Using the LENA System to investigate conversational partners in children with and without cochlear implants

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- Vincent Lin
- Claude Alain

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Disclosures

● We have nothing to disclose
Objective

- To identify differences and similarities in the auditory environments of children with and without cochlear implants
Effects of the auditory environment

- **Background noise can disrupt learning** (Caldwell & Nittrouer, 2013; Gremp & Easterbrooks, 2018)

- **Electronic media can have negative effects on language development** (Christakis et al., 2009; Sosa, 2016; van den Heuvel et al., 2019; Zimmerman et al., 2009)
Benefits of child directed speech

- **Language abilities** (Hart & Risely, 1995; Hoff, 2006; Romeo et al., 2018; VanDam et al., 2012; Zimmerman et al., 2009)
- **Literacy** (Hirsh-Pasek et al., 2015)
- **Executive function** (Sarsour et al., 2011)
- **Math** (Levine et al., 2010)
- **Social skills** (Connel & Prinz, 2002)
- **Social competence** (Ochs & Schieffelin, 2016)
Hypotheses

- Children with cochlear implants will
  - Spend time in similar auditory environments to their typically hearing peers
  - Participate in fewer conversations than their peers over a day
## Participants

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Age (months)</th>
<th>Gender (female)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children with cochlear implants</td>
<td>11</td>
<td>34.45 (SD=9.91)</td>
<td>4</td>
</tr>
<tr>
<td>Children with typical hearing</td>
<td>11</td>
<td>33.45 (SD=6.65)</td>
<td>3</td>
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</tbody>
</table>
## Participants

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Age (months)</th>
<th>Gender (female)</th>
<th># reporting siblings present</th>
<th># of weekday recordings</th>
<th>Recording length (hours)</th>
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</thead>
<tbody>
<tr>
<td>Children with cochlear implants</td>
<td>11</td>
<td>34.45 (SD=9.91)</td>
<td>4</td>
<td>7</td>
<td>4</td>
<td>14.39 (SD=1.92)</td>
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<tr>
<td>Children with typical hearing</td>
<td>11</td>
<td>33.45 (SD=6.65)</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>13.93 (SD=1.74)</td>
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<tr>
<td>Environmental Sounds</td>
<td>Conversational Sounds</td>
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<tr>
<td>Silence</td>
<td>Participant</td>
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<tr>
<td>Overlapping</td>
<td>Adult Female</td>
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<tr>
<td>Electronics</td>
<td>Adult Male</td>
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<tr>
<td>Noise</td>
<td>Other Child</td>
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<tr>
<td>Fuzzy</td>
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</tbody>
</table>
Auditory environments were similar across groups
Auditory environments were similar across groups
Auditory environments were similar across groups

*NS
Auditory environments were similar across groups
Children participated in a similar number of turns per day.
Children participated in a similar number of turns per day.

*NS *NS *NS

![Bar chart showing average turns per hour for Adult Female, Other Child, and Adult Male. The chart indicates that there is no significant difference (NS) between the groups.](image)
Caregivers of children with cochlear implants initiate more

Interaction Effect: $F(1)=17.56, p<.001$
Summary

- Children with cochlear implants are exposed to a similar auditory environment as peers
- Caregivers of children with cochlear implants are helping to provide appropriate stimulation
Thank you to all of our participants