INTRODUCTION

• Because the auditory input that children with cochlear implants (CIs) receive is degraded, children with CIs may have poorer phonological representations of words than children with normal hearing (NH).

• In nonword repetition tasks, children with NH produce sound sequences with high phonotactic probability more accurately than sound sequences with low phonotactic probability (Edwards, Beckman, Munson, 2004).

• This suggests that children’s vocabularies influence their production of novel words.

• Phonotactic probability: the frequency of occurrence of sounds and sound sequences in words in a language.

• Do children with CI show the same relationship as children with NH between phonotactic probability and nonword repetition accuracy?

STIMULI

• 2 and 3 syllable nonwords e.g., /dis/, /knædrok/.

• Initial CV/CCVs varied in phonotactic probability.

• 11 CVs
  /da, di, du, gu, gi, ti, tu, ku, ki, ku/

• 6 CCVs
  /kju, kjo, twa, twi, kwi, kwe/

• Each CV/CCV occurred in 3 nonwords.

• Calculation of phonotactic probability:
  Natural log of the proportion of words in the Hoosier Mental Lexicon (19,321 words) which began with that CV/CCV
e.g., /di/ as in /dib/.

• 3 lists of nonwords
  • Across lists, nonword endings (sounds which followed the initial CV/CCV) were appended to different CV/CCVs.
  • Across lists, the order of nonwords differed.
  • 51 nonwords per list

• Audio recordings were made of an adult female native English speaker saying the nonwords using child-directed speech.

PROCEDURE

• The nonwords were presented to the children over speakers.

• A color photograph of a novel object, animal, or plant was presented on a computer screen as the child heard the auditory presentation of the nonword.

• The children’s productions of the nonwords were recorded.

• Children with cochlear implants (CI) and normal hearing (NH) were compared.

• Children matched on age (NH-age) and vocabulary age (NH-voc).

• Children with CI matched on age and vocabulary age.

• /gɪdʒmæb/

• Standardized tests:
  • Peabody Picture Vocabulary Test, 4th edition (children with cochlear implants)
  • Receptive One Word Picture Vocabulary Test, 2nd edition (children with normal hearing)

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ANALYSIS

• Accuracy of initial consonants and consonant clusters was scored by a trained adult native English speaker.

• Interrater reliability for the children with cochlear implants and the children with normal hearing was 84% and 87%, respectively.

• Likelihood ratio tests were used to assess the statistical significance of fixed effects in predicting accuracy within mixed-effects logistic regression models with random intercepts for participants. Tests statistics were compared to a chi-square distribution with df = 1.

RESULTS

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean Accuracy</th>
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</thead>
<tbody>
<tr>
<td>CI</td>
<td>59% (SD=19%)</td>
</tr>
<tr>
<td>NH-voc</td>
<td>64% (SD=16%)</td>
</tr>
<tr>
<td>NH-age</td>
<td>72% (SD=12%)</td>
</tr>
</tbody>
</table>

What is the relationship between phonotactic probability and nonword repetition accuracy for the children with cochlear implants and the children with normal hearing?

- Phonotactic probability, p < .001
- Interaction, N.S.

What is the relationship between phonotactic probability and nonword repetition accuracy for the children with CI and the children with NH-voc?

- Phonotactic probability, p < .001
- Interaction, N.S.

What is the relationship between phonotactic probability and nonword repetition accuracy for the children with CI and the children with NH-age group?

- Phonotactic probability, p < .001
- Group, N.S.
- Interaction, N.S.

What is the relationship between phonotactic probability and nonword repetition accuracy for the children with CI and the children with NH-voc group?

- Phonotactic probability, p < .001
- Group, N.S.
- Interaction, N.S.

What is the relationship between phonotactic probability and nonword repetition accuracy for the children with CI and the children with NH-age group?

- Phonotactic probability, p < .001
- Group, p = .01
- Interaction, N.S.

CONCLUSIONS

- Similar relationships between vocabulary size and nonword repetition accuracy were found for the children with CIs and the children with NH.

- Similar relationships between phonotactic probability and nonword repetition accuracy were found for the children with CIs and the children with NH.

- All three groups showed wide between-participant variability in accuracy when phonotactic probability was low. When phonotactic probability was high, the children with CIs showed more between-participant variability than the children with NH.

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