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Introduction

Background

- Differential diagnosis and treatment planning of speech sound disorders (SSD) is one of the major challenges in the field of pediatric speech-language pathology.
- Intervention methods aim at specific parts of the speech production process, where diagnostic instruments consist of tests that measure knowledge and skills, and lack a direct relation with the underlying processes.

Research goal

- An individualized, process-oriented approach for the diagnosis and treatment of pediatric SSD.
- Advantages:
  - Direct leads for treatment - tailored to the individual speaker.
  - Evaluate and adjust treatment during the evolution of the disorder.

Aim of the present study

- Development and evaluation of a learning task as an instrument to assess the acquisition of sensor-motor representations of novel speech sounds.

Methodology

Participants

- 6 normally developing children: 3 male, 3 female; aged 4.6-7.8 yrs.
- 5 children with SSD: 2 male, 3 female; aged 4.3-7.5 yrs (Table 1).

Table 1: Diagnostic classification of the children with speech sound disorders.

<table>
<thead>
<tr>
<th>ID</th>
<th>Classification</th>
<th>Age (m)</th>
<th>SSD type</th>
<th>PSSC</th>
<th>VOW</th>
<th>/s/</th>
<th>/ʃ/</th>
<th>/ʃa/</th>
<th>/ʃg/</th>
<th>/ʃka/</th>
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</table>

Procedure (Table 2)

- Learning paradigm: repetition task of nonwords from a soundboard presented via headphones.
- Stimulation: non-native speech sounds (cluster)/mla/ in 4 context conditions, each item repeated 3-5 times.

Table 2: Schematic overview of the learning task.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Goal</th>
<th>Conditions</th>
<th>Example</th>
<th>Directions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>Explain target phonemes</td>
<td>Auditory and visual input</td>
<td>Auditory and visual input</td>
<td>Testable /ga/ and /ʃa/</td>
</tr>
<tr>
<td>Baseline measurement</td>
<td>10 x attempt to produce target syllable in isolation</td>
<td>/ga/</td>
<td>/ʃa/</td>
<td></td>
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<tr>
<td>Training 1</td>
<td>Practice target stimuli in different conditions</td>
<td>Sequencing</td>
<td>Prosody</td>
<td>Sequencing</td>
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<tr>
<td>Break</td>
<td>5 min of play time</td>
<td>/ʃa/</td>
<td>/ʃg/</td>
<td></td>
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<td>Training 2</td>
<td>Repeat training stage 1</td>
<td>Prosody</td>
<td>Sequence following consonant</td>
<td>Embodiment</td>
</tr>
<tr>
<td>Break</td>
<td>5 min of play time</td>
<td>/ʃa/</td>
<td>/ʃg/</td>
<td></td>
</tr>
<tr>
<td>Endpoint measurement</td>
<td>10 x attempt to produce target syllable in isolation</td>
<td>/ga/</td>
<td>/ʃa/</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

- Underlying profile vary widely per child with SSD.
- Results highlight important role of perception abilities.
- Strong correlation between non-word discrimination score and learning effect.

Future directions

- More data needed.
- Promising results for the profiling of SSD, suggesting that a detailed assessment of the acquisition of novel sensor-motor representations could provide direct starting points for therapy planning.
- Focus assessment on Embodiment, Sequencing & Prosody.

Data analysis

- Consonant transcription of all utterances by two experienced speech therapists.
- Dependent variables:
  - Percentage consonants correct (PCC).
  - Percentage word-stress correct (PWSC, Prosody condition).

Statistics

- Repeated measures analysis of variance.
- Pearson correlations.
- No significant correlations for /mla/.

Results

- Higher PCC in the prosody condition for /ga/.
- No significant correlations for /mla/.

Learning effects

- PCC overall.
- No learning effect by group interactions.
- No learning effect by group interactions.

References


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