Recap

• Syllabus (including the list of course readings) is available on Dr. Tessier’s website:

http://www.ualberta.ca/~annemich/LING420.html

• Dr. Tessier will be back on Tuesday.
Class Overview

• Data Exploration/Analysis
  – English: Joan (Velten, 1943)
  – English: Amahl (Smith, 1973)

• Introduction to Infant Speech Production
  – Babbling
An English L1 Chain Shift

Joan (Velten 1943)

a)  
[fub] ‘swim’
[dab] ‘jam’
[bud] ‘spoon’
[wud] ‘rain’
An English L1 Chain Shift

Joan (Velten 1943)

a)

[fub] ‘swim’
[dab] ‘jam’
[bud] ‘spoon’
[wud] ‘rain’

• /m/ changes to [b]
• /n/ changes to [d]
• word-finally

Rule 1:
/nasals/ --> [voiced stops] /__ #
An English L1 Chain Shift

Joan (Velten 1943)

b) 

[d uf] ‘stove’
[z us] ‘shoes’
[b at] ‘bad’
[z u ts] ‘seeds’
An English L1 Chain Shift

Joan (Velten 1943)

b)

- /v/ changes to [f]
- /z/ changes to [s]
- /d/ changes to [t]
- /dz/ changes to [ts]
- word-finally

Rule 2:
/voiced obstruent/ --> [voiceless] / __ #
An English L1 Chain Shift

Joan (Velten 1943)

c)  

\[
\begin{align*}
[zaf] & \quad \text{‘laugh’} \\
[zas] & \quad \text{‘sauce’} \\
[dut] & \quad \text{‘coat’} \\
[uts] & \quad \text{‘oats’}
\end{align*}
\]
An English L1 Chain Shift

Joan (Velten 1943)

c)

- [zaf] ‘laugh’
- [zas] ‘saucé’
- [dut] ‘coat’
- [uts] ‘oats’

• voiceless codas stay as voiceless codas
An English L1 Chain Shift

• How do our rules work?
  – ‘stove’ -- /duv/
    – Rule 1: does not apply
    – Rule 2: /duv/ → [duf]
    – This is what Joan says 😊

  – ‘rain’ -- /wun/
    – Rule 1: /wun/ → [wud]
    – Rule 2: /wud/ → [wut]
    – This is not what Joan says 😞
An English L1 Chain Shift

• How do we keep /wun/ from coming out as [wut]?

• Rule ordering:
  – Rule 2: This rule doesn’t apply to /wun/ (nasals are not obstruents)
  – Rule 1: /wun/ → [wud]

  – Therefore, Rule 2 must apply before Rule 1
A Korean L1 Chain Shift

S.H. (1;7-2;0) (Cho and Lee 2003)

/sadari/ [hadadi] ‘ladder’
/sagwa/ [huaga] ‘apple’
/satʰaŋ/ [hat’aŋ] ‘candy’
A Korean L1 Chain Shift

S.H. (1;7-2;0) (Cho and Lee 2003)

/sadari/  [hadadi]  ‘ladder’
/sagwa/   [huaga]   ‘apple’
/satʰaŋ/  [hat’aŋ]  ‘candy’

• Word-Initial Position
• /s/ changes to [h]

Rule 1: /s/ → [h] / # _
A Korean L1 Chain Shift

S.H. (1;7-2;0) (Cho and Lee 2003)

/ hyudzi/   [k’ogi]   ‘tissue’
/ horanji/  [kæganı]  ‘tiger’
/ hobak/    [k’oba]   ‘zucchini’
A Korean L1 Chain Shift

S.H. (1;7-2;0) (Cho and Lee 2003)

- /hyudʒi/ [k’ogi] ‘tissue’
- /hɔɾaŋi/ [kæɡəni] ‘tiger’
- /hɔbak/ [k’ɔba] ‘zucchini’

- Word-Initial Position
- /h/ changes to [k’]

