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Language Acquisition

LING 101, Lecture 12
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FINAL EXAM

- December 18, 1:00 PM, Brown Lab room 101.
- Exam is not cumulative (only material from 10/31).

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Language Acquisition

- Grammar: A system in an individual's mind/brain that enables them to combine sounds and words into an infinite number of utterances.
- How does this system get there?
- Is it innate?
- Is it learned from the environment?
- How does it develop/mature (or does it)?

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The Problem

How is it that all of us converge on basically the same grammar, with little or no explicit instruction?

- (1) Everyone thinks that Bush lied about Iraq.
- (2) Everyone thinks \emptyset Bush lied about Iraq.
- (3) What does everyone think that Bush lied about —?
- (4) What does everyone think \emptyset Bush lied about —?

The Problem

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How is it that all of us converge on basically the same grammar, with little or no explicit instruction?

- (5) Who does everyone think \emptyset — lied about Iraq?
- (6) * Who does everyone think that — lied about Iraq?

Instruction?

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- Was anyone explicitly taught not to wh-question an embedded subject if *that* is present?
- No; so we must have all built a grammar that excludes this by listening to utterances around us.
- Problem: no one says ungrammatical things (except in errors, which are another problem).
- But we have to be able to generalize beyond what people actually say.

The Problem

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All of us have a grammar that does the following:

- It generates embedded sentences with and without *that*.
 - It generates wh-questions questioning the object of an embedded sentence, with or without *that*.
 - It generates wh-questions questioning the subject of an embedded sentence without *that*.
 - It does **not** generate wh-questions questioning the subject of an embedded sentence **with** *that*.
- (7) What does everyone think (that) Bush lied about —?
 - (8) Who does everyone think \emptyset — lied about Iraq?
 - (9) * Who does everyone think that — lied about Iraq?

Generalization from Data?

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- Suppose we hear sentences with and without *that*, and we hear object questions with and without *that*.
- But we only hear subject questions without *that*.
- How do we conclude that having *that* is ungrammatical?

Missing Input

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- We cannot conclude that something that is missing in the utterances around us is ungrammatical.
- Most people have never heard sentences like the following, but they are judged by most speakers to be perfectly grammatical:
 - (10) Which colleague did John slander — because he despised —?
 - (11) This book is too interesting to put — down without having finished —.

Another Example

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- (13) When did you say Bush stole the election?
 - A1: Yesterday.
 - A2: In 2000.
- (14) When did you say how Bush stole the election?
 - A1: Yesterday.
 - A2: *In 2000.

Missing Input

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- Moreover, children *do* seem to conclude that things that are missing from the input are grammatical:
- It's well known that children go through a stage where they make *overregularization errors*:
 - **goed*
 - **foots, *feets*
- But adults don't say **goed* or **foots*.
- So why shouldn't we have concluded that wh-questioning a subject with *that*, even though we never hear it, is grammatical?

Ambiguity

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When is like other temporal adjuncts, and attaches to VP:

No Ambiguity

The lower attachment is impossible when another wh-word occupies the embedded Comp:

* When did you say how Bush [_{VP} [_{VP} stole the election] —] ?
 ↑

- But how do children acquiring the language conclude this?
- Questions like this do occur; why not think that they can have the lower construal of *when*?

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The Problem

- As you saw in the video, even very young children all have the same judgement as adults: the lower construal is impossible.
- How did we all come to have a grammar that precludes this?
- Again, no one taught us, or those kids, not to do this.
- And we cannot conclude from the absence of a sentence that it is ungrammatical.
- Here, the sentences *do* occur, it is just that one interpretation is ruled out; so the problem is even more difficult.

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The Innateness Hypothesis

- Noam Chomsky, reviving ideas going back to Descartes, Plato:
- The capacity for language is innate; we are programmed to learn language in the course of normal development.
- But more than that: much of the grammar is built in.
- Then, we don't need evidence to arrive at grammars with characteristics like those listed above;
- We're born with grammars with those characteristics.

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The Innateness Hypothesis

- Only language-particular things (words, sound systems, morphology) need to be learned.
- Good candidates for things that come built in:
 - Grammatical principles that are invariant from language to language;
 - (No language permits wh-movement over wh-words:
 *How did you tell me who fixed the car?)
 - Grammatical principles that cannot be inferred from the data.

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Innateness Accounts For:

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- The speed of acquisition;
- The ease of acquisition (compared to learning to read and write, learning algebra, learning to play tennis);
- Surprising uniformity in adult grammars;
- Universal principles across languages;
- Problem of lack of evidence, not enough evidence;
- No negative evidence (absence of ungrammatical utterances).

Birdsong

Correlate in the biological world: Birdsong

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- Siblings will acquire different dialects if they settle in different areas (dialectal features must be learned).
- Fully developed song acquired in several stages.
- Critical period in acquisition (see below).
- So the innateness hypothesis for language acquisition in humans finds correlates in other species: innate core, exact realization dependent on learning.

