

# Language and Mind: Slideshow 8

LING 222–Fall 2017

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# Outline

Structural ambiguity

Auxiliary inversion

wh-movement

D-structure, S-structure, and Transformations

Long distance wh-movement

How does long-distance movement work?

Constraints on wh-movement

# Keep the big picture in mind!

*“Because evidence from Japanese can evidently bear on the correctness of a theory of  $S_0$ , it can have indirect—but very powerful—bearing on the choice of the grammar that attempts to characterize the I-language attained by a speaker of English.” [Chomsky’s Knowledge of Language (1986:38)]*

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# Structure dependent phenomena

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## Syntactic ambiguity

- ▶ We can account for (some) ambiguous strings by positing different structures for the various interpretations:
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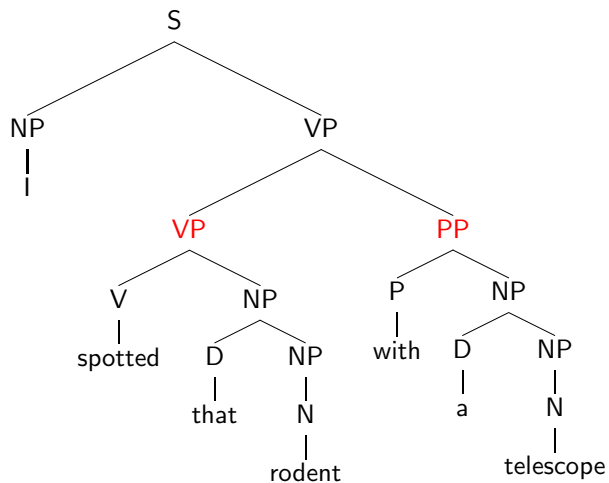
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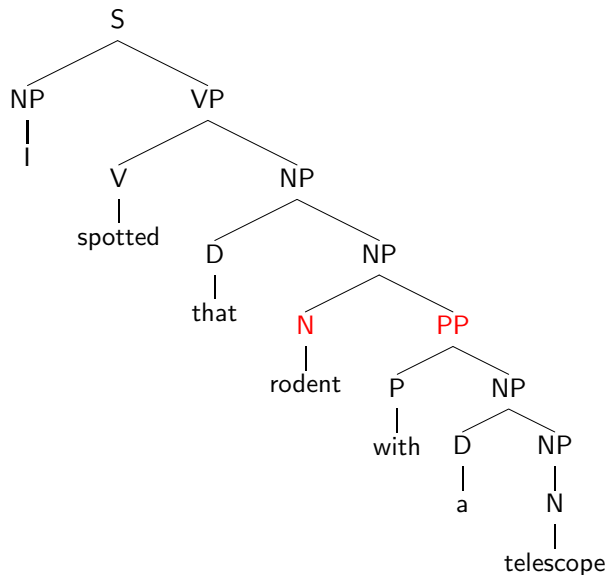
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# with a telescope rodent spotting



# *with a telescope* rodent



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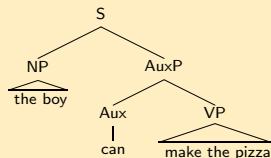
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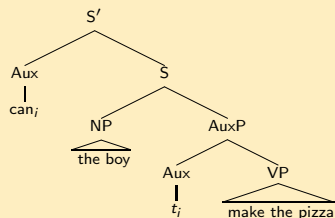
Constraints on wh-movement

# YES/NO questions transformationally (using trace)

## Deep Structure

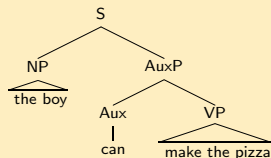


## Surface Structure

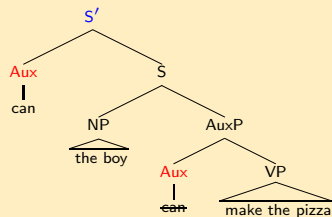


# YES/NO questions transformationally (using copy)

## Deep Structure



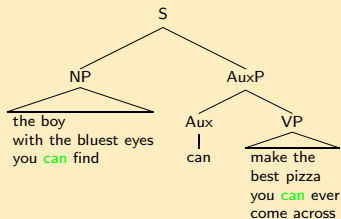
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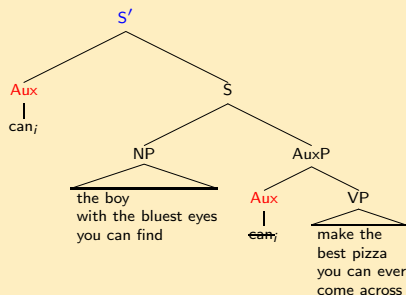
# YES/NO questions in sentences with more than one Aux

The transformation is **STRUCTURE DEPENDENT**—it finds the Aux of the *main* (largest) sentence.

