Psych 156A/ Ling 150: Acquisition of Language II

Lecture 1
Introduction to Language Acquisition

Administrivia

Instructor:
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Class web page:
http://www.socsci.uci.edu/~lpearl/courses/psych156A_2010spring/index.html
Accessible from EEE, as well. Contains overview (including office hours), schedule, readings, course assignments, and grading policies.

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Important to access readings
Click on readings in schedule page
user name = langacq
user password = models
Lecture notes do not require a password

Psych 156A/ Ling 150: Acquisition of Language II
Assignments
Homework:
Three throughout the quarter, usually due just after we finish discussing the relevant topics in class. Collaboration is allowed and highly encouraged. However…

If you collaborate, you must write up your answers separately, and you must write the names of your collaborators on your assignment when you turn it in.

If you do not do both these things, it will be considered academic dishonesty and you will receive a 0 for that assignment.

Assignments
Homework Advice:
Homework assignments are usually available as soon as we begin discussing the relevant topics. HW1 is already available on the website. The optimal strategy is to be working on the relevant homework problems as we discuss the topics in class.

Review questions are also available for each topic, but you are not required to do them. They are just there to help you review the material.

Assignments
Midterm Exam
There will be a midterm exam on 4/27/10. It will cover the material in weeks 1-4. There will be a midterm review in class 4/22/10. Being able to answer the review questions for the relevant topics is the best way to prepare for the exam.

The midterm exam will be open-note, but non-collaborative. If you are found collaborating with other classmates during the midterm exam, you will receive a 0.
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Final Exam/Assignment

Final assignment:

If you have an A in the class by week 10, you may choose to either take the final exam or submit a final paper. Details are on the class webpage, under the "assignments" section.

If you do not have an A in the class by week 10, you must take the final exam.

The final exam will be held 6/8/10 from 4 to 6pm. If you are submitting a final paper, it must be turned in by 6pm 6/8/10.

Final Paper

If you choose to do a final paper in place of a final exam, you will write a short review paper on one of the articles we discuss in class. You must indicate by 6/03/10 that you will be writing a final paper, and which article you will be reviewing. Articles available for review are listed under the "readings" section of the webpage.

Grades

Homework: 50%
Midterm: 20%
Final Assignment (Exam or Paper): 30%

Your grades will be determined by approximately this scale (available on the webpage):

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Extra Credit
You can earn up to 3 percentage points of extra credit two ways (that is, 3 points added to your total grade at the end of the quarter). See the class web page under the "assignments" tab for more details.)

(1) Participate as a human subject in social science experiments for up to 3 hours (half an hour = half a percentage point).

(2) Write a four page review paper on a language acquisition article.

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Schedule
"This is our wonderfully ambitious schedule. We'll attempt to keep with it, but it is subject to modification."

Topics:
- Introduction (3/30 - 4/1)
- Sounds & Sounds of Words (4/6 - 4/8)
- Words & Categories (4/13 - 4/20)
- MIDTERM (4/27)
- Morphology (5/4 - 5/6)
- Phrases (5/11)
- Poverty of the Stimulus & Learning Biases (5/13 - 5/20)
- FINAL (6/8)

Knowledge of Language

It’s so natural for us to produce and comprehend language that we often don’t think about what an accomplishment this is.

Or how we learned language in the first place.

Language is Special

“It is a very remarkable fact that there are none … without even excepting idiots, that they cannot arrange different words together, forming of them a statement by which they make known their thoughts; while on the other hand, there is no other animal, however perfect and fortunately circumstanced it may be, which can do the same.”

René Descartes
Language is Special

“For the moment, the main thing is to appreciate how hard a problem this is. The fact that we can talk (and cats can’t) seems so obvious that it hardly bears mention. But just because it’s obvious doesn’t mean it’s easy to explain. Think of another perfectly obvious, well-known phenomenon: the fact that metals turn red when you heat them. Why does this happen? It could be otherwise - they might just as well turn green or not change color at all. It’s a simple phenomenon, easily observable, but the explanation isn’t simple at all. It turns out to involve at the very least the theories of electromagnetic radiation and quantum mechanics, two of the more amazing intellectual advances in the past century. So it is, I want to suggest, with the human ability to use language.” - Ray Jackendoff, 1994

What is so special about language? Maybe nothing if you are a snail or a camphor tree. But language is paramount among the capacities that characterize humans, setting us off from even the most perfectly formed and functioning of the other beasts on earth; so, as a matter of species pride – if nothing else – we would hold up language as a marker of our humanity and thus a focus of our scientific interest.” (Gleitman & Liberman 1991: xix)

About Language

Language is a complex system of knowledge that all children learn by listening to native speakers in their surrounding environment.

