Language (and other fun sounds)
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Language (as performed by a 3-year-old)
• Good narrative skills
• New words for new concepts
  – Light-up sword, pokey-ball*
• Phoneme errors
  – Erratic production of final L sound
    – “well” followed by “wee”
  – sh --> s (tiny guy, spaceship)
  – th --> f (He tried to do it without seeing, Darf Vader)
• Verb forms overregularized (“blowed up”)
• Social phrases (Darf Vader, he’ll get ya!)

Language development in childhood

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What’s going on in the first year

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What ARE they thinking?
(A Q&D tutorial on child language methods)

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Headturn Preference Procedure: What seems **interesting**?

1. trial starts with green light
2. once baby’s ready, flash one side light
3. when baby turns to light, start playing sounds from speaker
4. when baby turns away, stop sounds and start new trial

**dependent measure:** listening time to a given kind of auditory material

What ARE they thinking? (A Q&D tutorial on infant methods)

Habituation: What seems **new**?

Version 1: **high-amplitude sucking** (HAS)--good if v. young kid gets to hear sound with each HA suck after hearing the same sound, suck rate declines present slightly-changed sound: does sucking rate perk up again? (= renewed interest)

Version 2: **visual habituation**

hear sound whenever kid looks at visual stimulus gradually, look length declines change sound: do looks get longer again?

What ARE they thinking? (A Q&D tutorial on infant methods)

What means something’s going to **happen**?

Conditioned Head-Turn Procedure

teach kid that whenever sound Y happens, reward usually a toy drumming bear

then present X, X, X, Y, X…
do they look for reward at Y?
I.e., can they detect Y (is it different from X?)

What ARE they thinking? (A Q&D tutorial on infant methods)

Picture fixation: What did a spoken word **refer to**?

Show pictures of a ball and an apple.

Sound: “Look at the ball! Isn’t it nice?”

Videotape eyes as word is heard.

Code **eye movements** to given picture.

Do they look more at the ball than the apple?
(=know the word?)

What ARE they thinking? (A Q&D tutorial on infant methods)

**innate auditory abilities**

case study: Eimas et al., 1971, on [p] vs [b]--HAS

the sound [p] in, say, “a pack”:
1. stop vocal fold vibration
2. put lips together
3. release lips and let air through
4. start vocal fold vibration

time between #3 and #4: **Voice Onset Time (VOT)**

VOT is a primary cue listeners use to distinguish [p] from [b] at syllable onset.

Early speech development
VOT variation in English

Thai uses all three: ba: ‘crazy’; pa: ‘aunt’; paa: ‘cloth’

Voicing lead
like Spanish /b/

Short lag
like Eng. /b/ or Spanish /p/

Long lag
like Eng. /p/

How do infants perceive speech sounds?

Eimas et al.: 1- and 4-month-olds; habituation procedure.

Further study: replications testing discrimination of many speech sounds.

Under ideal conditions, young infants can tell apart any two speech sounds that are used in any language for conveying different meanings.

Uniquely human genetic innate language capacity!…or not

Basic auditory ability

language-specific refinement

Werker & Tees 1984: test discrimination of Hindi dental and retroflex /t/, and discrimination of Nthlakampx velar and uvular consonants [k’] and [q’], using CHT.

Infants get worse at discriminating sounds that aren’t contrastive in their language.
**language-specific refinement: vowels**

Polka & Werker 1994, using visual habituation procedure

German /u/ vs /y/  4 months discriminate
6 months don’t
10-12 months don’t

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Catalan and Spanish

Catalan: has /e/ and /E/ (like “bait” and “bet”)  
Spanish: just something in between, near /e/

Bosch & Sebastian-Gallés, using habituation procedure:

all 4.5 month olds discriminate /e/ and /E/
Catalan 8.0 month olds discriminate them too;
Spanish 8.0 month olds don’t.

Learning sound patterns

- Native sounds (Werker and colleagues)
- Basic idea:
  - Infants start with all possible sounds
  - Then narrow down to those that are contrasts in their language

Coke-Sponsored Rover Finds Evidence Of Dasani On Mars

**Nonlinguistic** category loss (Hannon & Trehub)
- Infants: simple and complex meters
- Western adults: simple only
Problems in word learning

**phonological encoding:** what sounds did you say?
- Darth Vader

**present-referent identification:** what are you talking about now?
- R2D2 (not C3PO)

**category identification:** where else can I use this word?
- Pokey-ball

What about production?

- Why do kids say things the wrong way?
  – Maa-lin (?)

**Phonological encoding: production**

Children’s speech: often hard to understand
- “squirrel” (skwrl) --> /ga/
  - simplify consonant cluster skw --> k (“cluster reduction”)
  - liquids /l/ and /r/ often omitted
  - voiceless stop consonants often voiced
  - vowels often undifferentiated

Does children’s speech reflect their knowledge of words, or just what they can do with their vocal apparatus?

**Phonological encoding: perception**

To find out what children know about sound forms, try testing their word recognition with correct pronunciations and mispronunciations.

If children know how words should sound, mispronunciations should be **harder to understand** than correct pronunciations.

If children only have a vague idea how words should sound, they shouldn’t care how words are said.

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Swingley & Aslin, 2000, 2002

![Diagram](image-url)
Target fixation given correct pronunciation and mispron., plotted by child’s age

% better on correct pron. than on mispronunciation, shown by child’s production vocabulary (14-23 months)

A small caveat: doesn’t work so well for new words
Stager & Werker, 1997, habituation w/14-m-o

Why doesn’t it work for new words?
• Too unfamiliar
• Tested differently
• Too much “new stuff”

Now what happens?
• We’ve heard enough words enough times to recognize if they’re right.
• We know a lot of words: light, sword, shiny, guy, garage sale …
• So we just go on acquiring vocabulary forever and ever, but other than that we’re through.
• Wrong.

<shameless display of own data>
Big questions about spoken language

• How separate is it from other cognitive faculties?
• How does interpretation happen over time?
  – Wait until the end of a word/sentence to start considering what it means? No.
  – What things do you consider?
    – Is it hard to back off from wrong guesses?

  Ohhhh, yes.

Wrong guesses

We’re “led down the garden path”

The horse raced past the barn fell.