## Deep Structure



## Surface Structure



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# Shortcomings of PSGs:

*Which powder will the man sprinkle?*

- ▶ The verb *sprinkle* has no object
- ▶ The NP *which powder* is not in subject or object position
- ▶ *which powder* seems to be interpreted as the object of *find*, but it is in the wrong place
- ▶ *which powder* is the kind of thing that gets *sprinkled*, whereas *Which car will the man sprinkle?* is weird

# Shortcomings of PSGs: displaced constituents

## Solution: Transformations

Once again, we need *transformations* or *movement*.

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**D-structure, S-structure, and Transformations**

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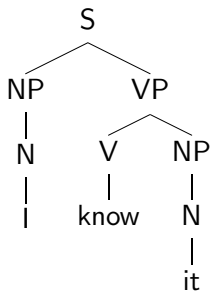
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Constraints on wh-movement

# D-structure, S-structure, and Transformations

I know it.

- ▶  $S \rightarrow NP VP$
- ▶  $VP \rightarrow V NP$



# D-structure, S-structure, and Transformations

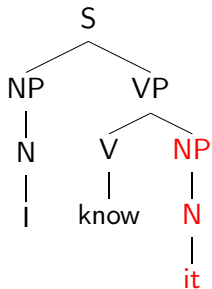
- ▶ I know **it**.
- ▶ I know **he ate a frog**.

**he ate a frog** has the same distribution as **it**—they both follow the verb.

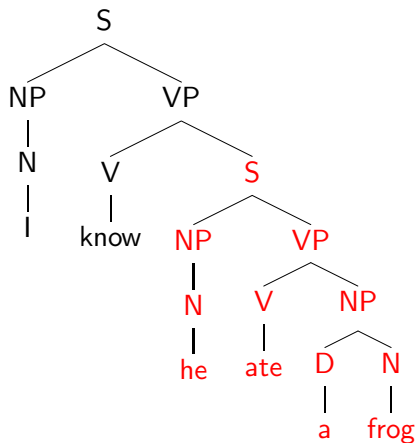
# D-structure, S-structure, and Transformations

- ▶ I know **it**.
- ▶ I know **he ate a frog**.
- ▶ VP  $\rightarrow$  V **NP**
- ▶ VP  $\rightarrow$  V **S**

# D-structure, S-structure, and Transformations



# D-structure, S-structure, and Transformations



# D-structure, S-structure, and Transformations

How about this one?

- ▶ I know **what he ate**.

# D-structure, S-structure, and Transformations

- ▶ I know **it**.
- ▶ I know **he ate a frog**.
- ▶ I know **what he ate**.
  
- ▶  $VP \rightarrow V$  **NP**
- ▶  $VP \rightarrow V$  **S**

# D-structure, S-structure, and Transformations

What kind of PSRs could generate **what he ate**?

# D-structure, S-structure, and Transformations

I know  $\text{what}_N \text{ he}_N \text{ ate}_V$ .

- ▶ what is  $\text{what}$ ?
- ▶  $\text{what}$  is a pronoun, i.e. a noun
- ▶  $S \rightarrow NP NP VP \text{ ??!!??}$

# D-structure, S-structure, and Transformations

- ▶ I know [what<sub>N</sub>] he<sub>N</sub> ate<sub>V</sub>.
- ▶ I know [which<sub>D</sub> fish<sub>N</sub>] he ate.
- ▶ I know [which<sub>D</sub> red<sub>A</sub> fish<sub>N</sub>] he ate.
- ▶ I know [which<sub>D</sub> red<sub>A</sub> fish<sub>N</sub> [PP from<sub>P</sub> the<sub>D</sub> tank<sub>N</sub> ] ] he ate.
  
