# Psych 56L/ Ling 51:
## Acquisition of Language

Lecture 11
Development of Syntax & Morphology I

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## Announcements

No office hours on 11/18/08 - sorry!  Please email if you need to discuss anything with me or Jacquece.

Reminder: Homework 2 due in class on Wednesday 11/12/08.

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## Adult Knowledge: The Target State
### Syntax



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## Creativity of Human Language

Ability to combine signs with simple meanings to create
(1) Utterances with complex meanings
(2) Novel expressions
(3) *Infinitely* many

Sentences never heard before...
   "Some tulips are starting to samba on the chessboard."
Sentences of prodigious length...
   "Hoggle said that he thought that the odiferous leader of the goblins had it in mind to tell the unfortunate princess that the cries that she made during her kidnapping from the nearby kingdom of Dirindwell that the goblins themselves thought was a general waste of countryside ..."

## An Account That Won't Work

"You just string words together in an order that makes sense"

In other words...

*"**Syntax** is determined by **Meaning**"*
(The way words are put together is determined solely by what they mean)

## Syntax is More than Meaning

Nonsense sentences with clear syntax

Colorless green ideas sleep furiously. (Chomsky)
A verb crumpled the ocean.
I gave the question a goblin-shimmying egg.

…which are incomprehensible when the syntax is nonsense
*Furiously sleep ideas green colorless.
Ocean the crumpled verb a.
*The question I an egg goblin-shimmying gave.

## Syntax is More than Meaning

Famous nonsense sentences with clear syntax

'Twas brillig and the slithy toves
Did gyre and gimble in the wabe;
All mimsy were the borogroves,
And the mome raths outgrabe

Beware the Jabberwock, my son!
The jaws that bite, the claws that catch!
Beware the Jujub bird, and shun
The frumious Bandersnatch!"

Lewis Carroll, *Jabberwocky*

## Syntax is More than Meaning

'It seems very pretty,' she said when she had
finished it, 'but it's RATHER hard to understand!'
(You see she didn't like to confess, ever to
herself, that she couldn't make it out at all.)
'Somehow it seems to fill my head with ideas --
only I don't exactly know what they are!
However, SOMEBODY killed SOMETHING:
that's clear, at any rate -- '

## Syntax is More than Meaning

And these same nonsense sentences with nonsense syntax are incomprehensible…

'Toves slithy the and brillig 'twas
wabe the in gimble and gyre did...



## Syntax is More than Meaning

Ungrammatical sentences that make perfect sense

Jareth put the cape on.
Jareth put on the cape.

Jareth put it on.
*Jareth put on it.



## Syntax is More than Meaning

Ungrammatical sentences that make perfect sense

Sarah gave a ring to the Wiseman.
Sarah gave him a ring.

Sarah donated a ring to the Wiseman.
*Sarah donated him a ring.



## Syntax is More than Meaning

Ungrammatical sentences that make perfect sense

Jareth made Hoggle leave.
Jareth let Hoggle leave.
Jareth saw Hoggle leave.
*Jareth wanted Hoggle leave.

*Jareth made Hoggle to leave.
*Jareth let Hoggle to leave.
*Jareth saw Hoggle to leave.
Jareth wanted Hoggle to leave.

## Syntax is More than Meaning

Cross-language Variation
If syntax was entirely determined by meaning, then we should not expect to find syntactic differences between languages of the world….but we do see variation.

English: Sarah    sees         that book.

Korean: Sarah    ku chayk     poata.
        Sarah    that book     see

## Syntax is More than Meaning

Cross-language Variation
If syntax was entirely determined by meaning, then we should not expect to find syntactic differences between languages of the world….but we do see variation.

English:
Baso put the money in the cupboard.

Selayarese (spoken in Indonesia):
Lataroi   doe     injo    ri  lamari      injo    i Baso.
put       money   the     in  cupboard    the       Baso

## So…what does determine how you string words together?

Answer: Syntax!
(That is, our knowledge of the possible *forms* of sentences in our language.)

