

Lec10: Constituent Structure

HUL 242

18/2

Constituent Structure

- Some words: *the a small nice big very boy book sees likes*
- Some good sentences:
 - the boy likes a book
 - the small boy likes the big boy
 - a very small nice boy sees a very nice book
- Some bad sentences:
 - *the boy the book
 - *nice boy likes book

Constituent is any syntactic unit, regardless of length or syntactic category

One possible way of bracketing

- Some words: *the a small nice big very boy book sees likes*
- Some good sentences:
 - (the boy) likes (a book)
 - (the small) boy (likes the big boy)
 - (a very small nice) boy (sees a very nice book)
- Some bad sentences:
 - *(the) boy (the book)
 - *(nice) boy (likes the book)

Can we find subsequences of words (constituents) which in some way behave alike?

Test for constituenthood

- Determine whether something is a constituent, we do one of the following:
 - substitute
 - move
 - question
 - focus

Substitution

A single word substitutes for a string of several words (same category)

The little boy fed the cat

Black cats detest green peas

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The little boy fed the cat → He fed him

Black cats detest green peas → They detest them

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The little boy fed the cat → *The little he fed him
Black cats detest green peas → *They detest green them

Substitution

In a different context ..

The little boy from next door fed the cat without a tail → *He
from next door fed her without a tail

These black cats detest those green peas → *These they detest
those them

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The little boy from next door fed the cat without a tail → He fed
her

These black cats detest those green peas → They detest them

Substitution

Put it on the table → Put it there

Put it on the table that's in the corner → *Put it there that's in the corner

Pronouns, forms like *it*, *there*, *here* are used for this test

Movement

Move a string from its position to the beginning of a sentence

I fed the cats → The cats, I fed ___

I fed the cats with the long fluffy tails → The cats with long fluffy tails, I fed

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She studied for the exam with the help of her friends →

With the help of her friends, she studied for the exam ___

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Ali Baba returned from his travels wiser than before →

Wiser than before, Ali Baba returned from his travels

Ungrammatical for non-constituents

I fed the cats with the long fluffy tails → *The cats, I fed with ___
long fluffy tails

She studied for the exam with the help of her friends →
*With the, she studied for the exam ___ help of her friends

Ali Baba returned from his travels wiser than before →
Wiser than, Ali Baba returned from his travels ___ before

Question formation

Can the string function as a short answer to a question?

What do you see?

The cats

The cats with long fluffy tails

Question formation

Can the string function as a short answer to a question?

What do you see?

The cats

The cats with long fluffy tails

How did she study for the exam?

With the help of her friends

Question formation

Can the string function as a short answer to a question?

What do you see?

The cats

The cats with long fluffy tails

How did she study for the exam?

With the help of her friends

How did Ali Baba return?

Wiser than before

Question formation

Can the string function as a short answer to a question?

What do you see the long fluffy tails?

*The cats with

Question formation

Can the string function as a short answer to a question?

What do you see the long fluffy tails?

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How did she study for the exam help of her friends?

*With the

Question formation

Can the string function as a short answer to a question?

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*The cats with

How did she study for the exam help of her friends?

*With the

How did Ali Baba return before?

*Wiser than

Focus

Bring the string into focus using a 'It is/was/ ... that sentence'

I fed the cat with the long fluffy tail yesterday → It was the
cat with the long fluffy tail that I fed yesterday

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Ali Baba returned from his travels wiser than before → It was wiser than before that Ali Baba returned from his travels.

Tests for strings including verbs

She will write a book →

Tests for strings including verbs

She will write a book →

Substitute with *do so*

She will do so

Tests for strings including verbs

She will write a book →

Substitute with *do so*

She will do so

Question test

What will she do?

Write a book *What will she do a book ?

Exceptions to constituent tests

Some strings are constituents but they fail the tests

We should invite the students and the teachers

We should invite the students and them

*The teachers, we should invite the students and --

*It is the teachers that we should invite the lawyers and --

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These are co-ordination structures or 'islands' from which movement is not allowed

Representing Constituents

- Once we have our constituents, we'd like to represent them

Brackets

[[The little boy] [fed [the cat]]]

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[[The little boy] [fed [the cat]]]

Labelled Brackets

We can label each bracket with the category that is the *head* of the constituent

boy, *fed*, *cat* are the syntactic heads of these phrases

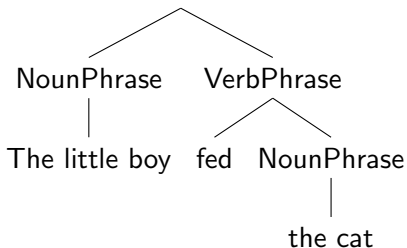
It is possible to have nested constituents

[NounPhrase The little boy] [VerbPhrase fed [NounPhrase the cat]]]

Representing Constituents

Trees

Labelled brackets can be converted to trees to more easily represent the hierarchical structures