- ▶ NP → (D) (A) N (PP)
- ▶ S → NP NP VP

# D-structure, S-structure, and Transformations

If we assume that this is a valid PS Rule, then we have two rules for analyzing sentences in English:

- ▶  $S \rightarrow NP NP VP$
- ▶  $S \rightarrow NP VP$

This leads to an increase of the number of rules that we posit for a language.

# D-structure, S-structure, and Transformations

Here are more possibilities:

- ▶ I know why he ate a frog.

S → AdvP NP VP

# D-structure, S-structure, and Transformations

I know in what place he ate a frog

S  $\rightarrow$  PP NP VP

# D-structure, S-structure, and Transformations

Do we really have so many rules for analyzing S?

- ▶  $S \rightarrow NP VP$
- ▶  $S \rightarrow NP NP VP$
- ▶  $S \rightarrow AdvP NP VP$
- ▶  $S \rightarrow PP NP VP$

# D-structure, S-structure, and Transformations

Hmmm . . . it seems that the verb 'ate' is the same (transitive) verb in both (a) and (b)

(a) I know he ate a frog

(b) I know what he ate.

in spite of the fact that in (a) there is a NP following the verb and in (b) there is no NP after the verb.

However, the rule for VPs including transitive verbs is:

- ▶  $VP \rightarrow V NP$

# D-structure, S-structure, and Transformations

In both (a) and (b) he ate something—a frog in (a) and **what** in (b).

We'll assume that **what** starts out in the same syntactic position as **a frog**, namely after the verb, and then it MOVES to the Sentence initial position.

(a) I know he ate **a frog**

(b) I know **what** he ate ~~what~~.

All *wh*-constituents in English have this property, i.e. they move from their initial position to a sentence initial position. (*what*, *which*, *who*, *why*, *when*, *where*, *how*)

# What evidence do we have for movement?

Semantic restrictions on the complement are preserved under movement.

- ▶ I know [he sprinkled **orange juice** on the carpet].
- ▶ ?? I know [he sprinkled **a red brick/ the fat mailman** on the carpet].
- ▶ I know [**which juice** he sprinkled on the carpet].
- ▶ ?? I know [**which brick/ which mailman** he sprinkled on the carpet].

# What evidence do we have for movement?

## West Ulster English

- ▶ **What all** did you give — to the kids?
- ▶ **What** did you give — **all** to the kids?
- ▶ **Who all** did you send — to the shops?
- ▶ **Who** did you send — **all** to the shops?
- ▶ **What all** did you do — after school today?
- ▶ **What** did you do — **all** after school today?
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# D-structure, S-structure, and Transformations

- ▶ Movement is an example of a syntactic operation or **Transformation**.
- ▶ (Syntactic) operations/ transformations apply to an input and yield an output.
- ▶ The input of syntactic operations/ transformations is called **Deep-structure**
- ▶ The output is called **Surface Structure**

# D-structure, S-structure, and Transformations

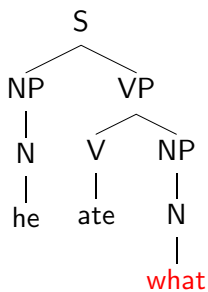
- ▶ **Deep Structure**—shows lexical properties like the fact that a verb is transitive or intransitive, that a preposition like *with* needs an object; shows a simple relationship between semantics and constituent structure.
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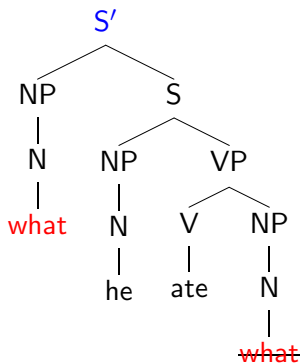
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# D-structure, S-structure, and Transformations

(I know)



Deep Structure



Surface Structure

# D-structure, S-structure, and Transformations

What's the gain?

