

Hierarchical structure

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Hierarchical
structure

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Hier.Phr.Str.

Embedding

Hier. word str.

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What are the two meanings of *I'm a big dog man*?

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What are the two meanings of *I'm a big dog man*?

1. I'm a man who likes big dogs ('big' = LARGE)
2. I'm a man who is keen on dogs ('big' = KEEN)

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What are the two meanings of *I'm a big dog man*?

1. I'm a man who likes big dogs ('big' = LARGE)
2. I'm a man who is keen on dogs ('big' = KEEN)

Each different meaning corresponds to a different syntactic structure.

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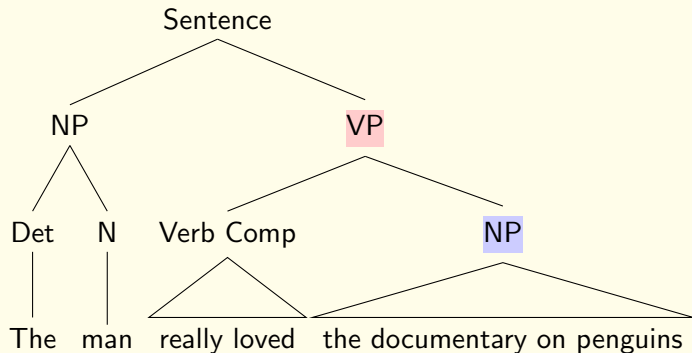
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(1) The man _{VP} [really loved _{NP} [the documentary on penguins]]

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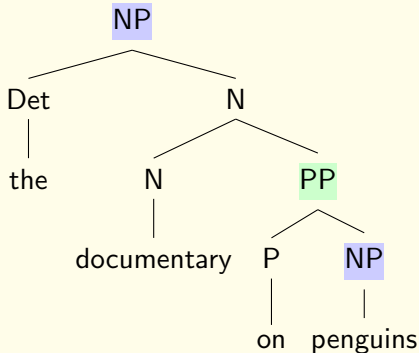
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Hierarchical phrase structure

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The **NP** [documentary **PP** [on [NP Penguins]]]



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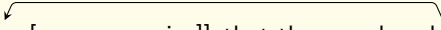
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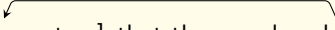
Embedding of one phrase inside another

If we move a phrase we have to move all embedded phrases.

It was [_{NP}the documentary [_{PP}on penguins]] that the man loved *t*



*It was [the documentary] that the man loved *t* [on penguins]



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Hierarchical structure in words

un- touch -able -s
un- root -able -s
un- root suff. -s
pref. stem -s
stem suff.

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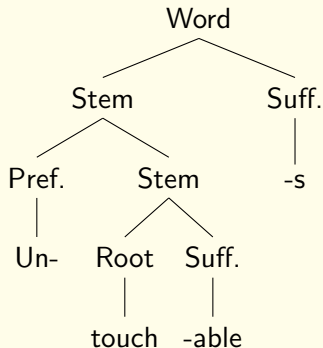
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Hierarchical structure in words



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Multiple syntactic presentations

(3) I'm a big dog man

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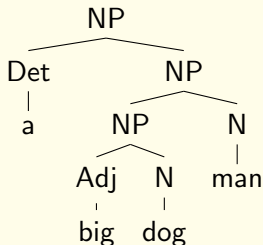
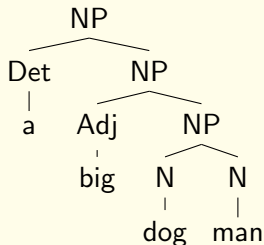
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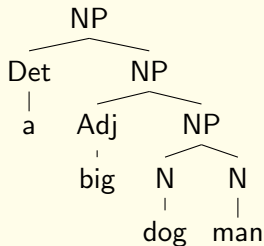
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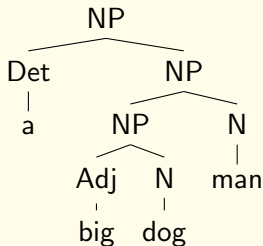
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Keen on all dogs



Likes big dogs only

Syntactic ambiguity in sentences

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Another example

(4) The man saw the woman with the binoculars

How is this ambiguous?

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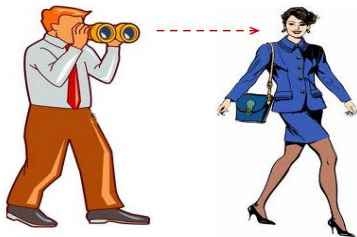
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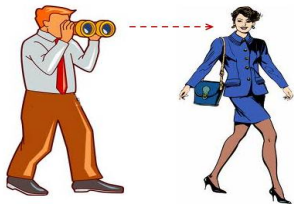
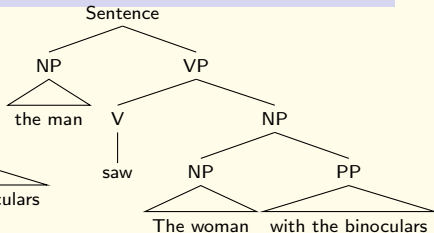
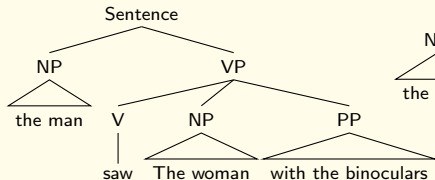
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Syntactic ambiguity in sentences

The man saw the woman with the binoculars



Syntactic ambiguity in sentences



Syntactic ambiguity in sentences

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The following sentences are syntactically ambiguous. In what way?