*"Syntax is determined by Meaning"*
(The way words are put together is determined solely by what they mean)

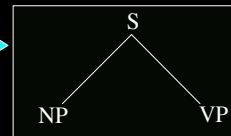## A Template

A sentence consists of a Noun Phrase followed by a Verb Phrase

S --> NP VP     ⬅     Phrase Structure Rule

Phrase Structure Tree ⬅

S
NP        VP

## Slide 1

### A Template

**Noun Phrase**

Hoggle

The chicken

Seven goblins

Sarah

A feeling

The strangest story
that you ever did hear

**Verb Phrase**

slept

tricked the guards

left

said that Hoggle thought
that pixies were nasty

kicked the bucket

got drunk on dwarf wine

## Slide 2

### A Template

**Noun Phrase**

Hoggle

The chicken

Seven goblins

Sarah

A feeling

The strangest story
that you ever did hear

**Verb Phrase**

slept

tricked the guards

left

said that Hoggle thought
that pixies were nasty

kicked the bucket

got drunk on dwarf wine

**6 Sentences**

## Slide 3

### A Template

**Noun Phrase**

Hoggle

The chicken

Seven goblins

Sarah

A feeling

The strangest story
that you ever did hear

**Verb Phrase**

slept

tricked the guards

left

said that Hoggle thought
that pixies were nasty

kicked the bucket

got drunk on dwarf wine

**36 Sentences**

## Slide 4

### A Template

**Noun Phrase**

NP --> Det N

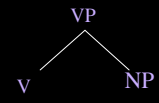NP

Det        N

NP --> N
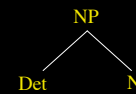
NP

N

**Verb Phrase**

VP --> V NP

VP

V        NP

VP --> V

VP

V

## A Tiny Little Grammar

5 Rules

S --> NP VP

NP --> Det N

NP --> N

VP --> V NP

VP --> V

9 Words
Det: *the, four, some*

N: *goblins, crystals, peaches*

V: *understood, ate, approached*

**468 Sentences**

## A Tiny Little Grammar

5 Rules

S --> NP VP

NP --> Det N

NP --> N

VP --> V NP

VP --> V

30 Words
Det: *the, four, some* + *7 more*

N: *goblins, crystals, peaches* + 7 more

V: *understood, ate, approached* + 7 more

**122,100 Sentences**

## Embedded Sentences

Additional VP Rule

Hoggle thought Sarah ate the peach.
VP → V S ⬅

> Sentence-inside-a-sentence
> *Recursion*

Ludo said Hoggle thought Sarah ate the peach.
The fairy claimed Ludo said Hoggle thought Sarah ate the peach.
The Wiseman's birdhat hoped the fairy claimed Ludo said Hoggle thought Sarah ate the peach.

> **Infinitely many sentences can be generated!**

## Complementizer

Complementizer: words like THAT, IF, and WHETHER that allow one sentence to be the subject or object of another sentence

Hoggle realized that Sarah ate the peach.
Whether Sarah ate the peach didn't matter.

S' → Comp S
VP → V S'
S → S' VP

**A Slightly Bigger Grammar**

9 Rules

S   --> NP VP
S   --> S' VP

NP  --> Det N
NP  --> N

VP  --> V NP
VP  --> V
VP --> V S
VP --> V S'

S' --> Comp S

Sentences it can generate:

Hoggle likes jewels.

---

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Sentences it can generate:

Hoggle likes jewels.

S   --> NP VP

NP --> N      VP  --> V NP

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NP --> N      VP  --> V NP

N        V   NP

Hoggle      likes jewels.

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Sentences it can generate:

Sarah thought that she solved the Labyrinth.

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NP --> N    VP  --> V S'

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VP  --> V
VP --> V S
VP --> V S'

S' --> Comp S

Sentences it can generate:

Sarah thought that she solved the Labyrinth.
S    --> NP VP
NP --> N    VP  --> V S'
     N          V  S'
   Sarah    thought  S' --> Comp S

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N             V   S'
Sarah    thought  Comp S

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N             V   S'
Sarah    thought  Comp S
                  that

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N             V   S'
Sarah    thought  that   S

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NP --> N      VP  --> V S'
N             V   S'
Sarah    thought  that   S --> NP VP

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VP  --> V
VP --> V S
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S' --> Comp S

Sentences it can generate:

Sarah thought that she solved the Labyrinth.

