The Development of Infant Speech Perception: What practitioners should know

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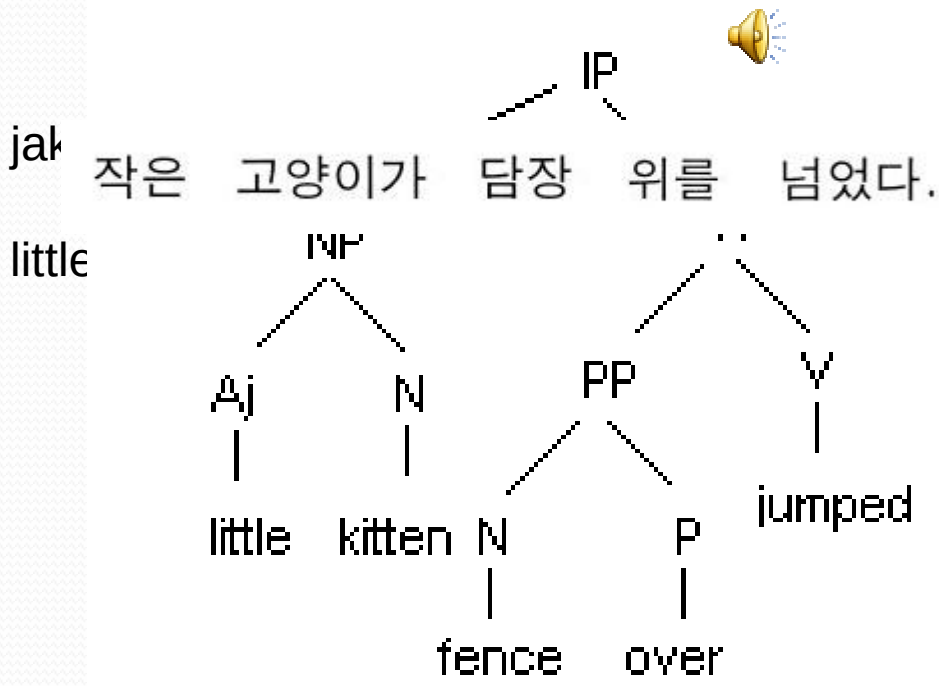
What needs to be Acquired?

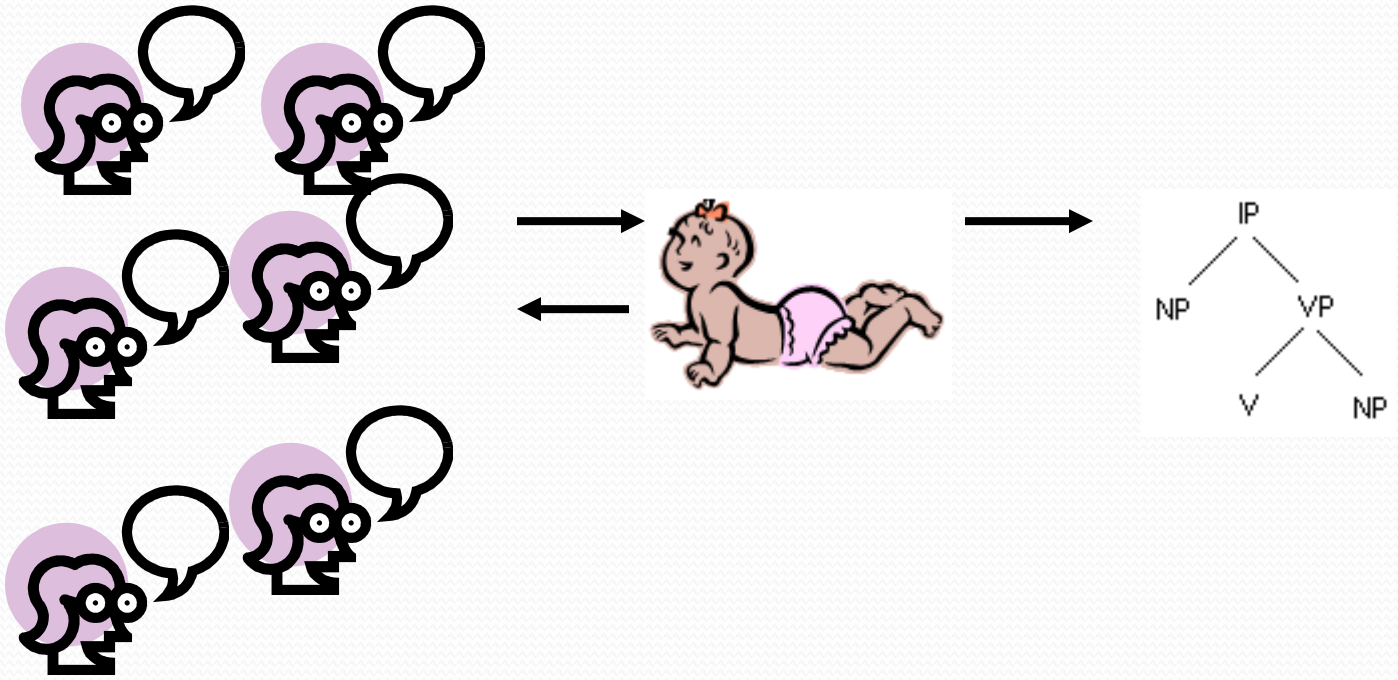
- Word segmentation
- Sound properties
  - “phonemes”
- Word meanings
  - The lexicon
- Syntactic structure
  - grammar