1. I saw her duck.
2. The chickens are too hot to eat
3. I said I would see you on Tuesday.
4. Sue adores men who love women who don't smoke.
5. The parents of the bride and the groom were waiting outside.

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- ▶ I saw her duck
I saw [NP her duck] / I saw [NP her] [VP duck]
- ▶ The chickens are too hot to eat
Interpretation A; the chickens are the subject of *eat*,
Interpretation B; the chickens are the object of *eat*.
- ▶ I said I would see you on Tuesday.
Does *on Tuesday* modify the verb *see* or the verb *say*?

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- ▶ Sue adores men who love women who don't smoke

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Syntactic ambiguity in sentences

- ▶ Sue adores men who love women who don't smoke
Sue adores non-smoking men who love women
Sue adores men who love non-smoking women
Ambiguity stems from *who don't smoke* - does this refer to *men* or *women*?
- ▶ The parents of the bride and the groom were waiting outside.

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- ▶ Sue adores men who love women who don't smoke
Sue adores non-smoking men who love women
Sue adores men who love non-smoking women
Ambiguity stems from *who don't smoke* - does this
refer to *men* or *women*?
- ▶ The parents of the bride and the groom were waiting
outside.
[NP The parents of the bride] and [NP the groom] were
waiting outside
[NP The parents of the bride and the groom] (i.e. both
sets of parents) were waiting outside

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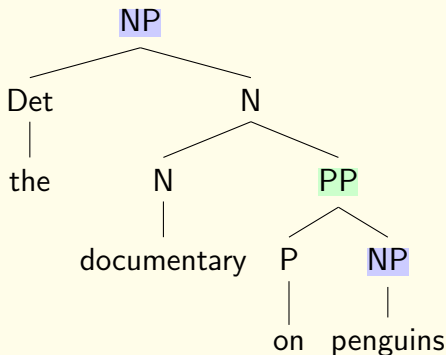
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It was [_{NP}the documentary [_{PP}on penguins]] that the man loved *t*



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Recursion is a very important property of language.

It refers to constructions where phrases are embedded in phrases **of the same type**.

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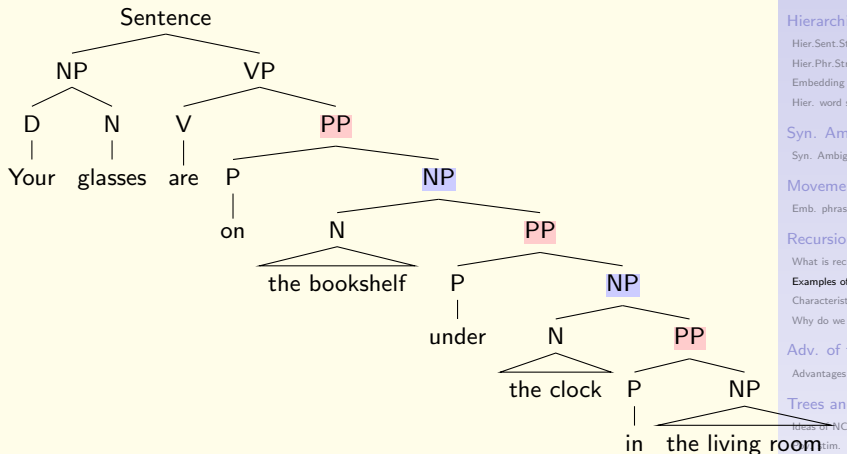
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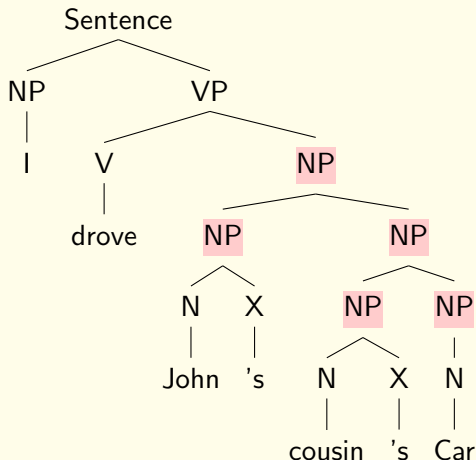
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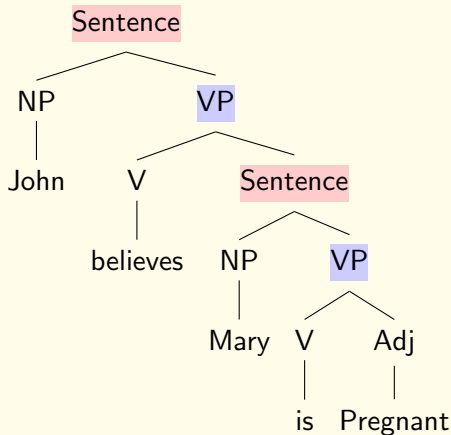
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And again and again. . .