It includes sound structure, word structure, word meaning, sentence structure, mapping from sentence structure to meaning, unspoken rules of conversation…

Stress pattern
gob lins

Individual sounds (in IPA)g a b l i n z
Language is a complex system of knowledge that all children learn by listening to native speakers in their surrounding environment. It includes sound structure, word structure, word meaning, sentence structure, mapping from sentence structure to meaning, unspoken rules of conversation…

Goblins like children.

Don’t goblins like children?
Some Terminology

Phonology: sounds and sound system of the language

Lexicon: Words and associated knowledge (word forms, word meanings, etc.)

Morphology: system for combining units of meaning together

Syntax: system for combining words into sentences

Pragmatics: knowledge of language use

Goblins like children.

Don’t goblins like children?

(use this question form if you have this prior belief)

Kids Do Amazing Things

Much of the linguistic system is already known by age 3.

…when kids can’t tie their own shoes or reliably recognize “4”.

What kids are doing: extracting patterns and making generalizations from the surrounding data mostly without explicit instruction. They usually only get examples of what’s allowable in the language, rather than explicit instruction about what’s allowable.

“Rules” of language = grammar

A learning analogy: Set

Here are some cards - they have some salient properties associated with them: number of items, shape of items, color of items, fill of items.
Task: Find Sets.

Here’s one:

What generalizations might you make about Sets?

A learning analogy: Set

Does this fit the generalization?
Set = all shapes, fills, and number of items the same?

A learning analogy: Set

Task: Find Sets.

Here’s one:

What generalizations might you make about Sets?
Set = all shapes, fills, and number of items the same?

A learning analogy: Set

Task: Find Sets.

Here’s another one:

Does this fit the generalization?
Set = all shapes, fills, and number of items the same?

A learning analogy: Set

Task: Find Sets.

Here’s another one:

Does this fit the generalization?
Set = all shapes and fills the same?
Task: Find Sets.
Here’s another one:

What about this one?

- Set = all shapes, fills, and number of items the same?
- Set = all shapes and fills the same?

A learning analogy: Set

Are these Sets?

- Yes
- Yes
- No
A learning analogy: Set

Task: Find Sets.

Are these Sets? Set = all fills the same?

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Yes ✓ Yes
Yes ✓ Yes
No ✓ No

A learning analogy: Set

Task: Find Sets.

Here are some examples of sets:

Set = all fills the same?

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Yes ✓ Yes
Yes ✓ Yes
No ✓ No

A learning analogy: Set

Task: Find Sets.

Here are some more examples of sets:

Set = all fills the same?

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Yes ✓ Yes
Yes ✓ Yes
No ✓ No

The Grammar of Set

A 'Set' consists of three cards in which each feature is EITHER the same on each card OR is different on each card. That is to say, any feature in the 'Set' of three cards is either common to all three cards or is different on each card.
Children infer rules with this amount of complexity (and more!) from examples of language. And sometimes, even when there's noise (misleading examples in the input).

Noise Analogy: “All these are Sets.”

Knowledge of Language & Hidden Rules

Some examples from language:

You know that...

...“Who did you see who did that?” is not a grammatical question in English

(Instead: “Who did you see do that?”)

Knowledge of Language & Hidden Rules

Some examples from language:

You know that...

...strop is a possible word of English, while stvop isn't.

Knowledge of Language & Hidden Rules

Some examples from language:

You know that...