Research approaches

- Input focus:
  - Input is tailored (motherese/infant-directed speech)
- Infant focus:
  - Perceptual/learning abilities
- Grammar focus:
  - Innate knowledge (Chomsky)

Interactions



Underlying messages

- Language acquisition is an ***early*** process
- Perceptual vs. productive development
- Important role of parental /caregiver environment
- Opportunities for bonding/attachment

Outline

- **Early experience**
  - **Prenatal perception and experience**
  - **Newborn and early infancy period**
- Shift to native-language (6-12 months)
  - Native/non-native contrasts
  - Speech segmentation
  - Statistical learning
  - Intonation
  - Early word learning
- Early grammatical development (11-24 months)
  - Grammatical suffixes (inflection)
  - Word order
- Language environment
- Implications for adolescent parenting

Prenatal Period

- Auditory pathways
  - 2nd trimester

- Characteristics of language input
  - Low pass filtering 
  - Maternal voice
  - Content of stories/songs

Early Perceptual Skills

- Habituation: High-amplitude sucking procedure
- Newborns/young infants prefer…
  - Speech over other auditory input
  - Mother's voice over stranger's
  - "Motherese"/"parentese"/IDS over ADS
- Newborns can discriminate….
  - Own language from foreign (rhythmic class)
  - Familiar over unfamiliar content
  - Phonemes (individual sounds) ***categorically***

Categorical Speech Perception

- High-amplitude sucking
- Feature: Voicing
  - Voice Onset Time

- Ba…ba….ba…ba…ba…ba…ba..
  - …pa…pa…pa…pa…
  - …ba…ba…ba…ba…

Eimas et al. (1971)

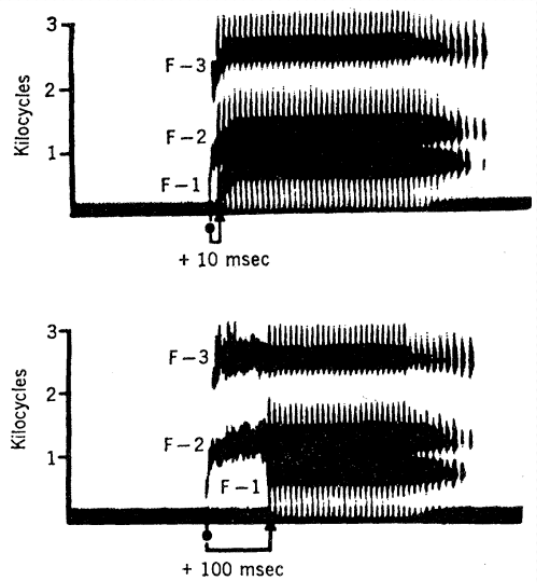


Fig. 1. Spectrograms of synthetic speech showing two conditions of voice onset time (VOT): slight voicing lag in the upper figure and long voicing lag in the lower figure. The symbols *F-1*, *F-2*, and *F-3* represent the first three formants, that is, the relatively intense bands of energy in the speech spectrum. [Courtesy of L. Lisker and A. S. Abramson]

