Speech Perception and Phonological Development

319_29_31JAN08
This Week’s Topics

- Speech production - phonological development & theories
  Hoff 121-134
- Phonological Processes practice on website
Phonological Development
Why is phonological development slow?

- Ideal vs. natural conditions
- Production is motoric
- Word production = coordination of motoric and linguistic/cognitive/social system
Phonology of the First Words

- 1-50 words in production
- Large variation in phonological structure of a single target word

“BOTTLE”
[bə], [βa], [pə] [baba], [βaβa], [βə], [bə]

- Underspecification?
  - Bottle = CV.CV, C = [+labial], V = [-hi]?
Phonology of the First Words

- Wholistic storage?
  - Phonological idioms

- Fully-specified phonological representations develop because: need, evidence, practice
Phonological Processes

- Emergence of systematic productions of target words
- Phonological processes: changes between the phonology of the target word and the child’s pronunciation
- Some processes persist until school age; other end around 2;6
Phonological Processes

Weak syllable deletion (S del): Omission of an unstressed syllable

banana [bə'nænə] → [nænə]

butterfly [ˈbʌtərflai] / [ˈbʌtərflai] → [bʌtərflai]

Final consonant deletion (syllable or word) (C del)

doll house [ˈdɒlhaus] → [dahau]
telephone [ˈteləfon] → [tɛfo]
Phonological Processes

Reduplication (Redup): Production of two identical syllables based on one of the syllables in the target word

Sesame Street \[\text{'sesəmiʃəstrit}' \rightarrow [\text{si:si}]\]
hello \[\text{'hɛlo} \rightarrow [\text{lolo} \rightarrow [\text{yoyo}]\]
bottle \[\text{'baɾl} \rightarrow [\text{baba}]\]

Consonant harmony (CH): One of two different consonants in the target word takes on features of another consonant in the same word

duck \[\text{d}\text{Δ k} \rightarrow [\text{g}\text{Δ k}]\]
tub \[\text{t}\text{Δ b} \rightarrow [\text{b}\text{Δ b}]\]
Phonological Processes

Consonant cluster reduction (CCR): Omission of one of the consonants of a cluster in the target word

<table>
<thead>
<tr>
<th>Word</th>
<th>Original Pronunciation</th>
<th>Reduced Pronunciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>cracker</td>
<td>[ˈkrækə] / [ˈkrækə]</td>
<td>[kækə]</td>
</tr>
<tr>
<td>play</td>
<td>[ple]</td>
<td>[pe]</td>
</tr>
</tbody>
</table>

Velar fronting (VF): A velar is replaced by an alveolar or dental

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<tbody>
<tr>
<td>key</td>
<td>[ki]</td>
<td>[ti]</td>
</tr>
<tr>
<td>cake</td>
<td>[kek]</td>
<td>[tet]</td>
</tr>
</tbody>
</table>
Phonological Processes

Stopping (stop): A fricative or affricate is replaced by a stop

- sea: [si] → [ti]
- church: [čəč] / [čəɾč] → [tət]

Gliding (glide): A liquid is replaced by a glide (not word or syllable final)

- rabbit: [ˈræbit] → [wæbit]
- Lissa: [ˈlɪsə] → [ˈyɪsə]
Phonological Processes

Final liquid vocalization (vocal): A liquid is replaced by a vowel

ball \( \rightarrow \) [bau]
pear \( \rightarrow \) [pœ]

De-aspiration (deasp): A voiceless stop in word initial position is un-aspirated, so it sounds voiced.

cup \( \rightarrow \) [gΛp]
pear \( \rightarrow \) [bœ]
bear \( \rightarrow \) [bœ]
# Phonological Processes

<table>
<thead>
<tr>
<th>spoon</th>
<th>spun</th>
<th>bu</th>
<th>CCR deasp C del</th>
</tr>
</thead>
<tbody>
<tr>
<td>train</td>
<td>tren</td>
<td>den</td>
<td></td>
</tr>
<tr>
<td>giraffe</td>
<td>jì'ræf</td>
<td>ræf</td>
<td></td>
</tr>
<tr>
<td>lion</td>
<td>laïən</td>
<td>waïən</td>
<td></td>
</tr>
<tr>
<td>chair</td>
<td>čer</td>
<td>teə</td>
<td></td>
</tr>
</tbody>
</table>
## Phonological Processes

<table>
<thead>
<tr>
<th>word</th>
<th>phonemes</th>
</tr>
</thead>
<tbody>
<tr>
<td>bottle</td>
<td>babu</td>
</tr>
<tr>
<td>elephant</td>
<td>εfΛ n</td>
</tr>
<tr>
<td>doggie</td>
<td>gagi</td>
</tr>
<tr>
<td>toast</td>
<td>dot</td>
</tr>
<tr>
<td>yellow</td>
<td>yeyo</td>
</tr>
</tbody>
</table>
### Phonological Processes

<table>
<thead>
<tr>
<th>Word</th>
<th>Phoneme</th>
</tr>
</thead>
<tbody>
<tr>
<td>grandma</td>
<td>ðæmə</td>
</tr>
<tr>
<td>zebra</td>
<td>dibə</td>
</tr>
<tr>
<td>tractor</td>
<td>tætæ</td>
</tr>
<tr>
<td>monkey</td>
<td>məki</td>
</tr>
<tr>
<td>dinosaur</td>
<td>dairɪcə</td>
</tr>
</tbody>
</table>
# Phonological Processes

<table>
<thead>
<tr>
<th>sippy-cup</th>
<th>tik ʌ p</th>
</tr>
</thead>
<tbody>
<tr>
<td>fall down</td>
<td>fadaʊ</td>
</tr>
<tr>
<td>tractor</td>
<td>tætɔ</td>
</tr>
<tr>
<td>space ship</td>
<td>peɪtɪp</td>
</tr>
<tr>
<td>slide</td>
<td>saɪd</td>
</tr>
</tbody>
</table>

*peɪtɪp*
How long does phonological development take?

- English norms
  - bilabials & alveolars >> velars
  - Stops & nasals mastered 2-4 yrs
  - Fricatives, liquids, affricates mastered 4-8 yrs
  - Late sounds: ‘th’ [ð] [θ]

- Crosslinguistic variation?
  - Functional Hypothesis: importance of a phoneme determines acquisition order
# Theories of Phonological Development

<table>
<thead>
<tr>
<th>Inside-out</th>
<th>Biologically-based</th>
<th>Cog Problem-solving</th>
<th>Behaviorist</th>
<th>Outside-in</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Connectionist</td>
<td></td>
<td></td>
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</tbody>
</table>
Theories of Phonological Development

- Behaviorist
  - Imitation & reinforcement
  - Problem: sound system, not just inventory

- Biologically-based
  - Easy to articulate = early emergence
  - Underlying rep can be intact, but production flawed
  - Problem: universal tendencies, but some crosslinguistic variation
Theories of Phonological Development

- Cognitive problem-solving model
  - Child actively involved
  - Piecemeal, word-by-word
  - Slow development of underlying rep and production

- Evidence:
  - individual variation
  - Frequency effects
Theories of Phonological Development

- Connectionist model
  - Interconnectivity of features, segments, words
  - Explanation of phonological processes without rules (t --> d / word initial)
  - Connections between features strengthen over time; when they are weak --> phono processes
Figure 3.7 Illustration of a partial connectionist model of phonology