Understanding Early Communication Outcomes

New Tools and Insights

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Background

- Reduced body of literature concerning children with mild to severe HL
- NIDCD funded multi-site longitudinal study
  - Five-year project (currently in Year 3)
  - Collaboration of University of Iowa, BTNRH and University of North Carolina-Chapel Hill
  - Multidisciplinary research team
- Outcomes of Children with Hearing Loss (OCHL)
Aims of study

• To describe the characteristics of:
  – children and families
  – intervention services
  – factors associated with service variations

• To characterize:
  – developmental, behavioral and familial outcomes
  – compared to normally-hearing age mates with similar backgrounds

• To explore:
  – how variations in child and family factors and in intervention characteristics relate to functional outcomes
Study design

- Each child followed for 3 years+.
- Retrospective data prior to enrollment obtained by medical record history.
Subjects Recruited (to date)

- Children with HL: \( n = 230 \) (goal = 300+)
  - Iowa: 47.6 dB HL
  - BTNRH: 47.6 dB HL
  - UNC: 52.2 dB HL
- Age at entry = 6 months to 6 years, 11 months
- Spoken English in the home
- Permanent, bilateral mild to severe hearing loss
  - PTA of 25-75 dB HL (500, 1K, 2K, 4kHz)
- Children with normal hearing: \( n = 64 \) (goal = 150)
Age at Identification of Hearing Loss

Majority Early Identified

Age in Months
Developmental Vulnerabilities?

- Phonological development
- Morphological development
New Tools for Infants and Young Children

1. Vocal Development Landmarks Interview (6-24 mos)
   - Moeller & Bass-Ringdahl, OCHL Project
2. Open and Closed Set Test (18 mos+)
   - Ertmer, Miller & Quesenberry, 2004
3. Morphological Elicitation Procedure (3yr+)
   - Moeller, et al., OCHL Project
Vocal Landmarks

Expansion (precanonical) 3-8 months
- Vowels, growls, Ingessives, High Pitch Squeals, Marginal babble

Basic Canonical 5-10 months
- CV syllable-speech like
- Reduplicated babble
- Squeals, ingessives
- Whispers

Advanced Forms 9-18 months
- CV =VC (up, eem), CVC (mom, tut), CCVC (stop!)
- Diphthongs (ow)
- Complex variegated babble
- Jargon

Nathani, Ertmer & Stark, 2006
Vocal Development Interview

- Parent interviews about early vocal landmarks
  - Production Infant Scale Evaluation (PRISE) – Kishon-Rabin, et al. (2005)
  - Infant Monitor of Vocal Production (IMP) Robin Cantle Moore (2009)

Example from PRISE: “Does the infant produce different consonant-vowel combinations? For example: when the infant plays with toys or addresses one of the family members, does he produce parts of words, such as: ba, du, pi, etc.,?”
PROVISION OF VOCAL EXAMPLES AND PAIRED COMPARISONS

To avoid use of technical terms
To ensure that parent and clinician “on same page”
To calibrate examiners

USES STANDARD INTERVIEW FORMAT AND PP SLIDES WITH AUDIO FILES
Item 1-2 (pre-canonical)

![Image 1](image1.png)  creaky

![Image 2](image2.png)  growl

<table>
<thead>
<tr>
<th>NEVER</th>
<th>RARELY</th>
<th>SOMETIMES</th>
<th>A LOT</th>
</tr>
</thead>
</table>

Item 1-4 (pre-canonical)

Breathing in

Breathing out

Breathing out
Item 2-3 (canonical)
Scoring of Parental Responses

Example for paired comparison item

<table>
<thead>
<tr>
<th>Top Row (true syllables)</th>
<th>Bottom Row (marginal syllables)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never (0)</td>
<td>Never (0)</td>
</tr>
<tr>
<td>Occasionally (1)</td>
<td>Occasionally (1)</td>
</tr>
<tr>
<td>Sometimes (2)</td>
<td>Sometimes (2)</td>
</tr>
<tr>
<td>A lot (3)</td>
<td>A lot (3)</td>
</tr>
</tbody>
</table>

Comments:
Item 2-7 (words)

Orange = aaa:
All done = da da
More toys = more toys

Imitates, but far off
Getting closer
Very close
Vocal Interview: Children with HL

M age younger = 11.0 mos (SD = 2.32); M age older = 18.7 months (SD = 1.29)

Preliminary data OCHL
Validation of the Vocal Development Landmarks Instrument

MOELLER, BASS-RINGDAHL & AMBROSE (2010)

Can parents accurately/adequately report on an array of vocal behaviors, at specific ages, using the Vocal Development Landmarks instrument?
Language ENVironment Analysis (LENA)

Mark Van Dam, Ph.D.
Sophie Ambrose, Ph.D.
Open & Closed Set Test

A MEASURE OF PERCEPTION-PRODUCTION
~18 MONTHS – 2 YEARS
ERTMER, MILLER & QUESENBERRY, 2004

10 ITEMS, REALISTIC PICTURES
PROMPTED PRODUCTION FOLLOWED BY PICTURE IDENTIFICATION

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Open and Closed Set Test (Perception-Production)

Mom: And “keys”....Child: /tis/...Mom: uhhuh, where are they?
Child: /tis/ + point. Mom: very good
2 year olds: O&C

Preliminary data OCHL
Morphology Elicitation Task

DVD DEVELOPED AT BTNRH

ELICITED PRODUCTION OF 9 TYPES OF MORPHOLOGICAL ENDINGS

EXAMPLES: PLURAL (CAT-CATS), VERB TENSE (HE WALKS/WALKED), POSSESSION (MOM’S PURSE)
Morphology Elicitation Task: Rationale


- What may influence development in HH?
  - Position in the sentence (He want+s the car; He got two bike+s) (Song, Sundara & Demuth, 2009)
  - Frequency in the input (McGukian & Henry, 2007)
  - Phonological production (fricatives, blends –bows vs parks) (Song, et al, 2009)
Morphology — 4 year olds

Preliminary data OCHL
Children with mild to severe hearing loss may show developmental vulnerabilities related to issues of language experience/access.

Suggests the need to examine early outcomes in areas like:
- Vocal development landmarks
- Transitions to advanced syllables and words

Use of morphological endings in English could be compromised by several issues:
- Elicitation procedures may help us understand role of audibility vs. other factors
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