Birdsong

Correlate in the biological world: Birdsong

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- *Cuckoos* will sing a fully developed song even if they never hear another cuckoo sing (completely innate).
- *Bullfinches* will learn any song they are exposed to, even songs of other species (completely learned).
- *Chaffinches*: calls and songs vary depending on geographical area.
- Young birds exhibit a basic version of the song shortly after hatching (innate);
- Later undergoes further learning to acquire the final “dialect.”

Alternatives: Imitation

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- Common theory: children imitate their parents.
- Obviously can't be true:
 - Children and adults produce and understand utterances they've never heard.
 - Children say things adults never say: **goed*, **foots*.
- Explicit instruction?
 - Rarely given, and usually ignored.

Alternatives: Analogy

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- Children say **foots* on analogy with vast majority of English nouns with -s plurals.
- Maybe children can produce and understand novel utterances on analogy with ones they have heard.
- As you saw in the video, analogies quickly break down:
 - John ate a sandwich. John ate.
 - John grew tomatoes. John grew.
- How do children learn *not* to analogize *grew* to *ate*?

Alternatives: Analogy

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- Could children learn subcategories of verbs, and, learning something about a new verb, assign it to the right subcategory?
- Then they would only analogize verbs that are in the same subcategory.
- Example: *read* is in the same subcategory as *eat*.
 - The man read the book. The man read (for a while).
 - (Just like *John ate* cannot mean *John ate his shoe*, *John read* cannot mean *John read tea leaves*.)

Alternatives: Analogy

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- Could a more sophisticated analogical theory actually work?
- *Grow* belongs to a class of verbs that participate in this alternation:
 - The ice melted. The sun melted the ice.
 - The door opened. The man opened the door.
 - The tomatoes grew. The farmer grew tomatoes.
- *Eat* does not:
 - The man ate. The monster ate the man.

Alternatives: Analogy

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- On *Buffy the Vampire Slayer*, I often hear other verbs being analogized to *eat*:
 - “Let’s go slay.”
 - “She’s out slaying.”
 - (Only means *slaying vampires/demons*, not *slaying inner demons*.)
- Could a more sophisticated theory of analogy, then, account for language acquisition, without anything being innate?

Alternatives: Analogy

- This kind of begs the question of why verbs fall into the classes they do, and why they do so in every language.
- Moreover, if it is true that many people have never heard sentences like these, why do they judge them to be grammatical?

(16) Which colleague did John slander — because he despised —?

- On analogy with the following, they should be ungrammatical:

(17) * Which colleague did John slander his boss because he despised —?

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Alternatives: Analogy

- Experiments have shown that both adults and children are *very* sensitive to (contingent) frequencies in spoken corpora.
- So it is possible that much more of language acquisition than many people think could be patterns extracted from the data.
- Still, it is unclear whether all of the facts of language can be accounted for in this way.

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Alternatives: Analogy

- We also have the problem of lack of evidence:
- Since people don't say ungrammatical sentences like that, how do we know they are ungrammatical?
- That is, we have nothing to analogize ungrammatical sentences to.
- This is not to say that a very sophisticated theory could not account for acquisition; it's just that no such theory has been proposed.

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Facts about Acquisition

- So children do not acquire language by imitation, explicit instruction, or (entirely) by analogy. What do they do?
- They have to learn words (what they mean, how to use them).
- They have to learn rules (construct a grammar).
- These rules are all subconscious (think of the difficulty you've had in this class).

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Problems in Word Learning

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- The video touched on some of the difficulties facing someone trying to figure out what a word means.
- I see a rabbit running by, and someone points and says “rabbit.”
- How do I know it doesn’t mean *ears, fur, legs, there goes a rabbit, look at that funny creature*, or any number of other things?
- And this is one of the easiest types of word: concrete nouns.

Problems in Word Learning

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- Imagine the difficulties with words like *like, bother, want, through*.
 - I like dogs. Me gusta el perro.
 - Dogs bother me.
- NP in psychological state does not even occur in uniform position;
- How do we figure out what *like* means, and what *bother* means?
- There aren’t even events or actions in the world that we can observe to correlate with the use of these verbs.

Stages of Development

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- All human children learn a language.
- Any human child will learn any language it is exposed to.
- All human children learn all languages at basically the same rate.
- *There are stages in acquisition, and they seem to be universal.*

Stages of Development

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- Prelinguistic
- Linguistic
 1. Babbling
 2. Single-Word
 3. Two-Word
 4. Telegraphic

The Prelinguistic Stage

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- Cries, whimpers, cooing noises are stimulus-controlled responses to hunger, discomfort, etc.
- Not language; language is not locked to stimulus.
- The newborn mind is not a blank slate: it appears to be biased to perceive information in certain ways.

