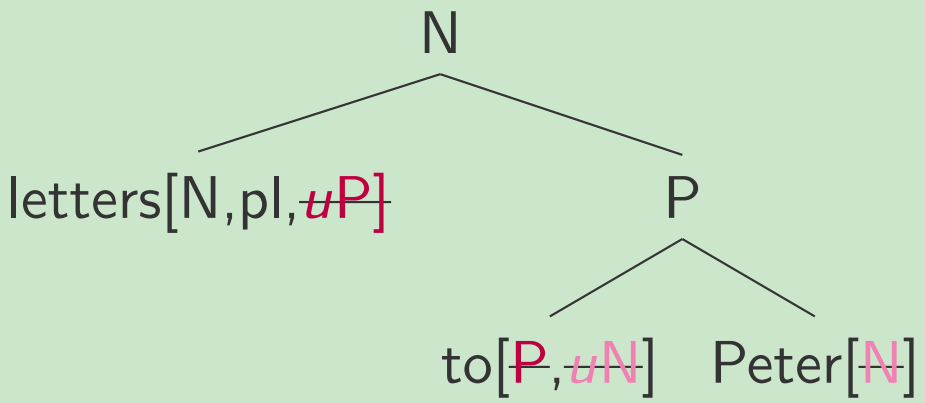
Move α in GB: Feature checking



Feature checking

The basic mechanism in Minimalist theories is feature checking.

(12) letters to Peter



- There are interpretable and uninterpretable features. E.g.,
  - singular/plural (interpretable, semantically relevant)
  - category (purely syntactic, cannot be interpreted semantcally)
- **Assumption**: all uninterpretable features have to be used up during the derivation of a complex linguistic object.

