Language Abilities of 3 & 6 year old Children with Mild-Severe Hearing Loss as Compared to their Typically Developing Peers: Data from the OCHL Project

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Introduction

Children with Hearing Loss provide a good test for the role of input and acquisition of morpho-syntax

•Research on grammatical development in children with HL has mixed results
  •Not like NH peers/no evidence of catching up
    •Ellenbein, Hardin-Jones & Davis (1994), Tomblin et al.(1999)
  •MMHL – half like NH peers/half don’t catch up
    •Ostega & Tuffer (2007)
  •MMHL/late dx - 3 of 4 children catch up eventually
    •Moeller et al., (2010)
  •MLU is a gross measure of morphosyntactic development, grammatical accuracy is more sensitive
    •Blake et al., (2004)
•Age, aid of id, degree of loss, benefit from aid, may all influence outcomes
  •Moeller et al., (2007, 2010), Mayne (1999), Spertzy et al. (2010)

1. To what extent does degree of HL influence MLU? Does this vary with age?
2. Does the perceptibility of the morpheme influence accuracy differently for children with HL, when MLU is controlled?

Results

Participants

<table>
<thead>
<tr>
<th>3 year-olds</th>
<th>6 year-olds</th>
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<tbody>
<tr>
<td>HL</td>
<td>NH</td>
</tr>
<tr>
<td>%</td>
<td>42</td>
</tr>
<tr>
<td>%</td>
<td>28</td>
</tr>
<tr>
<td>Range</td>
<td>3.9-5.5</td>
</tr>
<tr>
<td>MLU</td>
<td>2.19</td>
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<tr>
<td>BEPTA</td>
<td>48.88</td>
</tr>
<tr>
<td>SII</td>
<td>18.75-78.75</td>
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Average PTA for NH: 8.5
Average PTA for HI: 44.31

- s morphemes located in higher frequency range.
- Syllabic morphemes are made up of vowels and nasal sounds.

Morphemes by Audibility

MLU w by Better Ear PTA

MLU w by aided SII

Influence of sentence position and allomorph on accuracy

Conclusions

•BEPTA
  •BEPTA is the best predictor
    •For every 10 dB loss in PTA, MLU is .18 words lower
  •MLU in words – no penalty for morphological difficulties

•Speech Intelligibility Index (SII) – no relationship
  •Correlation between SII and BEPTA is -.69
  •Reduced N
  •Restricted range in SII – HAs are providing clear benefit

•Age of Amplification – no relationship
  •Correlated with age (3/6 year olds)
    •3 year old children all id’ before 18mos
    •6 year old children mostly id’ 6 later (2-4 yrs)

•Morphological Performance
  •Audibility
    •Morphemes produced with fricatives are difficult for the children with HL at both ages
    •6, but not at 3, HL and NH groups are similar on syllabic morphemes!

Predictors of accuracy on [s], [z], & [lz] morphemes

•Children with NH
  •Most affected by sentence position (medial < final)
  •Allomorph frequency (input) is the driving factor [s & z > [lz]
  •General replication of Song, Sundara, & Demuth (2009)

•Children with HL
  •Sentence position matters (medial < final)
  •Allomorph audibility is the driving factor [l] > [s & z]

Morphological Performance

- Allomorph audibility is the driving factor (l) > (s & z)

MLU

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Morphological Performance

- Allomorph audibility is the driving factor (l) > (s & z)
3. To what extent is grammatical accuracy predicted by articulation skill, degree of hearing loss, sentence position, and phonetic realization of the morpheme?

Data Collection & Analysis

- 15 min spontaneous language samples were collected at three sites for the Outcomes of Children with Hearing Loss (OCHL) project
- Iowa, North Carolina, Nebraska

- Language samples were transcribed and coded for grammatical morphology using SALT.
- Sentences were coded for accuracy based on the child's output and the input.

- For further information, contact Keegan Koehlinger:
  University of Iowa ICRL
  keegan.koehlinger@uiowa.edu

- Clinical Implications
  - Improved articulation leads to flexibility in morphological production
  - Consider auditory AND articulation skill in choice of targets
  - Target selection to introduce morphemes may matter


- Reference & Acknowledgements
  - Owen Van Horne:
    Speech, Language & Hearing Research, 52(3), 623-642.

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  keegan.koehlinger@uiowa.edu
  or see http://www.uiowa.edu/~ochl/

- Allomorphs & Articulation Skills
  - Poor artic: Articulation skills predict s/z use
  - Good artic: BEPTA predicts s/z use
  - Production: Impervious to artic skill
  - Suggest they know about marking, but can't say it!

- Sentence Position & Hearing Ability
  - Medial: heavily influenced by hearing skills
  - Final: influenced, but to a lesser degree

- Need to analyze medalian role of articulation on morphological accuracy.