High-Amplitude Sucking

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- One thing newborns do very well is suck.
- Can give them a nipple to suck that measures rate of sucking.
- Then, can measure changes in sucking rate to determine what child is attending to.
- Habituation: baby hears or sees the same thing over and over, becomes habituated to it (sucking rate decreases to a certain level).
- Give them a new stimulus: baby gets excited, sucking rate increases.
- Now can test whether babies perceive two things to be different things (sucking rate increases) or the same thing (sucking does not increase).

Phonological Perception

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- Categorical perception:
 - Babies consider [p] and [b] different things;
 - But they do not consider [p] and something midway between [p] and [b] to be different (just like adults).
- Babies ignore nonlinguistic differences: an [i] is an [i] whether spoken by a male voice or a female voice.

Phonological Perception

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- Babies can distinguish between all possible language contrasts.
 - Japanese infants distinguish [l] and [r], when their parents can't.
 - English infants distinguish Hindi retroflex [ɭ] from alveolar [t], while UD undergrads cannot.
- This ability is quickly lost, before the age of 1 year.
- Children older than 12 months perform like adults; they've narrowed down their phonological system from "all possible contrasts" to "contrasts in the language I'm learning."

Prelinguistic to Linguistic

- So babies are born ready to attend to language;
- And before they start producing anything resembling language, they've already done a huge amount of work:
- They've figured out what phonemic contrasts are relevant in the language they're hearing, and rewired their brains to ignore irrelevant ones.
- (Linguists studying unfamiliar languages will tell you how difficult it is to figure out the phonemic system of a language.)

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Babbling

- Around six months, infants begin to produce a large variety of sounds.
- Not a prerequisite for language: babies prevented from babbling by physical problems still acquire language normally when problem is corrected.
- Babbling noises drawn from set of possible human sounds;
- Intonation contours begin to resemble those used in baby's language environment.

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Babbling

- Vocalizations produced by deaf babies qualitatively different: unsystematic, nonrepetitive, and random.
- Instead, deaf babies babble with their hands, using motions present in sign languages.
- Babbling may be the first stage of language acquisition, where babies try to uncover the units of language.

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The Single-Word Stage

- By 12 months, babies have managed to segment the continuous speech stream, pick out some words, and begun to use them.
- At this stage children use only one word at a time.
- **Holophrastic** sentences: one word to express a whole sentence.
- Examples:
 - “up” to mean “pick me up”
 - “dog” (naming)
 - “no” (imperative or assertive)
 - “uh-oh” (after an accident)

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Single-Word Stage: Phonology

- Children simplify phonology considerably: mostly monosyllabic CV utterances.
 - “up” [bʌ?]/[mʌ?]
 - “dog” [dʌ]
- Sounds that occur frequently in the world’s languages are the first to be used: [b,m,d,k]
- Sounds that are infrequent are used last: [θ]
- However, studies show that children’s perception is much better than their production.

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The Two-Word Stage

- Around 2 years old, children start to put words together.
- Examples:
 - Mommy sock
 - allgone sticky
 - more wet
- No morphological markers
- Two words can have any number of grammatical relations (subject-object, possessive, locative, conjunction)

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The Telegraphic Stage

- There is no 3-word stage; when they get beyond two words, utterances can be 3, 4, 5, or more words long.
- First utterances longer than 2 words are all missing function words, like telegrams:
 - What that?
 - He play little tune.
 - Andrew want that.
 - No sit there.

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MLU

- Chronological age is not a good indicator of language development beyond the two-word stage.
- Instead, researchers use a measurement of the *mean length of utterance* (MLU) produced by the child.
- Length is counted in morphemes, not words (note that children usually leave off inflection, so it is significant when they include it).
- Children producing utterances that average 2.3 to 3.5 morphemes in length are at the same stage of language development, but one child may be 2 and another 3 years old.

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The Telegraphic Stage

- Telegraphic utterances conform to word order of language being learned (SVO in English, SOV in Japanese).
- Inflection and function words come in in different stages.
- Studies of grammaticality judgements and understanding of grammatical principles have shown that very young children understand the same grammatical principles as adults.
- The few places children actually differ from adults have proven to be very interesting from a cross-linguistic point of view.

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Errors?

- In Spanish and languages like it, can leave off the subject (*estoy cansado*, '(I) am tired').
- Children learning English also do this (*want other one spoon*).
- Children learning French and German also do this; French and German don't allow it either.
- When children leave out the subject, they also leave off the inflection (*like* instead of *likes*).
- In French and German, can tell that this non-agreeing form is the infinitive.

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Errors?

