Hierarchical structure

Nick Riches

Newcastle University

Compiled on February 8, 2019

Hierarchical structure

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Homework

Hier.Sent.Str.

Embedding

Hier. word str.

yn. Ambiguity

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Emb. phrases

ecursion

hat is recursion?

xamples of recursion

Characteristics of recursion
Why do we need recursion?

v. of trees

Advantages

es and UG

Ideas of NC

Pov. stim.

ie UG deba

Imp of rec.

A language without recursion?

Recursion in othe 1 d / 35ns?

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

Hierarchical sentence structure



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Trees and UG

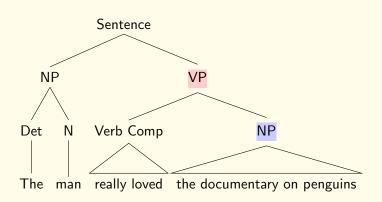
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Hierarchical phrase structure

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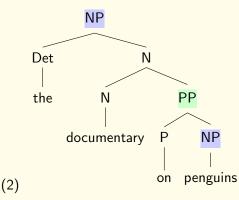
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Recursion in othe5d/r35ns?

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



Embedding

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Why do we need recursion?

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Embedding of one phrase inside another

It was [NPthe documentary [PPon penguins]] that the man loved t

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

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

Hierarchical structure in words

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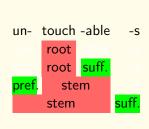
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Recursion in othe7d/n35ns?



Hierarchical structure in words

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Recursion in othe8d/r35ns?

Stem Suff.

Pref. Stem -s

Root Suff.

touch -able

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Syntactic ambiguity

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Recursion in othe9d/n35ns?

Multiple syntactic presentations

(3) I'm a big dog man



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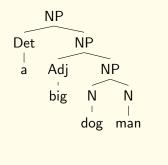
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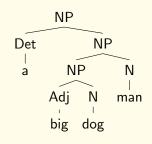
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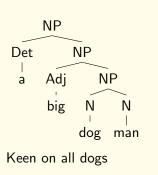
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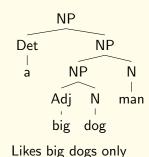
Recursion in oth 10d n 35ns?











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Recursion in other defrates?

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Syn. Ambiguity

Another example

(4) The man saw the woman with the binoculars

How is this ambiguous?

Emb. phrases

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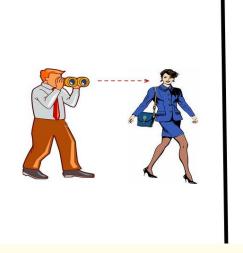
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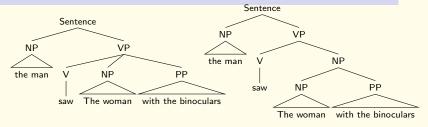
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Recursion in oth 12d/n35ns?

The man saw the woman with the binoculars











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Recursion in oth 15d r35ns?

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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Recursion in oth 16d/n35ns?

I saw her duck
I saw [NP her duck] / I saw [NP her] [√P 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?

Sue adores men who love women who don't smoke

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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.

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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 outisde

[NP The parents of the bride and the groom] (i.e. both sets of parents) were waiting outside

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Movement of embedded phrases

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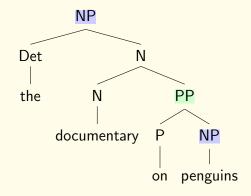
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Recursion in oth 8d r35 s?

It was [NPthe documentary [PPon penguins]] that the man loved t



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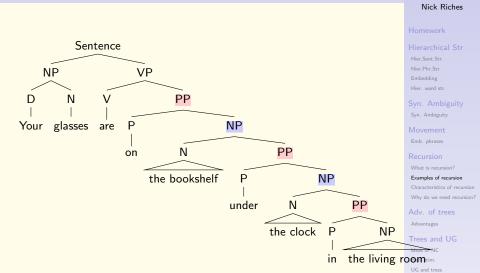
Recursion in oth 19d/n35ns?

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

Recursion is a very important property of language.

Examples of recursion

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Recursion in otl20d/n35ns?

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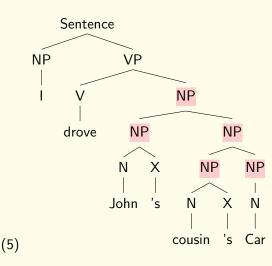
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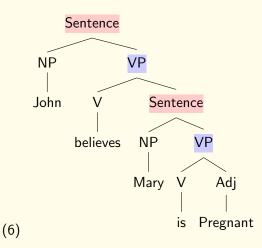
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And again and again. . .

• 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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Recursion in otl23d/n35ns?

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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Characteristics of recursion Why do we need recursion?

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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.

Characteristics of recursion



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Why do we need recursion?

living room \Rightarrow

• Your glasses are on the bookshelf under the clock in the

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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.

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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 ⇒

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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 ⇒ I drove a car. John has a cousin. The car belongs to the cousin.

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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 ⇒ I drove a car. John has a cousin. The car belongs to the cousin.
- John believes Mary is pregnant⇒

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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 ⇒ I drove a car. John has a cousin. The car belongs to the cousin.
- John believes Mary is pregnant⇒ John has a belief. The following is his belief... Mary is pregnant.

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The advantages of trees

Imp of rec.

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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 amiguity
- 3. They can represent movement processes and how these apply to embedded phrases
- 4. They can represent recursion

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Trees and Chomsky's Universal Grammar

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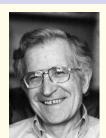
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The ideas of Noam Chomsky



Generative syntax

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

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

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

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The Poverty of the Stimulus

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Recursion in otl28d/n35ns?

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

But rudimentary mathematical abilities

The Poverty of the Stimulus

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At aged $2\frac{3}{4}$ children are capable of forming very complex

But rudimentary mathematical abilities

structures such as questions and negatives

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

Universal Grammar and trees

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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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Contraction and involu

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The advantages of trees

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Recursion in oth 30th n 35 ns?

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.

A language without recursion?



Daniel Everett

Pirahã language does not actually contain recursion

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Recursion in otl31d/n35ns?

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 Hierarchical structure

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Recursion in oth 33d on 35ns?

Concepts involving recursion

Recursion in other domains?

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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).

Presence of multiple recursion in spoken language

Nick Riches

omework

Hierarchical

structure

lierarch

Hier.Phr.Str. Embedding Hier. word str.

yn. Ambi Syn. Ambiguit

Movement Emb. phrases

b. phrases

irsion

is recursion?

of recursion

Why do we need recursion?

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Trees and UG

Pov. stim. UG and trees

UG del

Imp of rec.

A language without recursion?

Recursion in ott34d/n35ns?

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Theoreticaly, 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?

Homework

Hierarchical structure Nick Riches

Hier, word str.

Emb. phrases

Why do we need recursion?

Ideas of NC

Pov stim

Imp of rec.

A language without

Recursion in oth35d/n35ns?

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)