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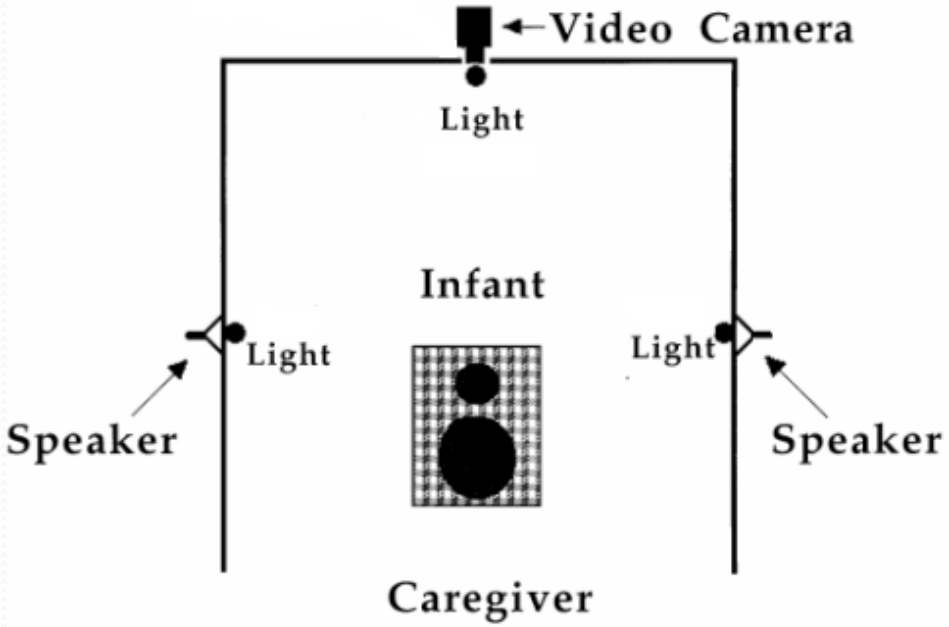
Native/non-native contrasts

- E.g. Japanese and r/l distinction
- Conditioned Headturn Procedure
  - 6 months: distinguish ***all*** contrasts
  - 12 months: ***loss*** of non-native contrasts

Werker & Tees, 1984

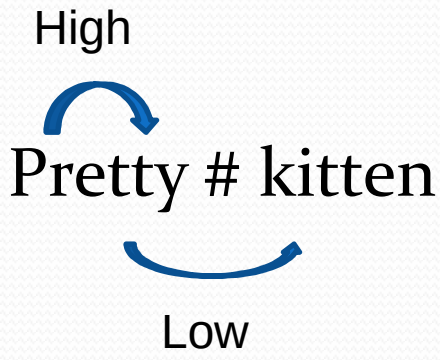
Segmenting Speech

- Headturn Preference Procedure
- Familiarize with words like “dog”, “bike”
- Test on: “the little ***dog*** walked down the street”



Jusczyk & Aslin (1995)

Statistical Learning



- Using Headturn Preference Procedure
  - Training: ….pabikutibudolatipu…..
  - Tested on: “tibudo” (word) vs. “kutibu” (partword)
- Significant preference for partword
  - Infants pay attention to probabilities between syllables

