

# Psych156A/Ling150: Psychology of Language Learning

Lecture 17  
Language Structure

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## Quiz 6

25 minutes

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## Announcements

Course evaluations now available online

Please email me ([lpearl@uci.edu](mailto:lpearl@uci.edu)) by Thursday if you are going to write a final paper instead of/along with taking the final exam. Make sure to indicate which article(s) you will be doing a review of.

Review questions for this last topic (learning structure with parameters) are now available

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Computational Problem:  
Figure out the order of words (syntax)



Jareth juggles crystals  
Subject Verb Object  
Noun Verb Noun

Depends on grammatical categories like Nouns and Verbs, but also on more precise distinctions like Subjects and Objects.

Some Noun Phrase distinctions:  
Subject = usually the agent/actor of the action, "doer": Jareth  
Object = usually the recipient of the action, "done to": crystals

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Computational Problem:  
Figure out the order of words (syntax)



Jareth juggles crystals  
Subject Verb Object

Important idea: The observable word order speakers produce is the result of a system of unconscious word order rules. (This linguistic system is called "syntax".)

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Computational Problem:  
Figure out the order of words (syntax)



Jareth juggles crystals  
Subject Verb Object

One way to generate Subject Verb Object order:  
The linguistic system specifies that order as the general pattern of the language.

English Subject Verb Object

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**Computational Problem:**  
Figure out the order of words (syntax)



Jareth juggles crystals  
Subject Verb Object

Another way to generate Subject Verb Object order:  
The linguistic system specifies Subject Object Verb as the general pattern, but the Verb in main clauses moves to the second position and some other phrase (like the Subject) moves to the first position.

German                      Subject Object Verb

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**Computational Problem:**  
Figure out the order of words (syntax)



Jareth juggles crystals  
Subject Verb Object

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German                      Subject Verb Subject Object Verb

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**Computational Problem:**  
Figure out the order of words (syntax)



Jareth juggles crystals  
Subject Verb Object

A third way to generate Subject Verb Object order:  
The linguistic system specifies Subject Object Verb as the general pattern, but the Object moves after the Verb in certain contexts (the Object is unexpected information).

Kannada                      Subject Object Verb

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**Computational Problem:**  
Figure out the order of words (syntax)



Jareth juggles crystals  
Subject Verb Object

A third way to generate Subject Verb Object order:  
The linguistic system specifies Subject Object Verb as the general pattern, but the Object moves after the Verb in certain contexts (the Object is unexpected information).

Kannada    Subject     $t_{Object}$     Verb    Object

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**Computational Problem:**  
Figure out the order of words (syntax)



Jareth juggles crystals  
Subject Verb Object

English  
Subject Verb Object

Kannada    Subject     $t_{Object}$     Verb    Object

German  
Subject    Verb     $t_{Subject}$     Object     $t_{Verb}$

The learning problem: How do children know which system their language uses?

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**Computational Problem:**  
Figure out the order of words (syntax)



Jareth juggles crystals  
Subject Verb Object

English  
Subject Verb Object

Kannada    Subject    Verb    Object

German  
Subject    Verb    Object

This is a hard question!

Children only see the output of the system (observable word order).

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## About Language & Variation



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## Navajo Code Talker Paradox (Baker 2001)



English must be very different from Navajo  
Japanese could decode English, but couldn't decode Navajo (when they didn't know it was Navajo).

### English must be similar to Navajo

English can be translated into Navajo and back with no loss of meaning. (Languages are not just a product of the culture - pastoral AZ lifestyle couldn't have prepared them for Pacific Island high tech warfare, but translation was still possible.)

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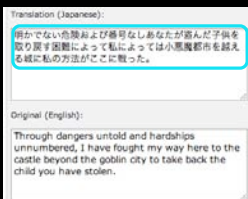
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## Translation is not so easy: more than just word-by-word gloss

[http://www.worldlingo.com/en/products\\_services/worldlingo\\_translator.html](http://www.worldlingo.com/en/products_services/worldlingo_translator.html)



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## Types of Variation

### Vocabulary

English "think": think, know, wonder, suppose, assume, ...

Multiple types of the action verb "think". Each has certain uses that are appropriate.

"I wonder whether the girl saved her little brother from the goblins." [grammatical]

\* "I suppose whether the girl saved her little brother from the goblins." [ungrammatical]

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## Types of Variation

### Vocabulary

English "think": think, know, wonder, suppose, assume, ...