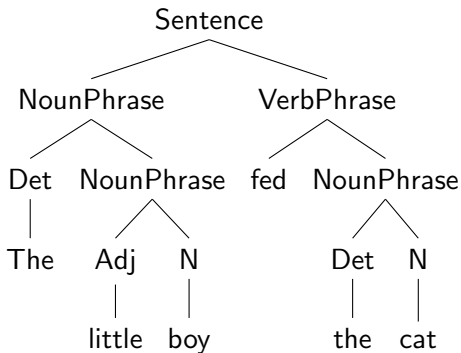
Representing Constituents

Trees

We can add labels for the terminal and non-terminal nodes

Non-terminals = constituents, Terminals= words

Each noun phrase should have a non-terminal node for a noun, its syntactic head



Context-free grammar

- If English grammar is based on a finite number of sentences (that a grammarian has seen)
- Can we come up with some general rules/laws that can generate all possible sentences?
- Chomsky: How do we choose/discover such a grammar that can generate grammatical sequences / reject ungrammatical ones?

Re-look at language as a set of sentences constructed from a finite set of symbols

Therefore grammar is a notation used to generate all the members of the set of sentences

Context-free grammars

- A formal device, (not a linguistic theory) that can represent grammatical sequences of a language in terms of the foll:
 - terminals
 - non-terminals
 - a start symbol
 - rules (re-write rules)
- Begin with the start symbol, apply the rules and stop when only the terminals are left

A CFG fragment for English

$S \rightarrow NP VP$

$VP \rightarrow V NP$

$NP \rightarrow Det N \mid Det NP \mid Adj N$

$N \rightarrow boy \mid cat$

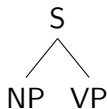
$V \rightarrow fed \mid likes$

$Adj \rightarrow little \mid big$

$Det \rightarrow the \mid a$

String derivation

Derive a string based on this re-write system $S \rightarrow NP VP$



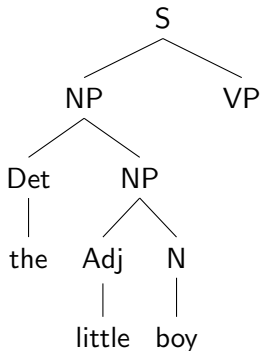
String derivation

NP \rightarrow Det N | Det NP | Adj N

Det \rightarrow the | a

N \rightarrow boy | cat

Adj \rightarrow little | big

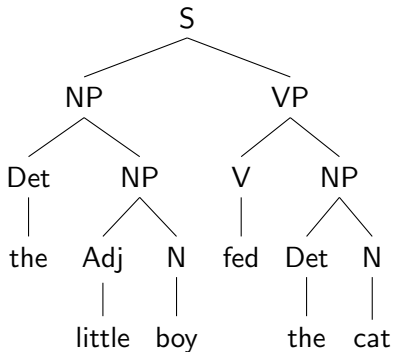


String derivation

VP \rightarrow V NP

V \rightarrow fed | likes

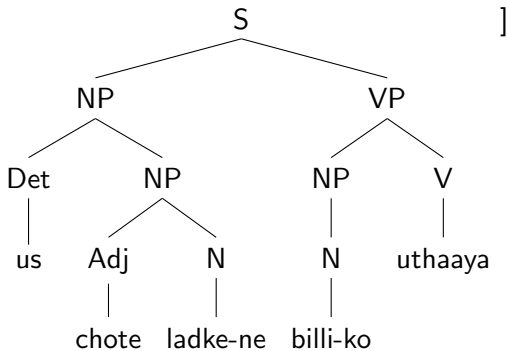
N \rightarrow boy | cat



- Formal languages: formal device to generate a set of strings (such as a CFG)
- Generative grammar approach in which a linguistic theory enumerates all possible strings/structures in a language (=competence)
- Chomskyan theories do not really use formal devices they use CFG + informally defined transformations
- In most linguistic theories, there is a need to represent not just phrase structure but also grammatical relations (dependencies)

Constituency in Hindi

us chote ladke ne billi ko uthaaya



Head-initial and head-final languages

Verbs in English are generally *before* their (objects) : *fed the cat*
but not **the cat fed*

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Adpositions precede the noun *with a hammer* → prepositions
Adpositions follow the noun *hathodi se* → postpositions

Exploring word orders

Head-directionality

English: head-initial language [SVO]

Hindi: head-final languages [SOV]

Languages vary with respect to how strict they are when following this

<http://wals.info/>

Verb Phrases

She will write a book → What will she do?

The ice will melt today → What will the ice do?

She knows his parents → (?) What will she do?

Will the *do ..so* substitution work here?

Verb Phrases

An additional lexical property exists i.e. the argument-taking capacity of the verb

Predicates and Valency

Predicate=lexical item that can combine with argument(s)

Valency=number of arguments it requires

melt is a one-place predicate i.e. requires only one argument

know, *write* are two-place predicates i.e. require two arguments

Although *know* is a stative verb and *write* is not

Reference

- The material in these slides was taken (sometimes verbatim) from Owen Rambow and UPenn's syntax course (<http://www.ling.upenn.edu/~beatrice/syntax-textbook/ch2.html>)