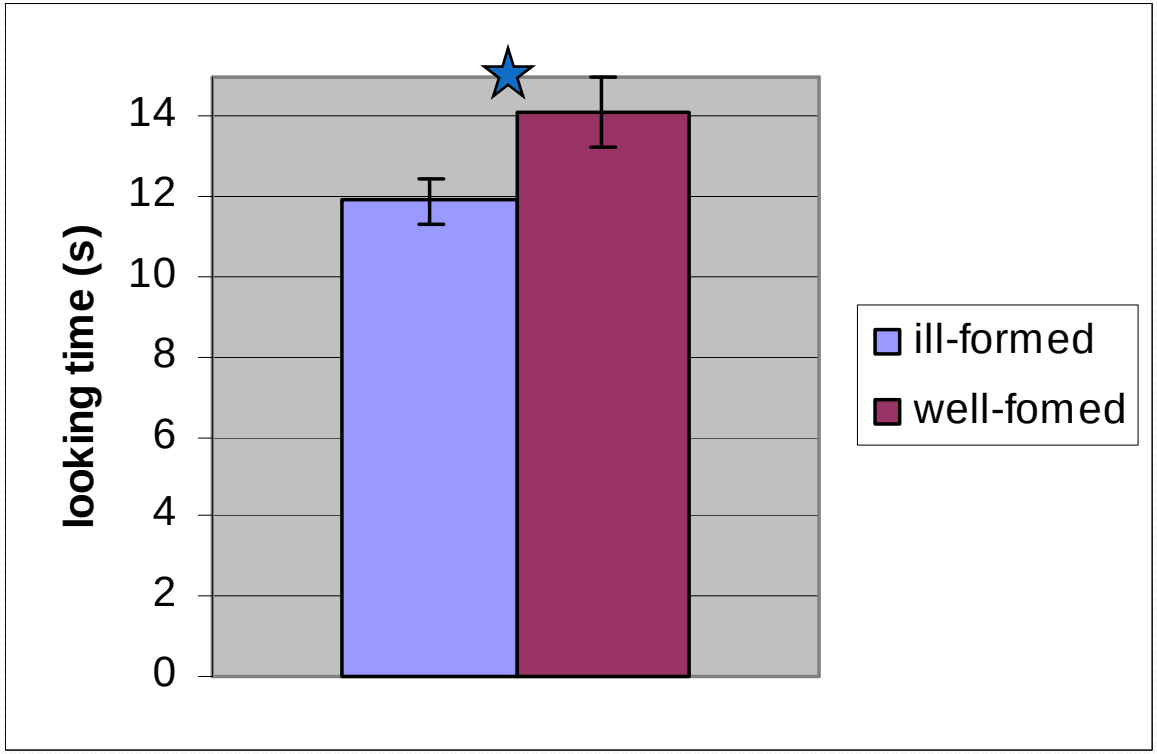
Saffran et al. 1996

Intonation and Rhythm: “prosody”

Inventive people [design telephones] at home. A fresh idea with promise surprises no-one who works there.

The director of design telephones her boss. New developments [promise surprises] for their old buyers.

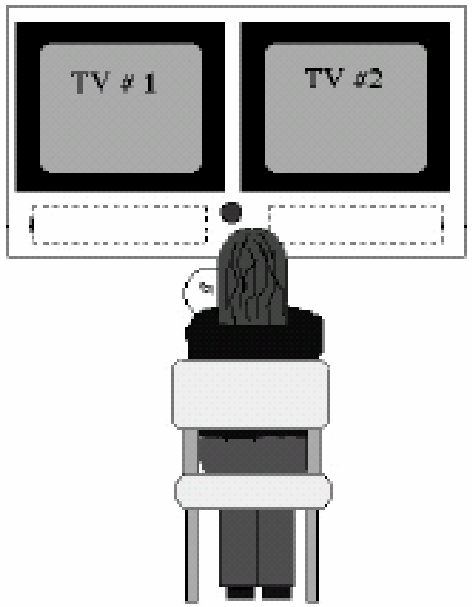
Verb Phrases (6 month olds)



Soderstrom et al. 2003

Early word learning

- Perception: 6 months!
  - Intermodal preferential looking procedure
  - Mommy/daddy



Tincoff & Jusczyk (1999)

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  - **Word order**
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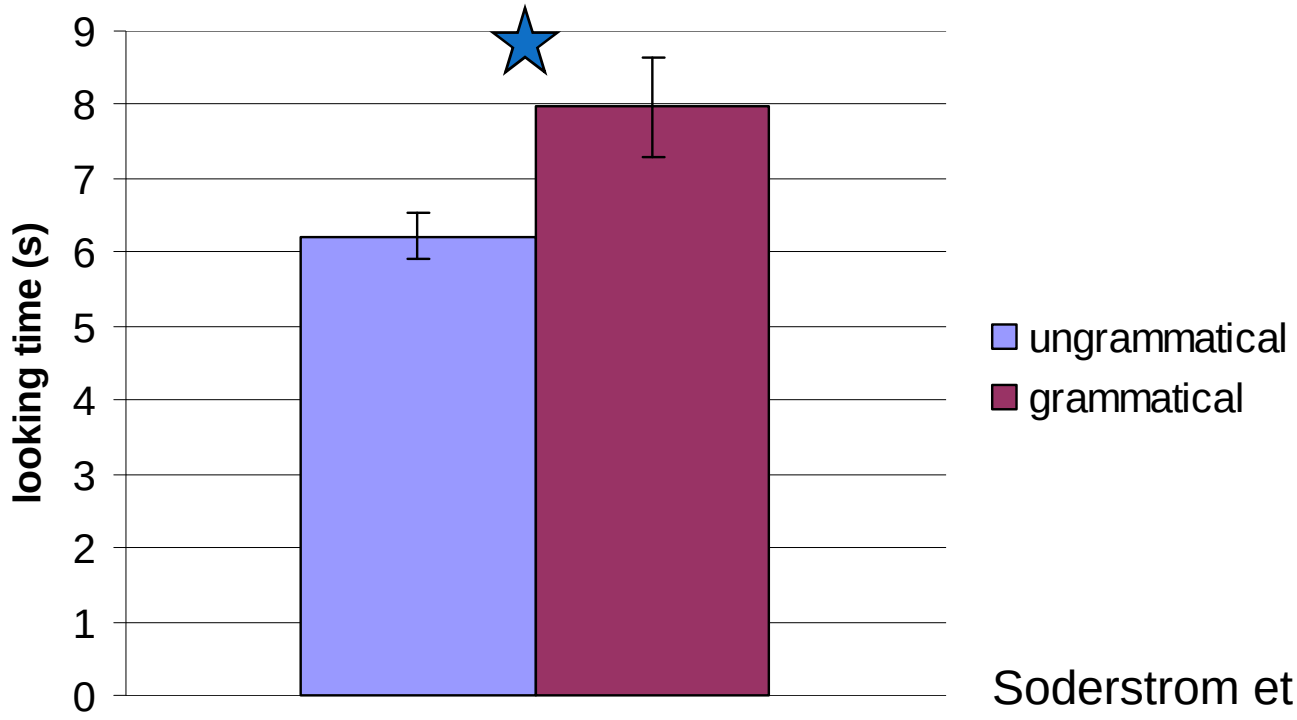
Grammatical knowledge