...In "She ate the peach while Sarah was reading", she ≠ Sarah but she can be Sarah in all of these:

Sarah ate the peach while she was reading.
While she was reading, Sarah ate the peach.
While Sarah was reading, she ate the peach.
Knowledge of Language & Hidden Rules

Some examples from language:

You know that…

…the ‘s’ in ‘cats’ sounds different from the ‘s’ in goblins

cats: ‘s’ = /s/
goblins: ‘s’ = /z/

Phonemes

Basic perceptual units of which speech is composed (Liberman, 1970)

Units that are used to build morphemes

Languages have a finite inventory of these units.

They are not units of meaning.

They are contrastive: changing a phoneme can change meaning (pig vs big).

Linguistic Productivity Means We Need Rules

Infinite number of phrases & sentences

Large but finite number of words

Smaller amount of morphemes (ex: -ing, -s)

Several dozens of sounds (phonemes) (ex: /s/, /z/)

Structure permits creativity

We are capable of combining existing phonemes to form new words

– “email”, “IM”, “xerox”
– Also, screennames!
**Morphemes**

Morphemes are the smallest meaningful units of language.

Free morphemes may stand alone:
- mail, movie, sensation, mother

Bound (usually grammatical) morphemes cannot:
- ing, -s, -ed

Morphemes combine to form the words of a language.

Ex: He's a regifter! (re + gift +er)

Combination is rule-governed: "Regifter" is okay but not:

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**Structure permits creativity**

We are capable of combining existing morphemes using existing morphological rules:

- **COMPounding**
  - e + mail, goblin + king, fantasy + movie + watcher
- **DERIVATIONAL**
  - re + gift, sensation + al
- **INFlectional**
  - sing \(\rightarrow\) singing, sings

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**Compounding**

- mother
- grandmother
- great-grandmother
- great-great-grandmother
- great-great-great-grandmother
- ...

**Derivational Morphemes**

- sensation
- sensational
- sensationalize
- sensationalization
- sensationalizational
- sensationalizationalize
Inflectional Morphemes

Structure permits creativity

We are capable of combining existing morphemes/words into new sentences

I know what I believe. I will continue to articulate what I believe and what I believe - I believe what I believe is right.

The expressive variety of language use implies that a language user’s brain contains unconscious grammatical principles” - Jackendoff (1994)

Example: Most sentences we have never seen or used before, but we can still understand them.

Question: Can speakers simply memorize all the possible sentences of a language the way they learn the vocabulary of their language? Not if there are an infinite number of them...

Linguistic Infinity

Hoggle has two jewels.
Hoggle has three jewels.
Hoggle has four jewels.
...
Hoggle has forty-three million and five jewels.
...
One (dumb) way to get infinity
Linguistic Infinity

An aardvark is not an antelope.
...
An aardvark is not a zenith.
...
A penguin is not a goblin.
...

Another way to get a really large number of sentences...

If an aardvark is not an antelope, then an aardvark is not an ant.
...
If an aardvark is not a zenith, then a peach is not an idea.
...
If a penguin is not a goblin, then a fruit is not a fairy.
...

Linguistic Infinity

An aardvark is not an antelope.
...
An aardvark is not a zenith.
...
A penguin is not a goblin.
...

Another way to get a really large number of sentences...

And another:

If an aardvark is not an antelope, then an aardvark is not an ant.
...
If an aardvark is not a zenith, then a peach is not an idea.
...
If a penguin is not a goblin, then a fruit is not a fairy.
...

Linguistic Creativity

What lists include this sentence?

Through dangers untold and hardships unnumbered, I have fought my way here to the castle beyond the goblin city to take back the child you have stolen, for my will is as strong as yours and my kingdom is as great.

Or this one?

In the purple powder room, there lived a grumpy dollop of cream that slept lazily and yelled silently by turns, often scaring the silverware with its fierce pacific nature.

Linguistic Infinity

The point: our minds store words and meanings and the patterns into which they can be placed (grammar).

Sentence Patterns:

- Hoggle has \( n \) jewels.
- An X is not a Y.
- Since an X is not a Y, a Z is not a W.
The argument for mental grammar

“In short, in order for us to be able to speak and understand novel sentences, we have to store in our heads not just the words of our language but also the patterns of sentences possible in our language. These patterns, in turn, describe not just patterns of words but also patterns of patterns. Linguists refer to these patterns as the rules of language stored in memory; they refer to the rules as the mental grammar of the language, or grammar for short.” - Jackendoff (1994)