

Language acquisition

LING 200: Introduction to the Study of Language

Hadas Kotek



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Outline

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 - Tacit knowledge and the problem of language acquisition
 - The poverty of the stimulus
 - Principles and parameters
- 2 The study of language acquisition
 - Comprehension before production
 - Over-regularization

Slides credit: Lauren Clemens, Moti Lieberman, David Pesetsky, Rebecca Starr

A paradox

The paradox of language acquisition

- Hundreds of adults with advanced degrees have spent the last half-century developing the field of generative linguistics and have yet to work out a decisive grammar for a single language.
- Every normal toddler acquires the grammar of (at least) one language effortlessly and in just a few short years.

A paradox

What do these toddlers learn?

- **Grammar:** a collection of rules...
 - ...that are necessary to understand and produce an infinite number of sentences.
 - ...that allow us to know what is *not* possible in our language.

A paradox

Tacit linguistic knowledge

- (1) a. The judges chose a picture of Tyler.
b. Who did the judges choose a picture of?
- (2) a. A picture of Tyler won first prize.
b. * Who did a picture of win first prize?
- (3) **Expletive infixation:**
a. On-f*ing-tario
b. * Onta-f*ing-rio

- No one ever *taught* you that (2b) is not a grammatical English sentence.
- We can also be fairly certain that no one taught you the grammaticality pattern in (3).

A paradox

Tacit linguistic knowledge

- There is an infinite number of sentences...
- (4)
 - a. The cat jumped on the windowsill before the paint was dry and subsequently decorated the floor with red paint.
 - b. A chihuahua never did defeat a dragon in a game of shoots and ladders.
 - c. If you say “artisanal macaroni and cheese” one more time, I will have to leave the room.
- You know whether these sentences are grammatical or not, despite never having heard them before.

A paradox

Tacit linguistic knowledge

- How is it possible that children acquire language so quickly at such an early age?
 - We weren't explicitly taught most of this knowledge.
 - We aren't even aware that we have most of this knowledge.
 - ▶ How did we come to have all of this knowledge?

A paradox

The problem of language acquisition

- No matter what language we speak (or sign) we have a vast amount of knowledge about that language.
 - Compare this with learning a new language as an adult.
- Imagine some other difficult topic...
 - A 5 year-old mastering multivariate calculus.
- Yet almost with out exception by age 5, children will have mastered at least one language.
- **Domain specificity:** language acquisition is autonomous from other cognitive processes (e.g., learning math).

The poverty of the stimulus

It gets worse. . .

- An indefinite number of alternative sets of principles are consistent with the regularities found in the linguistic data.
 - The correct set of principles isn't necessarily simpler or more natural.
 - The data that would be necessary to test these different principles isn't necessarily available.

The poverty of the stimulus

- The data children receive are noisy, unstructured, and incomplete.
 - slips of the tongue, false starts...
 - children get positive evidence from their input, but no substantial negative evidence.

The problem of language acquisition

- If children learned language with just the data available to them, they couldn't possibly arrive at the adult-like grammar.
- But children *do* arrive at the adult-like grammar.
- Therefore, children do not rely solely on the data available to them.

The poverty of the stimulus

The Innateness Hypothesis

- Children are able to learn language with noisy impoverished input, quickly, and at an age before they can learn much of anything else, because they do not start from scratch.
- **The innateness hypothesis:** Certain aspects of human language are innate.

Additional support for this idea:

- Language acquisition exhibits ordered developmental stages
- Children's errors are very predictable
- Critical period effects
- Linguistic ability is independent of general intelligence

A revolutionary idea

“Language learning is not really something that the child does; it is something that happens to the child placed in an appropriate environment, much as the child’s body grows and matures in a predetermined way when provided with appropriate nutrition and environmental stimulation”

—N. Chomsky (1988)

Do parents teach children to speak?

- ➡ The problem of language acquisition is one of the main questions that generative grammar wants to solve.

Behaviorism

“In teaching the young child to talk, the formal specifications upon which reinforcement is contingent are at first greatly relaxed. Any response which vaguely resembles the standard behavior of the community is reinforced. When these begin to appear frequently, a closer approximation is insisted upon. In this manner very complex verbal forms may be reached.”

—B.F. Skinner (1957) *Verbal Behavior*, pp. 30-31

Do parents teach children to speak?

Generative linguistics

“It is simply not true that children can learn language only through ‘meticulous care’ on the part of adults who shape their verbal repertoire through careful differential reinforcement, though it may be that such care is often the custom in academic families. It is a common observation that a young child of immigrant parents may learn a second language in the streets, from other children, with amazing rapidity, and that his speech may be completely fluent and correct to the last allophone, while the subtleties that become second nature to the child may elude his parents despite high motivation and continued practice.”

—N. Chomsky, 1957 review of Skinner’s *Verbal Behavior*

Behaviorism

- According to behaviorism, children learn language through...
 - Imitation
 - Reinforcement
 - Analogy
 - Structured input
- ➡ Some problems...

