Perception of Lexical Stress in CAS: Preliminary Findings

Emily W. Wang & Maria I. Grigos
New York University

BACKGROUND

Prosody refers to the suprasegmental aspects of speech (e.g., Cutler & Swinney, 1986). Lexical stress, an aspect of prosody, is described by the stress placed on a given syllable in bisyllabic and polysyllabic words (e.g., Cutler, 2005; Kehoe et al., 2005; Fry, 1958).

Typically developing (TD) infants as young as 7-months of age can identify lexical stress in bisyllabic words (Jusczyk et al., 1999; Turk et al., 1995), and begin to produce adult-like trochaic forms by 3-years of age (Ballard et al., 2012). Children with childhood apraxia of speech (CAS) do not follow this same developmental trajectory (e.g., Ballard et al., 2012; Skinder et al., 1999; Shriberg et al., 2003).

Impaired prosody, including difficulty with lexical stress, is a key characteristic of CAS (e.g., ASHA, 2007; Shriberg et al., 2003; Shriberg et al., 2017; Strand, 2020), yet the majority of existing literature has focused on the production of prosodic contrasts (e.g., Ballard et al., 2010; Koper & Grigos, 2019), without simultaneously exploring related perceptual skills. There is reason to examine perceptual skills in children with CAS since past work has suggested that perceptual skills are negatively impacted in children with CAS and a co-occurring language impairment, but not in children with a CAS only diagnosis (Zuk et al., 2018).

RESEARCH QUESTIONS

Do children with a CAS diagnosis demonstrate differences in their perception of lexical stress compared to their TD peers?

Are differences in the perception of lexical stress between CAS and TD children mediated by language skill?

METHOD

Participants (part of a larger study of n = 40)

• n = 4 (2 TD, 2 CAS); age range: 3;6 to 5;10

Stimuli

• 20 bisyllabic and polysyllabic words varying in lexical stress
  (e.g., “flower” = Sw (trochaic); “balloon” = wS (iambic))

Procedure

• Perceptual matching task referred to as the BUhBuh task (adapted from the DEEDee task, Nakatani & Shaffer, 1978)
  o Syllables of real words are replaced by the repeating syllable “buh” while maintaining stress patterns
    (e.g., “butterfly” = /buh.buh.buh/ (BUh.buh.buh))

RESULTS

Perceptual Accuracy of Lexical Stress (chi-square analysis)

Children with a CAS diagnosis without a co-occurring language impairment do not significantly differ from their TD peers on the perception of lexical stress

• Combined Sw and wS patterns, $\chi^2(1, N = 80) = 1.30, p = 0.25$
• Sw patterns only, $\chi^2(1, N = 40) = 1.82, p = 0.18$
• wS patterns only, $\chi^2(1, N = 40) = 0.01, p = 0.99$

SUMMARY & DISCUSSION

Children in the CAS group did not demonstrate significant differences in the perception of lexical stress compared to the TD group. Present results, however, are based on 4 children (2 TD, 2 CAS). Descriptively, both groups of children were more accurate when perceiving words with trochaic stress (Sw), and less accurate when perceiving words with iambic stress (wS). These findings align with past developmental research, which have reported that trochaic stress patterns develop before iambic stress patterns in children (e.g., Ballard et al., 2012).

Participant CAS 1, who had a low receptive language score, demonstrated poorer perceptual accuracy than participant CAS 2, who displayed a high average receptive language score. While results are preliminary, it is possible that the perception of lexical stress in children with CAS is mediated by language skill, as suggested in past work (Zuk et al., 2018).

FUTURE DIRECTIONS

Findings from the present study are preliminary, with data collection currently taking place for a larger sample size of children (n = 40). In addition to exploring the perception of lexical stress in CAS, the production of lexical stress is also being examined using acoustic measures.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age</th>
<th>% Accuracy (Combined)</th>
<th>% Accuracy (Sw)</th>
<th>% Accuracy (wS)</th>
<th>Receptive Language (SS)</th>
<th>Expressive Language (SS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS 1</td>
<td>4;11</td>
<td>40%</td>
<td>40%</td>
<td>40%</td>
<td>87</td>
<td>66</td>
</tr>
<tr>
<td>CAS 2</td>
<td>5;2</td>
<td>65%</td>
<td>70%</td>
<td>60%</td>
<td>110</td>
<td>73</td>
</tr>
<tr>
<td>TD 1</td>
<td>5;10</td>
<td>70%</td>
<td>90%</td>
<td>50%</td>
<td>112</td>
<td>114</td>
</tr>
<tr>
<td>TD 2</td>
<td>3;6</td>
<td>65%</td>
<td>70%</td>
<td>60%</td>
<td>120</td>
<td>108</td>
</tr>
</tbody>
</table>