Navajo "carry": multiple types, depending on object carried  
*aaah* (solid round-ish object)



*kaah* (open container with contents)



*l'é* (flexible object)

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## Types of Variation

Sounds: Each language uses a particular subset of the sounds used in all languages put together. There's often overlap (ex: "m", "p"), but languages also may make use of the less common sounds.

English: "th", "f", "sh", ...

Navajo "whispered l", "nasalized a", ...

	Bilabial	Labiodental	Dental	Alveolar / Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b		t d	t̪ d̪	c ɟ	k ɡ	q ɢ		ʔ	
Nasal	m	ɱ	n	ɳ	ɲ	ɲ	ŋ			
Fricative			f							ʁ
Tap or Flap			ɾ	ɽ						
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ç ʝ	x ɣ	ħ ʕ	h ʕ	h f
Lateral fricative			ɬ ɮ							
Approximant		ʋ	ɹ	ɻ	j	ɰ				
Lateral approximant			l	ɭ	ʎ	ʟ				

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## Types of Variation

### Morphology (word forms)

English: invariant words

"the girl is crying", "I am crying"

Navajo: no invariant forms (ex: 100-200 prefixes for verb stems)

At'ééd yicha. "Girl crying"

Yishcha. "I am crying"  
(yi + sh + cha)

Ninááhwishdlaad. "I am again plowing"  
(ni + náá + ho + hi + sh + l + dlaad)

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## Types of Variation

### Word order (syntax)

English: Subject Verb Object (invariant word order)

"The boy saw the girl"

Navajo: Subject Object Verb, Object Subject Verb

Ashkii at'ééd yiyiltsá  
boy girl saw  
"The boy saw the girl"



Ashkii at'ééd biltsá  
boy girl saw  
"The girl saw the boy"

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## Types of Variation

### Word order (syntax)

English: Subject Verb Object (invariant word order)

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boy girl saw  
"The boy saw the girl"



Ashkii at'ééd biltsá  
boy girl saw  
"The girl saw the boy"

This one prefix changes the entire meaning of the sentence

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## Thinking About Syntactic Variation



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## Similarities & Differences: Parameters

Chomsky: Different combinations of different basic elements (parameters) would yield the observable languages (similar to the way different combinations of different basic elements in chemistry yield many different-seeming substances).



Big Idea: A relatively small number of syntax parameters yields a large number of different languages' syntactic systems.



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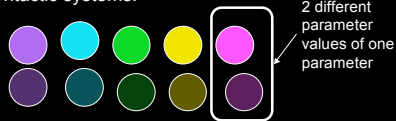
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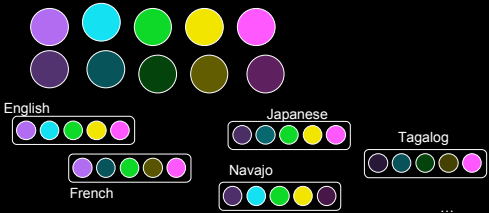
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### Similarities & Differences: Parameters

Big Idea: A relatively small number of syntax parameters yields a large number of different languages' syntactic systems.



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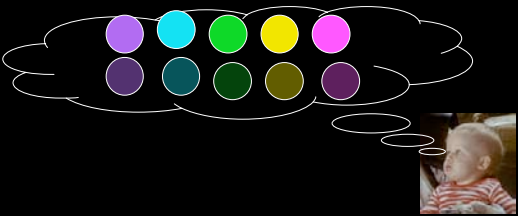
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### Learning Language Structure

Chomsky: Children are born knowing the parameters of variation. This is part of **Universal Grammar**. Input from the native linguistic environment determines what values these parameters should have.



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### Learning Language Structure

Chomsky: Children are born knowing the parameters of variation. This is part of **Universal Grammar**. Input from the native linguistic environment determines what values these parameters should have.

English

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### Learning Language Structure

Chomsky: Children are born knowing the parameters of variation. This is part of **Universal Grammar**. Input from the native linguistic environment determines what values these parameters should have.

Japanese

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### Learning Language Structure

Chomsky: Children are born knowing the parameters of variation. This is part of **Universal Grammar**. Input from the native linguistic environment determines what values these parameters should have.

Navajo

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Questions?

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