

Cognitive Psychology

PSYC230

Lecture # 18

Language Acquisition

The Big Question: *How did we do it?*

How did we go from no language to competence in approximately 6 years?

Language acquisition is an *amazing* cognitive feat

Relatively rapid (mostly complete by age 6)

Mastery of a very complex system

First language is not explicitly taught

Two views on child language

Organism/Nativist (Nature)

- a. "hardware": biology
- b. "software": cognition

Environment/Learning (Nurture)

- a. social interaction
- b. environmental events

Nativist view

LAD and the innateness hypothesis
(Chomsky)

Universal Grammar & "parameter setting"
a current version of the nativist view
(Pinker, *The Language Instinct*)

Learning view

Language development follows general
principles of learning & reinforcement
(Skinner, *Verbal Behavior*)

Compromise: Social Interactionism
Emphasis on social interaction but acknowledges role
of biology & stresses importance
of child directed speech *Caretakerese*
(Bruner; Berko-Gleason)

Methodology

How much do infants know?

How and what can we find out from a pre-linguistic child?

Traditional Methods:

Observation

Diary studies & parental reports

Audio- and video-tape

High amplitude sucking paradigm,
head-turning/looking, cardiac deceleration, etc.

Methodological issues:

Naturalistic vs controlled observational (lab)

Cross-sectional vs longitudinal

Language Development: Production

I. 0-8 wks: crying--reflexive crying, vegetative sounds

II. 8-20 wks: cooing, vowel-like, varied crying,
some back consonants (e.g., /k/, /g/)

III. 16-30 wks: vocal play

IV. 25-50 wks: reduplicated babbling, cv syllables
(e.g., baba)

V. 9-18 mos: nonreduplicated babbling,
varied syllable structure

Pragmatic Development

Perlocutionary stage: unintentionally communicative
e.g., crying

Followed by "proto" speech acts: Proto-declaratives & proto-imperatives

Proto-words/idiomorphs

(also known as Phonologically Constant Forms)

Function as words but not adult forms
relatively stable, though may change over time

Julie (30 mos):

buwah	music
ga	blanket
enh	bed
siihah	train (sound), boots
ummh	milk
boof	car
baba	biscuit, ice cream, sweet

Idiomorphs are different from attempts to say adult form

Julie (30 mos)

deesh fish

godo yogurt

buu(l) cow

Child phonology does not match adult phonology but does follow consistent rules within the child

Different children have different phonological rules
dog = "dadi", "doti", "gug", "gugi", "dug"

First words

First 50 words include concrete nouns, adjectives, actions, "social words"

NOT function words

people, food, toys, animals
body parts, household objects
social words (bye-bye, please)
attributes ("hot"), actions ("down")

Julie: "bis" for "please", then became "yes"
"mbis" for "no"
"mao" for emphatic "no"

First words

Children frequently overextend based on form

e.g., "gat" for cats, dogs, fur, hair
"ball" for doorknobs, plates, moon

Underextensions: word is applied in very limited contexts
e.g., "shoe" only for Daddy's shoe, in a closet

Holophrases: Use of word to convey more than one function (e.g., request, label)

"daddy" = that is Daddy
= Daddy pick me up

Comprehension precedes production

Children can comprehend words before they can produce them

17-month-olds (not at 2-word stage): Shown 2 different videos simultaneously.
A voice says "Cookie monster is tickling Big Bird" Children look at video of Cookie monster tickling Big Bird
not at Big Bird tickling Cookie monster

Beginnings of syntax: Two-word stage

(18 mos +): 2 words can express many semantic relations
e.g., Mummy sock =

"there is mummy's sock" (possession)
"mummy is putting on my sock" (actor + action)

Two-word speech: Semantic Relations

Some examples from Julie

actor-action

“ahgo buwah” (Nina is playing music, 30mos)

modify (noun)

“bad bu(l)” (dead calf, 29 mos)

possession

“ahgo aaaah” (Nina’s sheep”, 30mos)

location

“dada boof” (Daddy is in the car, 25 mos)

Beginnings of syntax: “Telegraphic” speech

2 years +: 3 to 4 word utterances

Omission of inflections, function words

“Mami ees ba(d)” Julie (30 mos)

Mum (a) took away a biscuit

(b) took her away from train ride.

Morphological development

Overregularisation: e.g., went ---> “goed”

“Is it the twoth day?” (Nina, 5 years old)

(evidence for hypothesis testing rather than rote memorisation)

Ages differ according to the child
Children do **not** learn by imitation and memorisation
Children understand & produce novel utterances

Child-Directed Speech

Adults and older speakers adjust their speech to infants and younger children

They use: simple syntax
simple vocabulary-- talk about "here and now"
names and nouns rather than pronouns
repetition and expansion
e.g., "tktk" "Yes, there's a horse"
exaggerated intonation
slower speech rate

What's the difference between humans and other animals?

Using Tools?

Making Tools?

Language?

Thinking?

Can cats think?

What does a dog think about?

I know that you think because I can talk with you about it

Can we communicate with an animal?

Warning: the answer has implications for how we treat other animals (and other humans)!

Primate Language

1931-1932 – Winthrop & Luella Kellogg &

Gua Gua was a chimpanzee *Pan troglodytes* raised with their own infant son Donald

At 16 months Gua understood about 100 English words (more than the human infant)

Comprehension	Donald	Gua
No No	12 months	7 months
Close the door	14 months.	13 months
Where is your nose	16 months	14 months
Close the drawer	18 months	15 months



Gua didn't progress any further and never produced spoken words

Primate Language

1947 - 1954 – Catherine & Keith Hayes & Viki

Viki raised as a human child, tried to teach her English learned about six English words, including:

“mama” “papa” “cup” & “Boo”

Telephone operation was another area where Viki excelled. Orange Park was making progress and no longer had an operator to connect local calls. Each client had a four-digit number and Viki randomly dialed numbers until someone answered, then greeted them with, “Boo,” one of the few words she spoke. Cathy Hayes always hastily explained and apologized whenever she heard a voice coming from the phone while Viki played. Residents would be heard bragging, “The ape called me today.”