Outline

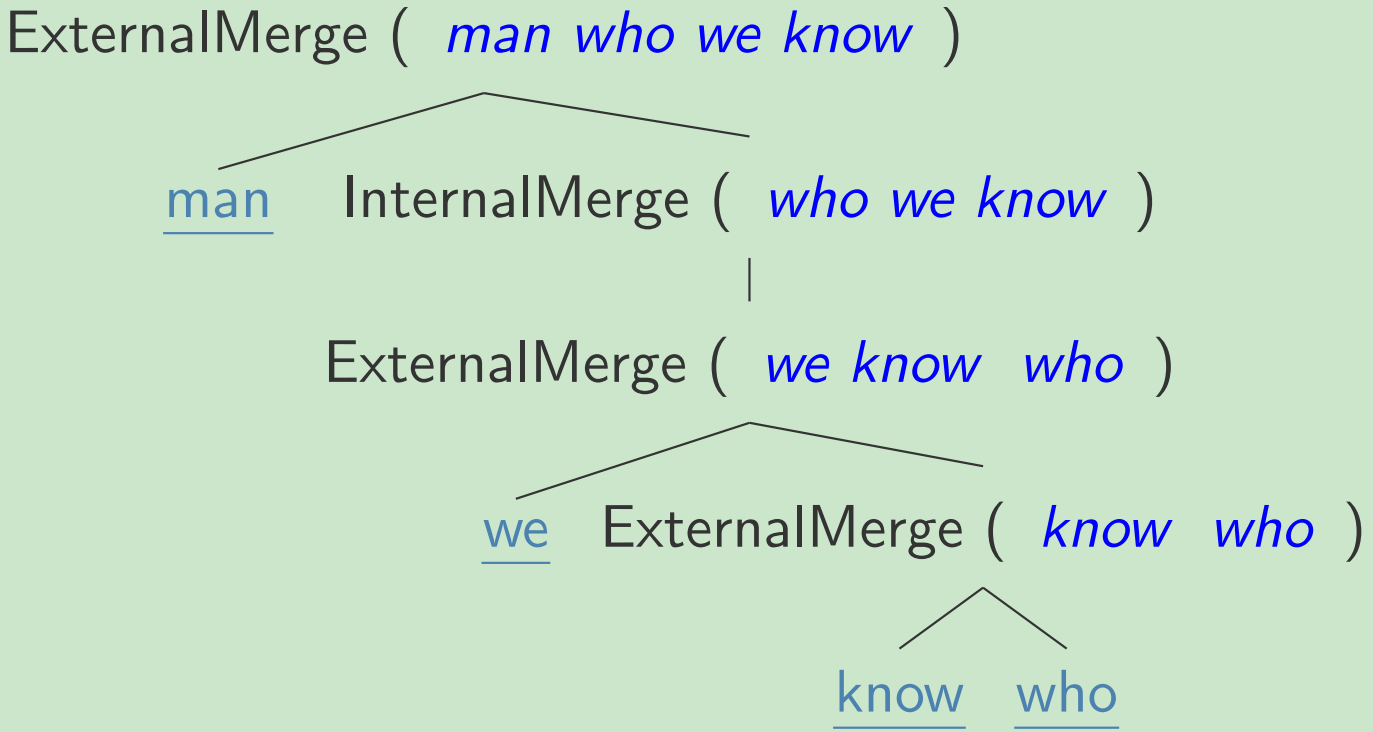
Bare Phrase Structure

Feature Checking

Generalizing Context-Free Grammar

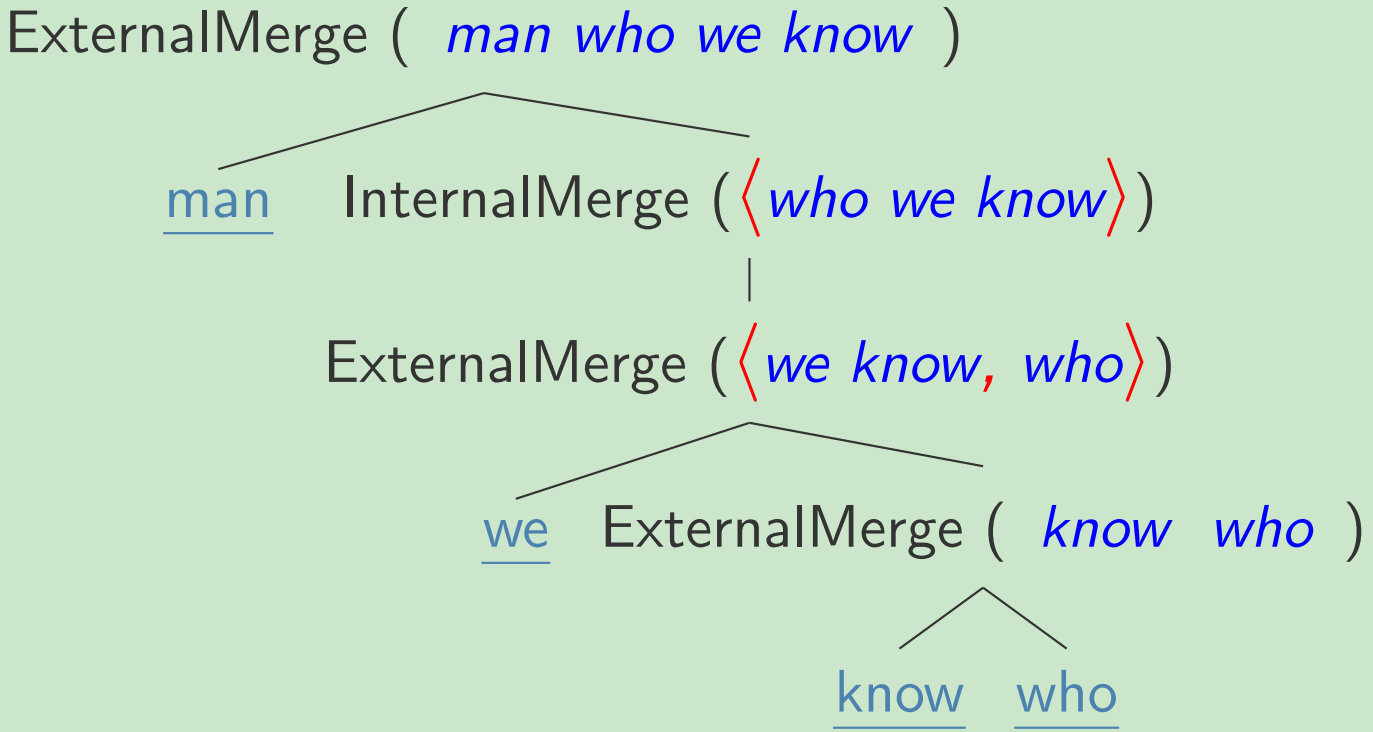
An example

The derivation



An example

The derivation

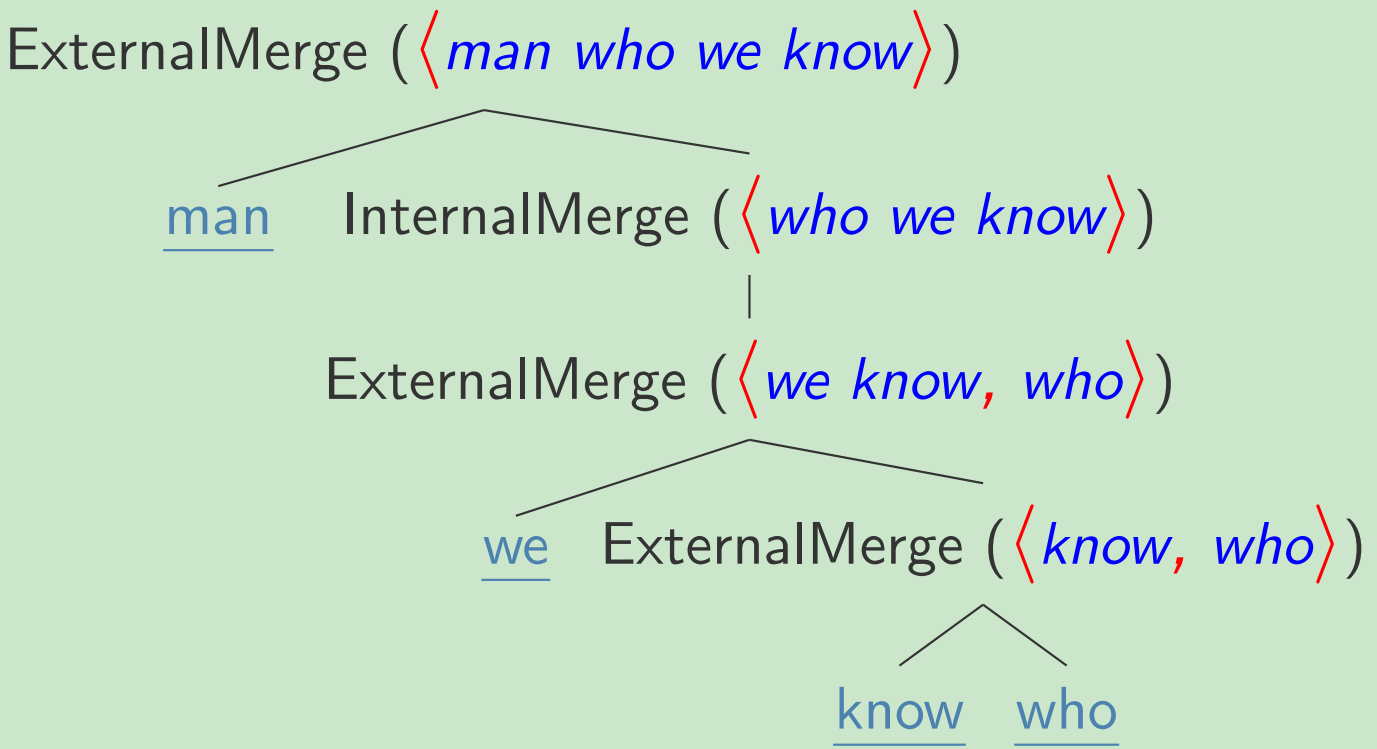


Key solution

Use tuples.

An example

The derivation



Key solution

Use tuples.

Concatenative and non-concatenative operations

Concatenative morphology:

play + ed	$\Rightarrow$	played
play + ing	$\Rightarrow$	playing
play + s	$\Rightarrow$	plays

Non-concatenative morphology:

(k,t,b) + (i,aa)	$\Rightarrow$	kitaab	(“book”)
(k,t,b) + (aa,i)	$\Rightarrow$	kaatib	(“writer”)
(k,t,b) + (ma,uu)	$\Rightarrow$	maktuub	(“written”)
(k,t,b) + (a,i,a)	$\Rightarrow$	katiba	(“document”)

Concatenative and non-concatenative operations

Concatenative syntax:

plays + tennis	plays tennis
plays + soccer	plays soccer
John + plays soccer	John plays soccer
Mary + plays soccer	Mary plays soccer

Non-concatenative syntax:

seems + (John, to be tall)	$\Rightarrow$	John seems to be tall
seems + (Mary, to be intelligent)	$\Rightarrow$	Mary seems to be intelligent
did + (John see, who)	$\Rightarrow$	who did John see
did + (Mary meet, who)	$\Rightarrow$	who did Mary meet

Multiple Context-Free Grammars (MCFGs)

$$st :: \mathsf{S} \leftarrow s :: \mathsf{NP}\ t :: \mathsf{VP}$$

An MCFG generalises to allow yields to be tuples of strings.

$$\langle t_2 s t_1 \rangle :: \mathsf{Q} \leftarrow \langle s \rangle :: \mathsf{NP}\ \langle t_1, t_2 \rangle :: \mathsf{VPWH}$$

which girl the boy says is tall::Q ← the boy::NP says is tall,which girl::VPWH

A nice introduction

Alexander Clark. *An introduction to multiple context free grammars for linguists*.

Minimalist Grammar

Tim Hunter's ESSLLI 2015 Course: *Sharpening the empirical claims of generative syntax*

`https://linguistics.ucla.edu/people/hunter/esslli2015/`