- *It is on the bookshelf under the clock in the living room at number 10 Grosvesnor street in the East End of London*

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And again and again. . .

- *It is on the bookshelf under the clock in the living room at number 10 Grosvesnor street in the East End of London*
- *I drove John's cousin's auntie's builder's hairdresser's car*

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And again and again. . .

- *It is on the bookshelf under the clock in the living room at number 10 Grosvesnor street in the East End of London*
- *I drove John's cousin's auntie's builder's hairdresser's car*
- *John believes that Sally believes that Cassandra believes that Rufus believes that Mary is pregnant.*

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- Your glasses are on the bookshelf under the clock in the living room \Rightarrow

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Why do we need recursion?

- Your glasses are on the bookshelf under the clock in the living room \Rightarrow
There is a clock in the living room. The bookshelf is under this. Your glasses are on that bookshelf.

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Why do we need recursion?

- Your glasses are on the bookshelf under the clock in the living room \Rightarrow
There is a clock in the living room. The bookshelf is under this. Your glasses are on that bookshelf.
- I drove John's cousin's car \Rightarrow

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There is a clock in the living room. The bookshelf is under this. Your glasses are on that bookshelf.
- I drove John's cousin's car \Rightarrow
I drove a car. John has a cousin. The car belongs to the cousin.

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There is a clock in the living room. The bookshelf is under this. Your glasses are on that bookshelf.
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I drove a car. John has a cousin. The car belongs to the cousin.
- John believes Mary is pregnant \Rightarrow

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- Your glasses are on the bookshelf under the clock in the living room \Rightarrow
There is a clock in the living room. The bookshelf is under this. Your glasses are on that bookshelf.
- I drove John's cousin's car \Rightarrow
I drove a car. John has a cousin. The car belongs to the cousin.
- John believes Mary is pregnant \Rightarrow
John has a belief. The following is his belief... Mary is pregnant.

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We can see that trees are extremely useful means of representing sentences;

1. They can represent hierarchical structure
2. They can represent syntactic ambiguity
3. They can represent movement processes and how these apply to embedded phrases
4. They can represent recursion

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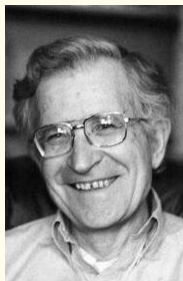
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The ideas of Noam Chomsky



Generative syntax

The main assumption of this approach is that there is a **poverty of the stimulus**

Language input is not sufficiently rich to account for children's linguistic knowledge

i.e. the *stimulus* is too *poor*

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The Poverty of the Stimulus

At aged $2\frac{3}{4}$ children are capable of forming very complex structures such as questions and negatives

But rudimentary mathematical abilities

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At aged $2\frac{3}{4}$ children are capable of forming very complex structures such as questions and negatives

But rudimentary mathematical abilities

⇒ we are born with an innate knowledge of language, sometimes called **Universal Grammar**.

Universal Grammar and trees

Hierarchical
structure

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According to Chomsky, Universal Grammar is a system which is optimised for building trees

So, the trees we have drawn above provide an insight in our innate knowledge of language

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The importance of recursion

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In a recent article (Hauser, M. D., Fitch, W. T., & Chomsky, N. (2002). The faculty of language: what is it, who has it, and how did it evolve? Science, 298. [Click Here.](#)) Chomsky "lets go" of a number of different components of Universal Grammar

But they insist that recursion is a key principle.

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Daniel Everett

Pirahã language does not actually contain recursion

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Recursion in other domains?



Marilyn Monroe's character thinks [that Tony Curtis's character (Joe) is a woman called Josephine]

We therefore mentally represent the situation described by the recursive sentence *Marilyn believes that Josephine is a woman*

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Concepts involving recursion

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Concepts involving recursion

Pregnancy (a person inside a person)

Russian dolls (a doll inside a doll inside a doll inside a doll, etc.)

Postal addresses (1 Smith Street, Covington, Berkshire, England, Europe, the Northern Hemisphere, the World, the Solar System, the Milky Way, the Universe, the Multiverse).

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Presence of multiple recursion in spoken language

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Theoretically, we can say John believes that Sally believes that Cassandra believes that Rufus believes that Mary is pregnant

I drove John's cousin's auntie's builder's hairdresser's car

But do we actually do this?

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What grammatical characteristic do the following song lyrics have in common.

When I fall in love, it will be forever (sung by Nat King Cole)

Wherever I lay my hat, that's my home (sung by Marvin Gaye)

Whenever/wherever we're meant to be together, I'll be there and you'll be near (sung by Shakira)