Psych 156A/ Ling 150: Acquisition of Language II

Lecture 1
Introduction to Language Acquisition

Administrivia

Class web page:

Accessible from EEE, as well. Contains overview (including office hours), schedule, readings, course assignments, and grading policies.

Administrivia

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

Homework:
Three throughout the quarter. Collaboration is allowed and highly encouraged. In fact, take a minute to introduce yourself to some people around you who might form a homework/study group with. You may turn in one assignment per group of collaborators – just make sure the names of all the collaborators are on it.

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 (and are a great way to study for exams).

Assignments

Midterm Exam

There will be an online midterm exam on 5/8/12, available through EEE. It will cover the material in weeks 1-5. There will be a midterm review in class 5/3/12. 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.

For details of the online exam policy and procedure, see the course webpage. We will also go over these during the midterm review.

http://www.socsci.uci.edu/~lpearl/courses/psych156A_2012spring/assignments.html#exams
Final Exam
There will be an online final exam on 6/14/12, available through EEE. It will cover the material in weeks 1-10, with a strong focus on the material in weeks 6 - 10. Review questions will be available for each topic covered in class, and there will be a final exam review in class on 6/7/12. Exam questions will come from the homeworks and the review questions.

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

For details of the online exam policy and procedure, see the course webpage. We will also go over these during the final review.

http://www.socsci.uci.edu/~lpearl/courses/psych156A_2012spring/assignments.html#exams

Grades
Homework: 50%
Midterm: 20%
Final Exam: 30%

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

96-100: A+  84-88: B+  72-76: C+  …
92-96: A   80-84: B  68-72: C
88-92: A-   76-80: B-  64-68: C-

Extra Credit
You can earn up to 3 percentage points of extra credit three ways. (See the class webpage under the “assignments” tab for more details.)

(1) Participate as a human subject in a language science experiment game.
(2) Participate as a human subject in social science experiments for up to 3 hours (half an hour = half a percentage point).
(3) Write a four page paper about a topic in language acquisition.

http://www.socsci.uci.edu/~lpearl/courses/psych156A_2012spring/assignments.html#extra_credit

Schedule
“This is our wonderfully ambitious schedule. We’ll attempt to keep with it, but it is subject to modification.”

Topics:
Introduction  (4/3/12 - 4/5/12) [2]
Sounds & Sounds of words  (4/10/12 - 4/17/12) [3]
Words  (4/19/12 - 5/1/12) [4]
Midterm review & Midterm  (5/3/12 - 5/8/12)
Categories & Phrases  (5/10/12 - 5/12/12) [2]
Poverty of the stimulus  (5/17/12 - 5/24/12) [3]
Sentences & Language structure  (5/29/12 - 6/5/12) [3]
Final review & Final  (6/7/12 - 6/14/12)
What is language?
A language is a system of signals, such as voice sounds, gestures or written symbols, that encode or decode information.

Human languages are usually referred to as natural languages, and the science of studying them is linguistics.

The term “animal languages” is often used for non-human languages. Most researchers agree that these are not as complex or expressive as human language; they may better be described as animal communication. Some researchers argue that there are significant differences separating human language from the communication of other animals, and that the underlying principles are unrelated.

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.”

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.

The mystery of language acquisition
http://www.quickmeme.com/meme/36f39x/
Language is Special

“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…
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\[ \text{goblin (plural) = goblin} + \text{s} \]

Goblins like children.
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Don’t goblins like children?
Goblins like children.

Goblin (plural) = goblin + s

Goblins = goblins

Some Terminology

Phonology: sounds and sound system of the language

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

Morphology: system for combining units of meaning together (goblin + [plural] = goblins)

Syntax: system for combining words into sentences

Pragmatics: knowledge of language use

Don’t goblins like children? = surprise if the answer is ‘no’ (expectation is that the answer is ‘yes’)

Use this question format to show expectation of a ‘yes’ answer.

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Goblins like children.

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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.

Terminology: Patterns or “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?

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?
Task: Find Sets.

Here's another one:

Does this fit the generalization?

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

A learning analogy: Set

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

Task: Find Sets.

Are these Sets?

Set = all shapes, fills, and number of items the same?
Set = all shapes and fills the same?
Task: Find Sets.

Are these Sets? Set = all fills the same?

Yes

Yes

No

Task: Find Sets.

Here are some more examples of sets:

√

√

×

We need a different generalization…
The Grammar of Set

A 'set' version 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 these cards is either common to all these 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.”

How do we know they’re not only imitating or being taught?

Imitation certainly is useful for learning some aspects of language, such as learning that the sequence of sounds “cat” refers to a furry, purring pet.

However, children can’t learn how to understand and produce full sentences by imitating what they hear and repeating it word for word.

Why not?
One reason: Most sentences are novel – you understand and produce them on the fly, and may never have heard them before.

Back to Kids & Language

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Noise Analogy: “All these are Sets.”

How do we know they’re not only imitating or being taught?

Also, it turns out that children are bad at imitating sentences where they don’t know some of the words (so how could they learn those words by imitating them?):

“The cat is hungry” becomes “Cat hungry.”

In addition, children don’t often repeat word-for-word what adults around them say.
How do we know they’re not only imitating or being taught?

(From Martin Braine)

Child: Want other one spoon, Daddy.
Father: You mean, you want the other spoon.
Child: Yes, I want other one spoon, please Daddy.
Father: Can you say "the other spoon"?
Child: Other...one...spoon.
Father: Say "other".
Child: Other.
Father: "Spoon."
Child: Spoon.
Father: "Other spoon."
Child: Other...spoon. Now give me other one spoon?

How do we know they’re not only imitating or being taught?

It’s also unlikely children learn by being explicitly taught. This is because once we go beyond the most superficial things (like “cat” is a furry, purring pet), most of our knowledge is subconscious. We know it – but we don’t know how we know it or why it’s so.

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...

...to ask about “Jack” in the sentence “You think that Jack did it”, you can’t ask it this way:

“Who do you think that did it?” 😞

(Instead: “Who do you think did it?”) 😊
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.

You know that…

…the ‘s’ in ‘cats’ sounds different from the ‘s’ in goblins cats: ‘s’ = /s/ goblins: ‘s’ = /z/

You get to choose who you will rescue. “Who do you want to rescue?” “Who do you wanna rescue?”

You get to choose who will do the rescuing. “Who do you want to do the rescuing?” **Who do you wanna do the rescuing?”
Some examples from language:

You know that…

contracted forms like “wanna” and “gonna” can’t always replace their respective full forms “want to” and “going to”.

You get to choose who you will rescue.

“Who are you going to rescue?”

“Who are you gonna rescue?”

Knowledge of Language & Hidden Rules

Some examples from language:

You know that…

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You get to choose who you will rescue.

“Who are you going to rescue?”

“Who are you gonna rescue?”

“I’m going to the witch’s lair to rescue her.”

“I’m gonna the witch’s lair to rescue her.”

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 creativity

What sentence 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.

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)

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: /\( s \)/, /\( z \)/)
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).

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
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.
Recap

Children learn (hard) things about language that are not easy to explain.

Children don’t just imitate what they’ve heard - they’re trying to figure out the patterns of their native language. Also, they may not notice or respond to explicit correction.

The creativity and expressivity of language suggests that there is an underlying structured system that produces language as its output.

Questions?

You should be able to do up through question 4 on the introduction review questions.