- ▶ We get to keep our PSRs unaffected
- ▶ We can explain the West Ulster facts
- ▶ We can explain the 'sprinkling' effects

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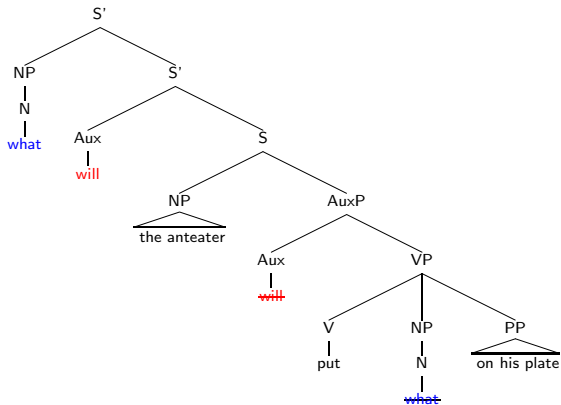
More examples

- ▶ The anteater **will** put **ants** on his plate.
- ▶ **What will** the anteater put on his plate?

# D-structure, S-structure, and Transformations

What ~~will~~ the anteater ~~will~~ put ~~what~~ on his plate?

# D-structure, S-structure, and Transformations



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How does long-distance movement work?

Constraints on wh-movement

Long distance dependencies without limit:

- ▶ *What can John make?*
- ▶ *What does Mary think John can make?*
- ▶ *What should Bill claim Mary thinks John can make?*
- ▶ ...

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# One fell swoop or step-by-step?

- ▶ [**What** did [ Martha tell Ben [ Barbie said [ Bernie knows [ Adam wants ~~what~~ ]]]]]
- ▶ [ ~~What~~ did [ Martha tell Ben [ ~~what~~ Barbie said [ ~~what~~ [ Bernie knows [ ~~what~~ Adam wants ~~what~~ ]]]]]

# One fell swoop or step-by-step?

- ▶ [**What** did [ Martha tell Ben [ Barbie said [ Bernie knows [ Adam wants **what** ]]]]]
- ▶ [**What** did [ Martha tell Ben [ **what** Barbie said [ **what** [ Bernie knows [ **what** Adam wants **what** ]]]]]

# All those intermediate positions are possible

- a. [ Martha told Ben [ that Barbie said [ that Bernie knows [ Adam wants **this** ]]]]
- b. [ Martha told Ben [ that Barbie said [ that Bernie knows [ **what** Adam wants ~~what~~ ]]]]
- c. [ Martha told Ben [ that Barbie said [ **what** Bernie knows [~~what~~ Adam wants **what** ]]]]
- d. [ Martha told Ben [ **what** Barbie said [ ~~what~~ Bernie knows [~~what~~ Adam wants **what** ]]]]]]
- e. [ **What** did [S Martha tell Ben [ ~~what~~ Barbie said [ **what** [S Bernie knows [ ~~what~~ Adam wants **what** ]]]]

# West Ulster again

- ▶ What all did you eat x?
- ▶ What did you eat x all?
- ▶ What all did Mary say [ you ate x ]?
- ▶ What did Mary say [ you ate x all ]?
- ▶ What did Mary say [ y all that you ate x ]?

This suggests movement through intermediate position.

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# Spanish optionally allows subject to appear VP

- a. **Maria** contestó la pregunta  
Maria answered the question  
'Maria answered the question.'
- b. Contestó la pregunta **Maria**  
Answered the question Maria  
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# In wh-questions, inversion is *not* optional

- a. Qué querían **esos dos**?  
What wanted those two  
'What did those two want?'
- b. \*Qué **esos dos** querían?—ungrammatical  
What those two wanted  
'What did those two want?'

# Generalization

When a wh-phrase is in the left edge of a clause, inversion is obligatory; otherwise, it is optional.

[Juan pensaba [que Pedro le había dicho [que la revista había publicado ya el artículo]]]

Juan thought that Pedro to-him had said that the journal had published already the article.

'Juan thought that Pedro had told him that the journal had published the article already.'

# What happens?

[Juan pensaba [que Pedro le había dicho [que la revista había publicado ya QUÉ?]]]

Juan thought that Pedro to-him had said that the journal had published already WHAT?

'What did Juan think Pedro had told him the journal had already published?'

# Compare the two theories?

- ▶ One fell swoop?
- ▶ Step-by-step?

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- ▶ Step-by-step?

# The result

Qué pensaba Juan que le había dicho Pedro que había publicado la revista?

and not

\*Qué pensaba Juan que Pedro le había dicho que la revista había publicado ?

# Suggesting

Qué pensaba Juan x que le había dicho Pedro x que había publicado la revista?