Chimpanzees don’t have a vocal apparatus suitable for human speech

Primate Language

1966 – Beatrix & Allen Gardner & Washoe

Decided to use a real language, selected ASL because chimpanzees are dexterous & use gesture in the wild (although Gardner’s were not native speakers – frozen sign)



Washoe was raised in Gardner’s home (slept in a trailer in garden)

At age of 5 Washoe had 132 signs, 2 & 3 word sentences, and produced novel words “water bird” for swan “candy fruit/drink fruit” for watermelon

Primate Language

1972 – Ann & David Premack & Sarah

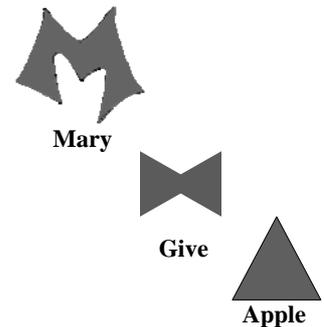
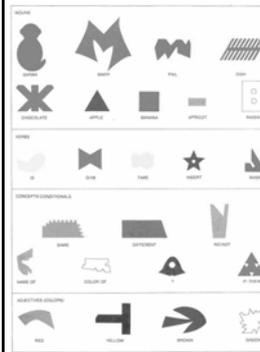
Sarah was raised in a cage, taught to use plastic symbols produced sentences like “Mary give Sarah chocolate”

Used plastic tokens as words with food rewards. Use of tokens removed possibility of cuing and observer bias. Sarah learned 130 signs, understood abstract concepts (bigger than, same-different, naming)

Good sensitivity to word order, but little spontaneous language -- not a living language

Primate Language

1972 – Ann & David Premack & Sarah



Primate Language

The **Lana Project** (or LANguage Analog) established in 1971 by Duane Rumbaugh
Rumbaugh invented a keyboard language, Yerkish

“Began with one orangutan, Biji and one chimpanzee, Lana. Both were housed together in a small room with a computer based keyboard. At the outset it was decided that only one of the apes would be utilized in language training; the ape to be selected would be the one that first began to use the keyboard. This proved to be the chimpanzee, Lana”



Primate Language

The **Lana Project**

Lana was the first to demonstrate that chimpanzees could form syntactically adequate novel sentences
“? You give Lana banana which is black”
(for an overly ripe banana)

Lana was the first to demonstrate that non-human apes could read. She could take partially completed sentences, read them and complete them appropriately

Lana was the first to learn an extensive colour vocabulary and demonstrate that chimpanzees’ sense of colour was very similar to our own

Recent tests on some lexigrams that were not used at all from 1978 to 1998 showed that Lana recalled many of them, even though she had not used them in 20 years.

Primate Language

1973 – Herb Terrace & Nim Chimsky

Set out to show that apes learn “the rules of language” through Skinnerian reinforcement contingencies

Terrace tried to replicate the Gardners’ work with ASL training

Nim's life was less free, training more like a drill

Nim needed trainers to prompt signing

Nim had many trainers, none fluent in ASL

Nim guided by interlocutor, not creating new sentences



Primate Language

1973 – Herb Terrace & Nim Chimsky

The experiment was not a success
Terrace becomes vocal critic of ape language research

“The main goal of Project Nim was to ask whether a chimpanzee could create a sentence. I have concluded that, unfortunately, the answer to that question is no”

After his owners were reportedly going to sell Nim to a medical research lab, public campaign funded Nim's retirement to a ranch in Texas, where he died in 2000, at the age of 26 from a heart attack.



Primate Language

1980s to present, Penny Patterson & Koko
Koko (a gorilla) learned to comprehend English, sign in GSL (Gorilla Sign Language) & type on computer keyboard

Koko can understand 2000 spoken words

Koko can reliably sign 500 words in GSL

Koko can string up to 7 words together forming a sentence

Koko is able to express emotions and understand abstract concepts like pregnancy and death

Koko can make up words

Koko enjoys painting pictures & creating poetry

Koko's IQ is between 70 - 75



Primate Language

1980s to present, Duane Rumbaugh, Sue Savage-Rumbaugh & Kanzi

Worked with Bonobos (*Pan paniscus*) & standard chimps using English & Yerkish

Kanzi (a bonobo), exposed to human language and Yerkish keyboard from 6 mo, remained with mother to 30 mo. Not interested in keyboard while his mother was being trained; did attempt to imitate human speech in terms of pitch/intonation

Started to use keyboard spontaneously when weaned from mum



Primate Language

Kanzi

Immediate comprehension of skills that had to be taught to other chimps

Used symbols to request things he wanted
Also to name things he didn't (currently) want

Comprehended human attempts to use keyboard to communicate with him

Never “trained”, never made to use keyboard for reinforcement, just for communication



Did these animals think (“like humans”)?

Did these animals learn to speak?

Achieved vocabularies of 300+ words, produced novel words & sentences, expressed ideas about past, future, & absent friends

In some cases they taught their siblings and children language (ASL or Yerkish)

Noam Chomsky “Attempting to teach linguistic skills to animals is like trying to teach humans to flap their arms and fly”

Stephen Pinker “In my mind this kind of research is more analogous to the bears of the Moscow Circus who are trained to ride unicycles”

Daniel Willingham “... the main question has been answered: apes cannot learn language or much of anything like language”