

## Vocalizations

- Stage 1: Reflexive vocalizations
  - Crying
  - Fussing
  - Burping
  - Coughing
- Automatic responses to environment

## Cries

- Newborns - first month:
  - Directly in response to stimuli/distress (no communicative intent)
- Three types become distinguished during first month
  - Basic or hunger cry - rhythmic pattern of loud crying, silence, whistling inhalation, & rest
  - Pain cry - loud shrill cry, followed by breath-holding silence and series of short whimpers
  - Temper cry

## Cries

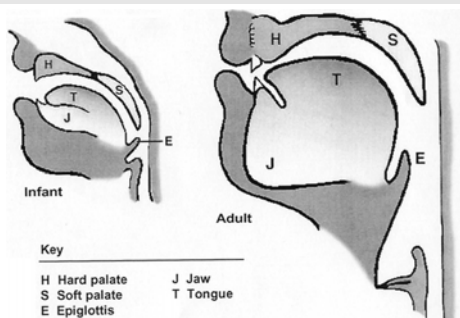
- Naturally occurring behavior
  - Then recruited for communication
  - Continuum of intentionality
  - Both directed and undirected crying still present at 12 months
    - Directed crying - combined with gestures, directed to caregiver

## Vocalizations

- Stage 2: Cooing (vowel-like sounds) and laughter, 2-4 months
- Intentional sounds
- Sound like vowels /e/ and /u/ but
  - last longer
  - more guttural & throaty
  - produced in the back of the vocal cavity
- thought to be precursors to consonants
  - /k/ /g/

## Vocal tract anatomy changes

From Thinking Publications, 1996



## Stage 3

- Isolated vowel-like sounds
- Vocal play
- Transitional babbling: single syllables of vowel-like and consonant-like sounds

<http://www.VocalDevelopment.com/>

## Vocal experimentation

- Yells/whispers: playing with amplitude/intensity
- Squeals & Growls: playing with pitch
- Raspberries
- Marginal babbles

<http://www.VocalDevelopment.com/>

## Vocalizations

- Stage 4: Canonical babbling
- Two types
  - Reduplicated babbling
  - Variegated babbling



Image credit: Laura Petitto  
<http://www.dartmouth.edu/~lpetitto/langAc.html>

## Jargon babbling

- Adds intonational changes
- [movies/Ch0202.mov](#)

## Theoretical arguments

- Is babbling related to phonological development or word production?
- Jacobson argued
  - Infants babble all possible sounds
  - A break occurs between babbling and speech.
- Lennenberg (1967)
  - Babbling in deaf infants at the same age that babbling occurs in hearing infants.

## Is there a break?

- Most evidence has shown that there is no break between babbling and production of first words.
- In fact, there is overlap - many children continue to babble after producing first words.

## Do infants babble ALL sounds?

- No.
  - The 12 most-frequent consonants in 12-month-old babbling make up 95% of babbling.
  - The 12 least appeared in only 5%.
  - Some sounds never appear in some infants' babbling.
  - Generally, fricatives, affricates & liquids are less common.

## Do deaf infants babble the same way?

- Stoel-Gammon & Otomo (1986)
  - HI infants produced fewer utterances, and fewer different consonant types
  - These infants show less variety in consonants over time
- Oller & Ellers (1988)
  - They begin babbling later (11 or 12 months, not 6-10)
  - Even after several months, most HI infants did not produce vocalizations similar to those of hearing infants
- Thus, babbling does not appear to develop normally without auditory input

## Is there continuity between babbling & language?

- Vihman (1992)
- Earliest babbling shows little differentiation among languages
  - Ex: /h/ does not occur in French, but shows up in early syllables as frequently as it does in English

## Universality of early babbling inventory

- Locke, 1983:
  - b d g
  - p t k
  - m n
  - w j h
- Vowels in babbled syllables tend to be low front or central.

## Early inventory, cont.

- Vihman (1992) examined English, Swedish, French, Japanese
- Top 6 syllables babbled were /da/, /ba/, /wa/, /d^/, /ha/, /h^/

## Why these sounds?

- Jaw Oscillation ("Frame") theory
  - MacNeilage & Davis, 1993
- Alternation between open and closed vocal tract can be produced by a single action: **mandibular oscillation**.

## Jaw oscillation should lead to

- Bilabial consonants and central vowels
  - tongue stays neutral



## Jaw oscillation should lead to

- Front consonants with front vowels  
– tongue stays front



## Why do we hear these sounds?

- Most babbling tends to have these correlations between particular consonants & vowels  
– Davis & MacNeilage, 1995

## Conclusions from this?

- Some characteristics of infants' babbling patterns are a result of the amount of control they have over their articulators

## Babbling and mouth movements?



<http://www.dartmouth.edu/~lpetitto/BabbleMovie.html>

<http://www.dartmouth.edu/~lpetitto/NonBabbleMovie.html>

<http://www.dartmouth.edu/~lpetitto/SmileMovie.html>

## Later babbling

- Sounds in early babbling appears not to depend on the particular language.
- What about later babbling?

## Vihman, 1992 /h/ data

	WORDS				
	0	4	15	25	target
• English	18%	13%	16%	13%	13%
• French	19%	8%	3%	6%	0%

## Effects of linguistic experience on babbling

- de Boysson-Bardies et al. (1984)
  - Recorded babbling from 6-, 8-, and 10-month-old infants
  - Different language backgrounds (French, Arabic, Chinese).
- Adults could recognize the infants from their own language by 8 months.

## Follow-up work

- de Boysson-Bardies et al. (1989)
  - Spectral analyses of vowels
  - Infants from Parisian French, Hong Kong Cantonese, Algerian Arabic & British English households
  - Showed differences by 10 months

## More follow-ups

- Longitudinal study of French, Swedish, English & Japanese infants plotted the drift towards native-language categories
- Differences between infants were seen by 10 months
- Intonational differences between infants of different languages have also been seen (Whalen, Levitt & Wang, 1991)

## Is this just dyad effects?

- Individual mother-child dyads show no greater similarity than that between the infant and any other mother in the same language group
  - Vihman, Kay, de Boysson-Bardies, Durand & Sundberg, 1994

## Babbling to first words

- Syllables used in early words are primarily from the ones that had appeared frequently in babbling for most kids
  - Vihman et al 1984; Elbers & Ton 1985
- But greater reliance on the “easier” phonemes

## Conclusions?

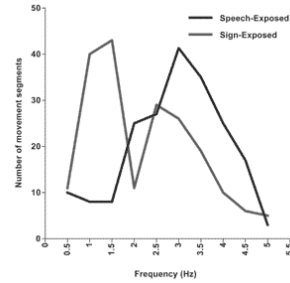
- Babbling appears to be a natural and necessary part of language acquisition
- It is part of the process of getting to word production

## Sign babbling



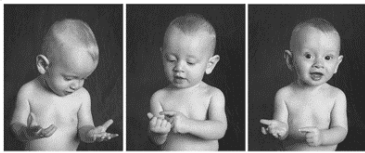
Image credit: Laura Petitto

## Sign babbling



Sign-exposed infants showed two different types of hand-movements; speech-exposed infants showed only one.

## Sign babbling



6 month old hearing speech-exposed boy producing a series of hand movements.

<http://www.dartmouth.edu/~lpetitto/Largequick.html>

or

<http://www.dartmouth.edu/~lpetitto/smallquick.html>

## Variability

- Just as sounds might be produced correctly during babbling, but not during first words, the same sound might be produced correctly in some contexts but not others.
  - Chain shifts
  - Stored articulatory routines