# Keep the big picture in mind!

wh-movement is always step-by-step

*“Because evidence from Japanese can evidently bear on the correctness of a theory of  $S_0$ , it can have indirect—but very powerful—bearing on the choice of the grammar that attempts to characterize the I-language attained by a speaker of English.” [Chomsky’s *Knowledge of Language* (1986:38)]*

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**Constraints on wh-movement**

What; will the fish who kissed the rat who bit the kitty who licked the turtle who scratched the pony's eyes out hit the chicken with ~~what;~~?

# Two simple sentences

- a. *You will see John.*
- b. *You will see Bill and John.*

# Only one *wh*-question possible

- a. *Who will you see?*
- b. *\*Who will you see Bill and?*

- ▶ Possibilities for wh-movement

- ▶ *The fish hit the chicken with the belt*—ambiguous
- ▶ *What did the fish hit the chicken with?*—not ambiguous

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# Structural ambiguity—prepositional phrase modifying Noun

- ▶ *The fish hit the chicken with the belt* .

Insert brackets for the reading in which the chicken's pants won't fall down. (“... a chicken wearing a belt”)

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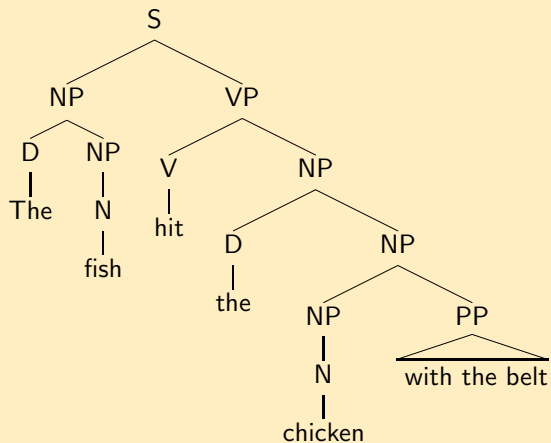
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# Structural ambiguity—prepositional phrase modifying Noun

- ▶ *The fish [ hit [ the chicken [with the belt ] ] ].*

Insert brackets for the reading in which the chicken's pants won't fall down. (“... a chicken wearing a belt”)

# As a tree ...



# Structural ambiguity—prepositional phrase modifying Verb

- ▶ *The fish with the hat hit the chicken with the belt .*

Insert brackets for reading in which the fish uses one of his own (or someone else's, including the chicken's) fashion accessories to punish the chicken. (“... using a belt he hit the chicken”)

# Structural ambiguity—prepositional phrase modifying Verb

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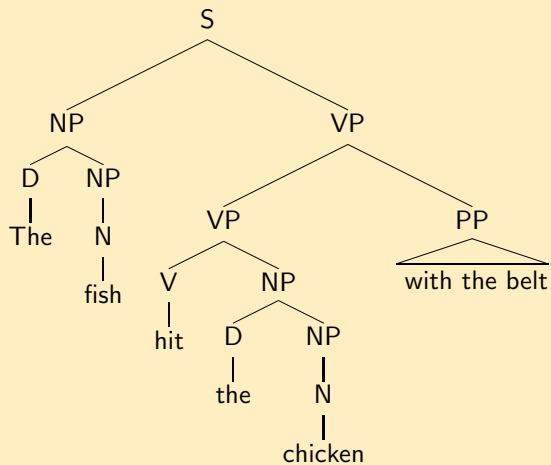
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# As a tree ...



# More on structure dependence

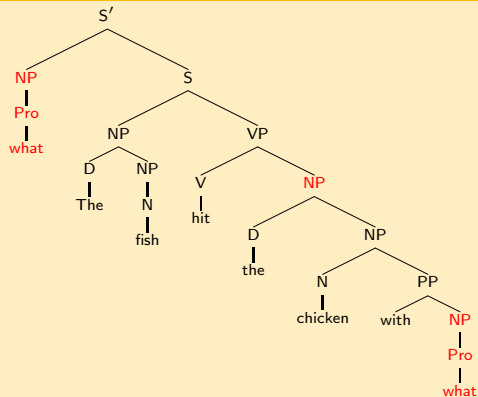
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# Impossible wh-movement

*wh*- word cannot move from inside a NP



# Possible wh-movement

*wh*- word can move from inside a VP