Rule 2: /h/ → [k’] / # _
A Korean L1 Chain Shift

S.H. (1;7-2;0) (Cho and Lee 2003)

\[ /k^h o/ \quad [k'o] \quad \text{‘nose’} \]
\[ /k^h ok’iri/ \quad [k’ok’ii] \quad \text{‘elephant’} \]
\[ /kæguri/ \quad [kak’ui] \quad \text{‘frog’} \]
A Korean L1 Chain Shift

S.H. (1;7-2;0) (Cho and Lee 2003)

\[
\begin{array}{ccc}
/k^h_o/ & [k'o] & \text{‘nose’} \\
/k^h_0k’i/ri & [k’ok’ii] & \text{‘elephant’} \\
/k_æguri/ & [kak’ui] & \text{‘frog’} \\
\end{array}
\]

- Word-Initial Position
- \(/k^h/\) changes to \([k’]\)
- Note: \(/k/\) stays as \([k]\)

Rule 3: \(/ k^h / \rightarrow [k’] \) / # _
A Korean L1 Chain Shift

• How do our rules work?
  • ‘zucchini’ /hoba/
    • Rule 1: does not apply
    • Rule 2: /hoba/ → [k’oba]
    • Rule 3: does not apply
    • This is what S.B. says 😊

• ‘apple’ /suaga/
  • Rule 1: /suaga/ → [huaga]
  • Rule 2: /huaga/ → [k’uaga]
  • Rule 3: does not apply
  • This is not what S.B. says 😞
A Korean L1 Chain Shift

• How do we keep /suaga/ from turning into [k’uaga]?

  – Rule ordering

  – Rule 2: This rule doesn’t apply to /suaga/

  – Rule 1: /suaga/ → [huaga]

  – Therefore, Rule 2 must apply before Rule 1
Another English L1 Chain Shift

Amahl at 2;11 (Smith 1973)

<table>
<thead>
<tr>
<th>Target</th>
<th>Word</th>
<th>Phoneme</th>
<th>Word</th>
<th>Phoneme</th>
<th>Word</th>
<th>Phoneme</th>
</tr>
</thead>
<tbody>
<tr>
<td>/s/</td>
<td>taxi</td>
<td>/tʰæktɪ:/</td>
<td>legs</td>
<td>/lɛɡd/</td>
<td>fish</td>
<td>/wit/</td>
</tr>
<tr>
<td>/s/</td>
<td>sun</td>
<td>/tʌn/</td>
<td>zip</td>
<td>/dɪp/</td>
<td>gracious</td>
<td>/ɡeɪtət/</td>
</tr>
<tr>
<td>/s/</td>
<td>sausages</td>
<td>/tɔtɒdɪd/</td>
<td>zebra</td>
<td>/dɪˈbra/</td>
<td>sharpening</td>
<td>/tʰaːpənɪn/</td>
</tr>
<tr>
<td>/t/</td>
<td>fetch</td>
<td>/wɛt/</td>
<td>ginger</td>
<td>/dɪnˈdə/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/t/</td>
<td>cherry</td>
<td>/tɛriː/</td>
<td>John</td>
<td>/dʌn/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/t/</td>
<td>cheese</td>
<td>/tiːd/</td>
<td>pyjamas</td>
<td>/pədəˈmeɪd/</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Another English L1 Chain Shift

Amahl at 2;11 (Smith 1973)

a. target /s/  
   \[tʰækti:] ‘taxi’
   \[tʌn] ‘sun’
   \[tɔtədiŋ] ‘sausages’

b. target /z/  
   \[lɛgd] ‘legs’
   \[dʒp] ‘zip’
   \[dɪ:brə] ‘zebra’

c. target /ʃ/  
   \[wɪt] ‘fish’
   \[geitəf] ‘gracious’
   \[tʰa:pənɪn] ‘sharpening’

d. target /tʃ/  
   \[wɛt] ‘fetch’
   \[tɛri:] ‘cherry’
   \[ti:d] ‘cheese’

e. target /dʒ/  
   \[dɪndə] ‘ginger’
   \[dən] ‘John’
   \[pədəməd] ‘pyjamas’