S   --> NP VP

NP --> N    VP  --> V S'
N           V  S'

Sarah   thought  that  NP VP

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Sarah   thought  that  NP VP

NP --> N    VP --> V NP

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S' --> Comp S

Sentences it can generate:

Sarah thought that she solved the Labyrinth.

S   --> NP VP

NP --> N    VP  --> V S'
N           V  S'

Sarah   thought  that  NP VP

NP --> N    VP --> V NP
N           V NP
she     solved

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N           V  S'

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N           V NP
she     solved
NP --> Det N

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VP --> V
VP --> V S
VP --> V S'

S' --> Comp S

Sentences it can generate:

Sarah thought that she solved the Labyrinth.

S   --> NP VP

NP --> N    VP  --> V S'
N           V  S'
Sarah   thought that  NP VP

NP --> N    VP --> V NP
N           V NP
she     solved

Det   N

the Labyrinth

## Syntax Recap

The structure of language (syntax) involves more than simply the meaning of the words.  It involves rules about how the words themselves are allowed to go together.

It isn't enough to know the list of possible sentences in the language.  Because adults can generate novel sentences and sentences of infinite length, adults need to know a generative rule system.

Adults know (unconsciously) a system of rules for generating the word orders they use.  A fairly small set of rules can generate a fairly large set of sentences.

## Adult Knowledge: The Target State Morphology

## Words and word parts

The smallest unit manipulated by the rules of syntax is *not* a single word.  Instead there are units smaller than words that play a role.

One goblin.
Two goblins.          goblins = goblin + s =          + plural

Morpheme = smallest unit of meaning

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Bound morpheme = morpheme that
   can't stand on its own - it must be
   attached to something

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One goblin.
Two goblins.          goblins = goblin + s =          + plural

Free morpheme = morpheme that can
   stand on its own - it does not need to
   be attached to another morpheme

## Types of Morphology

Inflectional morphology: adds grammatical information, but does not change the word's category (nouns stay nouns, verbs stay verbs, etc.)

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He shrugs.          shrugs = shrug + s =          + present tense

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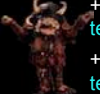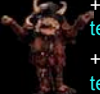
One goblin.
Two goblins.          goblins = goblin + s =          + plural

He shrugs.          shrugs = shrug + s =          + present tense
He shrugged.          shrugged = shrug + ed =          + past tense

---

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Derivational morphology: forms a new word, potentially changing the word's category (nouns become adjectives, verbs become nouns, etc.)

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goblin
goblinish          goblinish = goblin + ish =                    + similar to

---

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Derivational morphology: forms a new word, potentially changing the word's category (nouns become adjectives, verbs become nouns, etc.)

goblin
goblinish          goblinish = goblin + ish =                    + similar to

shrug
shrugger          shrugger = shrug + er =                    + one who
                                                             does that
                                                             action

---

## Crosslinguistic Comparison

English does not have a rich morphological system, compared to other languages.  Instead, English mostly relies on word order to indicate who did what to whom.

Languages like Hungarian, however, rely more on morphology.

"The boy gave a book to the girl."

A     fiú     könyvet          adott          a        lánynak.
The boy  a book+ACC      gave          the     girl+DAT

---

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The boy  a book+ACC      gave          the     girl+DAT

Inflectional morphology: ACC = accusative case = direct object (thing given)

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| A | fiú | könyvet | adott | a | lánynak. |
|---|-----|---------|-------|---|----------|
| The boy | a book+ACC | gave | the | girl+DAT |

Inflectional morphology: DAT = dative case = indirect object (recipient of giving)

## Morphology Recap

Morphology refers to how words are put together to convey meaning.

The smallest units of meaning are morphemes, which can be smaller than a whole word.

Some morphology can change the category of a word (derivational), while other morphology does not (inflectional).

Languages vary on how rich their system of morphology is. Children must learn how their language puts words toegther, and what types of meaning can be conveyed via morphology.

## Questions?