- Children get all aspects of the infinitive right: placement in sentence (different from finite verb in French and German), position wrt negation.
- When they do use the inflected, finite form of the verb, they include the subject and get everything else right.
- Non-finite verbs do not require subjects (*To be, or not to be*).
- So the "error" is that, for some reason, children use non-finite forms of verbs where adults do not allow them.
- Even so, the child's grammar is rule-governed and obeys strict principles.

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Errors from Other Languages

- Children also make errors that are grammatical in other languages:
- "What do you think what's in here?" (=What do you think is in here?)
- This is grammatical in many languages, like German and Passamaquoddy:
 - (1) **Keqsey** Pil kt-iy-oq **keq** ketuw-aqosoma-sk?
 what Bill 2-say.to-Inv what Fut-cook.for-2ConjInv
 'What did Bill tell you he was going to cook for you?'

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Universal Grammar

- The innateness hypothesis refers to the built-in grammar as *universal grammar*.
- Particular grammars are learned from language input; all of them conform to principles of UG.
- UG makes things available that are not allowed by particular grammars.
- English grammar disallows “What do you think what’s in here?”, but UG allows it.
- Hence, a child that makes this “error” just hasn’t excluded it from her English-particular grammar yet.

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Frequent Errors

- Recall that Bickerton’s Bioprogram Hypothesis explained creole formation as UG asserting itself.
- One of Bickerton’s claims was that children’s errors will reveal UG principles, which are realized in creoles.
- So the frequent error “nobody don’t like me” is UG asserting itself: a negative word doubled by sentential negation.

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Frequent Errors

- Most languages that use double negation (Spanish, AAVE) do not use it with subject negative words like *nobody*, only objects.
- But all creoles do.
- So frequent errors like this reveal principles of UG, which have to be modified in acquiring particular languages.

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Non-Occurring Errors

- Certain errors never occur.
- Hypothesis: they would violate UG.
- That is, they would violate built-in grammatical principles that do not need to be learned.
- Examples: construal of *when* above (or any violation of constraint on *wh*-movement); incorrect use of progressive *-ing*; any non-structure-dependent rule.
- So children build grammars; and grammars are always within the range of possibilities made available by UG.

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Recovering from Errors

- Another major issue is how children recover from errors and converge on the correct grammar.
- Morphological errors: **goed, foots*, overregularization of morphological rules;
- These can be corrected easily: child observes that these forms are never used, instead irregular forms are (*went, feet*).
- Errors in word meanings: children often overextend word meanings, e.g., *dog* for all animals;
- Not clear how they narrow down reference to just that of the adult usage.

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Recovering from Errors

- How about other errors?
- It turns out that most conceivable errors do not occur, hence are not a problem.
- Using infinitives incorrectly? or “What did you say what’s in here?”?
- These are harder: there is no negative evidence to show that these are actually ungrammatical.
- In the infinitives case, children just seem to recover; using infinitives appears to be a maturational stage.

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Critical Age

- Learning a language as an adult is very hard (and errors differ qualitatively from children’s errors).
- This suggests that there is a **critical age** in language acquisition.
- In the birdsong of chaffinches mentioned above, there is also a critical age:
- If not exposed to chaffinch song within 10 months, they do not acquire it.
- It is thought that language acquisition is genetically determined to take place in a specified pattern of development, like walking.

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Evidence for a Critical Period

- Children raised in extreme isolation, e.g. “feral children.”
- Example: Genie.
- Despite deliberate, painstaking attempts to teach her language, syntax and morphology never developed.
- She did learn lots of words, but just strung them together, like children in the telegraphic stage (“Genie full stomach”).

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Evidence for a Critical Period

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- Deaf children born to hearing parents often receive delayed language exposure (parents do not know sign language).
- Early and late learners of sign language do not differ in vocabular size or knowledge of word-order constraints (very regular in ASL);
- But they do differ in production and comprehension of morphologically complex signs.

Language Disorders

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- **Specific Language Impairment (SLI):** Not well-defined, but seems to be an impairment of just language ability, with no other cognitive deficits.
- SLI is also genetic (runs in families).
- Acquired impairments (e.g., brain damage) also show that language can be affected to the exclusion of other systems.

Language Disorders

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- Developmental disorders affecting language show two things: the genetic basis of language, and its modularity (system distinct from general cognition).
- Dyslexia: a developmental disorder that seems to affect the perception of certain acoustic attributes; it also causes difficulties in learning to read.
- Not well understood; but it is known to be hereditary.

Double Dissociation

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- The converse situation also occurs:
- Mental retardation with intact language abilities.
- Laura and Christopher (textbook pp.49–50):
- Severely impaired cognitive abilities (IQs around 40, 65);
- Cannot perform numerical calculations, cannot perform basic tasks;
- But appear to have intact language abilities.
- Christopher seems to have super ability: has learned around 20 different languages.

Additional Issues

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- If desired, read the section on chimpanzees and gorillas (pp.350–355);
- Also read chapter 2, on language in the brain (but realize that it's a little outdated).