• Fricatives and Affricates become stops (regardless of syllable position)

• Here we see /s/, /z/, /ʃ/, /tʃ/, /dʒ/ → [stop]

Rule 1: /+delayed release/ → [−delayed release]
Another English L1 Chain Shift

Amahl at 2;11 (Smith 1973)

a. target dark lateral
   [pægəl]  ‘puddle’
   [bɔkəl]  ‘bottle’
   [dʒəŋəl]  ‘journal’
   [kæŋɡəlz]  ‘candles’

b. target clear lateral
   [bʌklə]  ‘butler’
   [æŋkləz]  ‘antlers’
   [trəɡlə]  ‘troddler’
Another English L1 Chain Shift

Amahl at 2;11 (Smith 1973)

a. target dark lateral
   [pʌgəl] ‘puddle’
   [bɒkəl] ‘bottle’
   [dʒənəl] ‘journal’
   [kæŋɡəlz] ‘candles’

b. target clear lateral
   [bʌklə] ‘butler’
   [æŋkləz] ‘antlers’
   [trəɡlə] ‘toddler’

Alveolar stops become velars before [l] .

Rule 2: (/+coronal/, /-continuant/) → [dorsal] / ___ [+lateral]
Another English L1 Chain Shift

Amahl at 2;11 (Smith 1973)

Rule 1: /+delayed release/ → [-delayed release]

Rule 2: (/+coronal/, /-continuant/) → [dorsal]

Rule 2: (/+coronal/, /-continuant/) → [dorsal]

Rule 1: /+delayed release/ → [-delayed release]

a. /s, z, ñ, t, ñ̂, d̂/ → [t, d]
   [pʌdəl] ‘puzzle’
   [pɛtəl] ‘pencil’
   [bɛtəl] ‘special’
   [ˈændələ] ‘Angela’
   [paːtliː] ‘parsley’
Another English L1 Chain Shift

Amahl at 2;11 (Smith 1973)

‘puzzle’
- Rule 1: /pʌzəl/ → [pʌdəl]
- Rule 2: /pʌdəl/ → [pʌgəl]
- This is not what Amahl says 😞

Therefore, Rule 2 must apply before Rule 1
Overview of Development

First Year of Life (0-12 Months)

Bjorkland (2005); Shaffer, Wood, & Willoughby (2002)

• Motor Development
  – head-down
  – Trunk-out

• Milestones:
  – By 4-5 months --- voluntarily grasp objects
  – By 9 months --- play patty-cake
  – By 16 months --- scribble with a crayon.
Overview of Development
First Year of Life (0-12 Months)

Bjorkland (2005); Shaffer, Wood, & Willoughby (2002)

• Auditory Development:
  – Auditory development begins early.

  – Newborns already:
    • Know their mother’s voice
    • Discriminate a familiar from unfamiliar story

  – By 4½ to 6 months --- distinguish between musical pieces with natural vs. unnatural pauses.
Overview of Development
First Year of Life (0-12 Months)

Bjorkland (2005); Shaffer, Wood, & Willoughby (2002)

• Visual Perception
  – Newborns can perceive light
  – By 2 months --- begin to fixate on internal facial features (e.g. eyes and mouth).
  – By 3 months --- focus their lenses like adults.
  – By 4 months --- preference for human faces compared to other visual stimuli.
  – By 6 months --- follow moving objects with their eyes.
Overview of Development
First Year of Life (0-12 Months)

Bjorkland (2005); Shaffer, Wood, & Willoughby (2002)

• Intermodal Integration
  
  – To some degree this skill is present at birth
  
  – By 6 months --- integrate tactile and visual sensory information.
Back to Language Development

Hoff (2001)