Behaviorism

Imitation

Child: My teacher **holded** the baby rabbits and we patted them.

Adult: Did you say your teacher **held** the baby rabbits?

Child: Yes.

Adult: What did you say she did?

Child: She **holded** the baby rabbits and we patted them.

Adult: Did you say she **held** them tightly?

Child: No, she **holded** them loosely.

Behaviorism

Imitation

- Children don't hear words like "holded" from their caregivers.
- More interestingly, children can't even repeat structures they are not yet producing spontaneously:

Adult: He's going out.

Child: He go out.

Adult: That's an old-time train.

Child: Old-time train.

Adult: Adam, say what I say... Where can I put them?

Adam: Where I can put them?

Behaviorism

Reinforcement (and its failures)

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 the **other one spoon**?

Behaviorism

Reinforcement (and its failures)

Child: Nobody don't like me.

Mother: No, say "nobody likes me."

Child: Nobody don't like me.

Mother: No, say "nobody likes me."

Child: Nobody don't like me.

(8 repetitions of this exchange)

Mother: No, now listen carefully; say "nobody likes me".

Child: Oh! Nobody don't likes me.

Behaviorism

Analogy

- I painted a red barn.
 - I painted a red *wheelbarrow*.
 - I painted a *blue* barn.
 - I *saw* a red barn.
- I painted a barn red.
 - I painted a *wheelbarrow* red.
 - I painted a barn *blue*.
 - *I *saw* a barn red.

Behaviorism

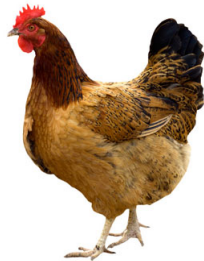
Structured input

- Many adults talk to children in a special way characterized by elongated vowels, dramatic intonational contours, slow speech rate, etc. (“motherese”)
- Children all over the world learn to speak on a remarkably similar timeframe, yet...
 - Many cultures do not use a special way of speaking with babies.
 - Some cultures hardly speak to babies at all.

“Learning” vs. “Acquiring”

- Behaviorism can't account for patterns in language development that speakers of different languages share.
- Note that the tenets of behaviorism (imitation, analogy, reinforcement, and structured input) are *learning* mechanisms.
- But language *acquisition* requires very little obvious learning aside from arbitrary correspondence between sound and meaning.

- Children do need to learn that the word for chicken is *chicken*. . .
It could just as well be *dinkle*.



Principles and parameters

Principles and parameters

- The idea: **Humans have an innate capacity for language.**
- Children figure out the specifics of the language they are acquiring, but they are not starting from scratch.
- One way to think about this is by distinguishing between *innate principles* and *observed parameters*.

Principles and parameters

Principles

- **Principles** are shared by all languages, presumably because they are hardwired into the human brain in the form of **Universal Grammar**.
- For example: all languages can form a content question by using a special interrogative word to specify what information is needed.
- There is an innate principle underlying this linguistic universal.
 - Although the syntactic form the question can vary cross-linguistically.

Principles and parameters

Wh-questions

English statement

Anna bought a book

English *wh*-question: obligatory movement

What did Anna buy?

Anna bought what? (← only as an *echo* question)

Chinese statement

Ana maile yi benshu
Ana bought a book

Chinese *wh*-question: no movement

*Shenme Ana maile?

Ana maile shemne (← a true question!)

What did Ana buy (lit: Ana bought what?)

French statement

Ils ont vu Pierre
They saw Pierre

French *wh*-question: optional movement

Qui ont ils vu?

Ils ons vu qui? (← a true question!)

Who did they see

Principles and parameters

Parameters

- If “*wh*-questions” are a principle of human language, then this principle is realized differently in different languages.
- **Parameters** are like switches that can be turned on or off.
 - English has the “move *wh*-word” setting turned on.
 - Chinese has the “no movement” setting turned on.
 - French allows both the “move *wh*-word” and the “no movement” settings.



Principles and parameters

The job of the child

- Children are born “knowing” something about the universal structure of *wh*-questions.
 - “All” they have to do is determine whether they can move the *wh*-word to the beginning of the sentence or whether they can leave the *wh*-word in the place that corresponds to the information they are seeking would be in the declarative sentence (“in situ”).

Principles and parameters

- The idea that humans have an innate capacity for language that gives them access to certain linguistic principles can also explain what types of mistakes children don't make.

The Coordinate Structure Constraint

Statement

Anna bought a book

Anna bought a book and a pen

Anna bought a book and a pen

Anna bought a book and a pen

Question

What did Anna buy?

What did Anna buy?

*What did Ann buy a book and?

*What did Ann buy and a pen?

