The Development of Nasal Consonants [m n] in Young Children

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Introduction

Speech perception of children is highly related to their sensory hearing abilities (Geers et al., 2005; Jerger, 2007). Children with profound hearing loss are at a particular disadvantage in developing adequate speech perception. There is limited information regarding the development of consonant and vowel perception in children who use cochlear implants (CI). The discontinuity hypothesis suggests that abrupt changes in amplitude between the consonant and vowel provide salient information in identification in adults. However, there is no information on the perception of nasals in children with and without cochlear implants.

Purpose

The purpose of this study is to examine the development of speech perception in children with and without cochlear implants as a function of systematic variation in place of articulation of nasal consonants.

Research Questions:

1. Are there developmental changes in the perception nasal segment conditions of 50 ms murmur, 50 ms transition, and 25 ms murmur + 25 ms transition?
2. Do children who use cochlear implants identify nasals comparable to children with normal hearing?
3. Does the performance of nasal identification in children with normal hearing support the predictions of the discontinuity hypothesis of speech perception?

Participants

The children with normal hearing and who were between the ages of 3.6 to 7.11-years-old were recruited from Nashville area schools and preschools. The children who use cochlear implants and who were between the ages of 4.0 to 7.11-years-old were recruited from the National Center for Childhood Deafness and Family Communication at the Vanderbilt Bill Wilkerson Center. See Table 1 for participant demographics.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean Age</th>
<th>Age Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHY</td>
<td>4.36 yrs</td>
<td>2.97-5.89 yrs</td>
</tr>
<tr>
<td>NHO</td>
<td>40 yrs</td>
<td>34-46 yrs</td>
</tr>
<tr>
<td>CI</td>
<td>4.8 yrs</td>
<td>4.3-5.3 yrs</td>
</tr>
</tbody>
</table>

Research Question 1: Are there developmental changes in the perception nasal segment conditions of 50 ms murmur, 50 ms transition, and 25 ms murmur + 25 ms transition?

Results

Research Question 2: Do children who use cochlear implants identify nasals comparable to children with normal hearing?

Results

Research Question 3: Does the performance of nasal identification in children with normal hearing support the discontinuity hypothesis of speech perception?

Discussion

• There are developmental differences in the identification of nasal consonants in children with normal hearing. The younger children performed differently than the older children and adults in:
  - murmur (M)
  - transition (T)
  - murmur + transition (MT)

• Children with normal hearing and children who use cochlear implants can identify nasals [m n] from a consonant-vowel [i æ u] syllable that varies systematically in the acoustic correlates of place of articulation.

• Children who use cochlear implants are less accurate than children with normal hearing in identifying CV syllables by segment type (i.e., M, T, MT) and by vowel type (i.e., [i æ u]).

• The discontinuity hypothesis of speech perception was supported by the performance of the children with normal hearing. Children process place of articulation with greater accuracy for the MT segment than the other acoustic conditions.

References


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