• Before Words:
  1. Reflexive Crying
  2. Cooing and Laughter (approx. 1.5 to 4 months of age)
  3. Vocal Play (approx. 4 to 6 months of age)
  4. Reduplicative Babbling (approx. 6 to 9 months of age)
  5. Nonreduplicative Babbling (approx. 9-12 months of age)
Vocal Play
(approx. 4-6 month olds)

Hoff (2001)

• the number of consonants and vowel sounds increases

• [g] and [k] are typically the first consonants

• consonants articulated in the front of the mouth appear by the end of this stage
Vocal Play
(approx. 4-6 month olds)

• An Example from YouTube:

Vocal Play!
Reduplicative Babbling
(approx. 6-9 months)

Hoff (2001)

• aka: canonical babbling (e.g. [dada])

• first appearance of syllables

• not necessarily an attempt to communicate
Reduplicative Babbling
(approx. 6-9 months)

Hoff (2001)

• Canonical babbling is a crucial part of prespeech development

• First point in vocal development that distinguishes hearing from deaf children
Babbling and Profound Hearing Impairments

McLeod (2007)

• Differences between children with and without hearing loss:
  – Vowels are restricted
  – Fewer consonants
  – Smaller syllable inventory
Reduplicative Babbling
(approx. 6-9 months)

• An Example from YouTube:

mamamama
Nonreduplicative Babbling
(approx. 9-12 months)

Hoff (2001)

• Babies sound inventories expand

• Babble contains different syllable strings

• Babies make use of the prosody contours of the ambient language
Nonreduplicative Babbling
(approx. 9-12 months)

- Two Examples from YouTube:
  
  How was your day?

- Social Interactions and Babble
  
  (Saffran & Thiessen, 2007)

  Political Speech
Speech Sounds at the end of the Babbling Stage

• /h, w, j, p, b, m, t, d, n, k, g/

• similar across languages

• consonant clusters are very rare

• vocalizations at this point are often single syllables

Hoff (2001)
Why Babble?

Kimbrough Oller (2000)

- Practice makes perfect
- Auditory feedback
- Gestural Babbling
Motor Development and Consonant Production

Beckman (2009)

• Stops are often first

• Fricatives develop later than stops

• Affricates appear later than fricatives
Motor Development and Syllable Production

- Consonants are highly connected to the adjacent vowel (Menn, 2004).

- This pattern holds cross-linguistically (http://www.utexas.edu/features/archive/2005/babble.html)
Sensory Integration and Babbling

Beckman (2009)

• Beginning in the Vocal Play stage, children make use of a feedback loop.

• By 4 months of age, infants know the facial cues that correspond to specific vowels.
Other Factors and their impact (or lack there of) on Babbling

Kimbrough Oller (2000)

- Socio-Economic Status
- Prematurity
- Bilingualism
More on Bilingual Babbling

Genesee & Nicoladis (2007)

• Age of onset is the same

• Utterance and syllable structure

• Segmental Features
Neurodevelopmental Disorders and Babbling

Tager-Flusberg (2007)

• Autism
  – Canonical babbling --- same segments
  – Phonological skills are relatively unimpaired

• Williams Syndrome
  – Canonical babbling --- slight delay
  – Articulation is good

• Down Syndrome
  – Canonical babbling --- slight delay
  – Difficulties with phonology persist
From Babble to Words

• Babble becomes more like the target language (Menn, 2004)

• Many children go through a transitional period where they use invented words (Hoff 2001)

• Babble and words co-exist for several months (Stoel-Gammon & Vogel Sosa, 2007)
Babbling and Speech Perception

Hoff (2001); Beckman (2009)

• The early stages of speech production (e.g. vocal play) appear to be universal

• By 6-months of age, language-specific features begin to appear in babbling

• Babies are sensitive to the frequency of sounds in their input
References


Cho & Lee (2003). (get reference from Dr. Tessier)


Velten, (1943). (get reference from Dr. Tessier)