Principles and parameters

The Coordinate Structure Constraint

- **Coordinate Structure Constraint:** you must front all of a coordinated structure, you can not front only part of it.
- In all languages for which this has been investigated, a coordinate structure constraint has been part of the grammar.
- Children never say sentences like “What did Ana buy a book and?”
- Conclusion: The coordinate structure constraint is a basic **principle** of human language.

Principles and parameters

The *pro*-drop parameter

- Some languages allow speakers to “drop” (=not pronounce) **subjects**.
 - We might imagine that there is a silent *pronoun* in place of the subject.
(Take more syntax to see the evidence for that!)

(5) **Chinese:** +

Ɔa kanjian ta le
(he) see he LE
'(He) saw him'

(6) **Italian:** +

- a. ~~I~~ parlo italiano
(I) speak Italian
- b. ~~Nei~~ parliamo italiano
(we) speak Italian

(7) **English:** –

*~~We~~ speak English.

Principles and parameters

The *pro*-drop parameter

- Some languages additionally allow **objects** to be dropped.
 - Implicational hierarchy: if objects can be dropped, subjects can as well.

(8) **Chinese:** +
Ta kanjian ta le
He see (he) LE
'He saw (him)'

(9) **Italian:** –
*Gianni ~~lo~~ vede
Gianni (him) sees
'Gianni sees him'

(10) **English:** –
*John saw ~~him~~

Principles and parameters

Parameter setting in action!

- (11) **Danish:**
Se, blomster har. (Jens, 2;2)
look flowers have/has
- (12) **English**
Tickles me. (Adam, 3;6)
- (13) **French:**
Mange du pain. (Gregoire, 2;1)
eat some bread

- ➡ All children start with the “on” setting, and either receive evidence that makes them change the setting to “off” (e.g. in English), or they keep their original setting (e.g. in Italian).

Principles and parameters

A curious correlation

- As it turns out, a language's ability to drop subjects correlates with other properties of the language.

	English	Italian
Possibility of Pro-drop:	*are here	Sono arrivati Are here ('they are here')
Possibility of post-verbal subjects:	*has arrived John	È arrivato Gianni. is arrived John ('John arrived')
Obligatory "dummy" subjects:	*raining	Piove. rains ('It's raining')
	*seems John is here	Sembra che Gianni è arrivato seems that John is arrived

- ➡ Idea: one parameter setting determines all of this behavior at once!

Child language

- Child language is not a degenerate form of adult language.
 - Child language is principled and rule-based.
 - But obviously children are not working with same rules as the adult speakers.

The *fis* phenomenon

Comprehension before production

- Children's comprehension of language is generally ahead of their production abilities.
- This means that they can hear when something is incorrect, even when they can't produce it themselves.
- This is sometimes called "the *fis* phenomenon."

The *fis* phenomenon

Child: My fis.

Adult: This is your fis?

Child: No, my fis!

Adult: This your fish?

Child: Yes, my fis.

(Berko & Brown 1960)



The *fis* phenomenon

An example from Japanese

Phonological rule: The sound /t/ in adult Japanese never precedes the vowels “i” or “u”, instead /t/ becomes [tʃ] before “i” and [ts] before “u”.
(these rules are the only sources of tʃ and ts)

tama	<i>ball</i>
terebi	<i>TV</i>
tobu	<i>fly</i>
machi (*mati)	<i>city</i>
tsuta (*tuta)	<i>ivy</i>

The *fis* phenomenon

Adult

tama

terebi

tobu

machi (*mati)

tsuta (*tuta)

mikaŋ

po**k**etto

ne**k**o

aki

kuma

Child 3;2

tama

terebi

tobu

machi

tsuta

mitaŋ

po**t**etto

ne**t**o

ati

tuma

ball

TV

fly

city

ivy

orange

pocket

cat

fall

bear

Over-regularization

Error patterns

- If we study the errors that children make, we find some interesting things.
- One peculiar thing that children do is **over-regularization**.

Over-regularization

Error patterns

- First, children learn irregular forms correctly:
 - I eat, I ate
 - Mouse, mice
- But then, at around 2 years old, they enter a phase when they over-apply regular inflectional rules:
 - I eat, I eaten
 - Mouse, mouses
- Then they may use a hybrid form
 - I eat, I ated
 - Mouse, mices
- Finally they return to adult-like production.

Over-regularization

Error patterns

- How are errors “unlearned”?
- **The Blocking Principle:** A regular form is blocked by the presence of a synonymous special form in the lexicon.

<i>Child's word</i>	<i>Adult vocabulary item</i>
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car-smoke

exhaust

cup-egg

boiled egg

fire truck man

fire fighter

plant man

gardener

Over-regularization

Significance of over-regularization

- Children produce forms (e.g., 'eated') that they have never heard.
- What can we conclude from this?
- This is evidence that children are developing a system of grammatical rules, not just imitating what they hear.
 - eat + -ed = eated

For next time...

- **Assignment 6 has been posted, due March 30**