- Headturn Preference Procedure
  - 16-month-olds listen to grammatical and ungrammatical sentences
- Both inflection and position signal violation
  - Grammatical: "Chairs are good to stand on when you sing a lot"
  - Ungrammatical: "Sing are good to stand on when you chairs a lot"
- Prediction: If they distinguish the passage types, infants should prefer grammatical passages

16-month-olds prefer grammatical passages



Soderstrom et al., 2007

Word order or agreement?

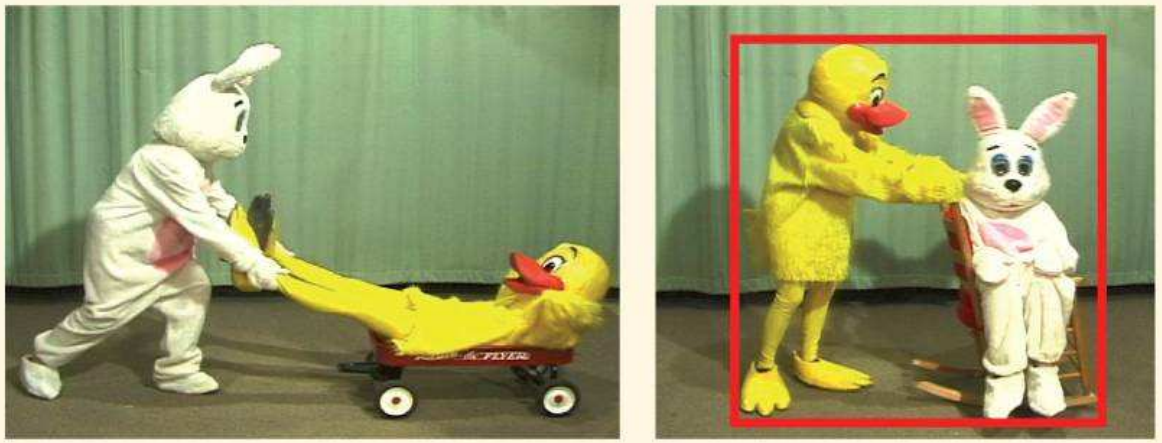
- Experiment 2: Content word order:
  - Grammatical: Chairs are good to stand on when you sing a lot.
  - Ungrammatical: Sings are good to stand on when you chair a lot.
- Experiment 3: Suffix only moved:
  - Grammatical: Chairs are good to stand on when you sing a lot.
  - Ungrammatical: Chair_ are good to stand on when you sings a lot.

Infants better with suffix than word order

Word Order

- Intermodal Preferential Looking Procedure

- 18 month olds
  - Familiar words
- 21 month olds
  - Novel words



(a) "The duck is gorping the bunny!" (b)

Hirsh-Pasek & Golinkoff, 1996; Gertner et al., 2006

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Language environment

- Characteristics of infant-directed speech
  - Intonation, length, repetition, word choice
  - Changes across development
    - Changes in ID speech itself
    - Changes in infant preferences
- Comparing speakers
  - Siblings/Fathers/others
  - Age of parent/experience
  - Father-bridge hypothesis
- Differing environments?
  - Depressed mothers
  - Daytime care environment

Implications for adolescent parents

- Mother is heard – even during fetal development
- First two years are critical for development
- Infants are smart and resilient
- Role of father (and/or other extended family)
- Maternal (mental) health/happiness is important

Some outstanding questions

- From the infant speech researcher
  - Does adolescent parental input differ
    - Qualitatively
    - Quantitatively
  - Is infant of adolescent parent more at risk
    - Depressed mother
    - Poor quality child care
    - Lack of “bridge” caregiver
  - Would these differences actually impact language milestones?

- From you
  - ???