Using Biofeedback Intervention for School-Age Children with Persistent Articulation Disorders

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Introduction

Persistent articulation errors are speech sound errors that have been addressed in therapy, but are resistant to progress. Persistent speech sound disorders in children can be detrimental to a child's success in academics and participation in social activities (McCormack, McLeod, McAllister, & Harrison, 2009). For school-age children, there are several therapy techniques a speech-language pathologist may use to improve these children's intelligibility. One approach is traditional therapy. Another approach that is new is biofeedback therapy. It is unclear if traditional or biofeedback therapy will lead to better speech intelligibility for children with persistent articulation errors.

Case Scenario

I am currently a first year graduate student at the University of Nevada, Reno. One of my current clients, Ben, is an 11-year-old male who has a persistent articulation disorder of the rhotic /r/ speech sound. He has been in speech therapy for articulation for three treatment periods at the University of Nevada, Reno and has made some improvements but has yet to master all of his articulation goals. Ben and his family are concerned about which option will lead to the quickest discharge from therapy and are contemplating between traditional therapy or beginning biofeedback therapy.

Purpose

The purpose of this research is to determine the efficacy of two types of treatment for articulation disorders. A PICO (Patient, Intervention, Comparison, Outcome) framework (Gillam & Gillam, 2008) was used to formulate the following research question: Does biofeedback therapy lead to children achieving articulation goals more quickly, as measured by number of sessions attended before discharge (O), than traditional therapy (C) for school-age children with articulation disorders (P/F)?

Methodology

Search Terms: EPG therapy, electropalatography, articulation disorder, biofeedback, and speech sound disorders

Electronic Databases: PubMed, Cochrane, and ASHA

Rating System: The Gillam & Gillam (2008) appraisal points were used to appraise validity and statistical significance. Nine articles were appraised using an 8-point system. Articles earning 7-8 points were rated as “Compelling”, 4-6 points as “Equivocal”, and 0-3 points as “Inequivocal”.

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Results

<table>
<thead>
<tr>
<th>Author(s), Year, Design, &amp; Appraisal Points</th>
<th>Purpose</th>
<th>Participants (age, gender, diagnosis)</th>
<th>Dependent Variables</th>
<th>Perceptual rating of /r/ probes</th>
<th>Perceptual rating of /r/ probes</th>
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</thead>
<tbody>
<tr>
<td>McCormack, Byrne &amp; Hitchcock, (2012)</td>
<td>To examine whether children who fail to respond to traditional forms of treatment for /r/ can benefit from acoustic biofeedback intervention.</td>
<td>N = 11&lt;br&gt; Age: 6.0 - 11.9 years&lt;br&gt; Gender: 10 male, 1 female</td>
<td>Ma: Traditional articulatory intervention was reported for all participants</td>
<td>6 out of 8&lt;br&gt; 631-633. DOI: 10.1044/2009-0302.2011.537332</td>
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<td>Carter &amp; Edwards, (2004)</td>
<td>To understand the prediction and outcomes of using EPG therapy for children with long standing speech disorders.</td>
<td>N = 10&lt;br&gt; Age: 7.0 - 14.0 years&lt;br&gt; Gender: 8 male, 2 female</td>
<td>Ma: Not reported</td>
<td>Percentage of consonants produced correctly (PCC)</td>
<td>Percentage of consonants produced correctly (PCC)</td>
</tr>
<tr>
<td>Nordberg, Carlsson, &amp; Lohmander, (2011)</td>
<td>To investigate whether the visual feedback method of EPG could be an effective tool for treating children with Dysarthria and Cerebral Palsy (CP).</td>
<td>N = 5&lt;br&gt; Age: 7.4 - 12.9 years&lt;br&gt; Gender: 3 males, 2 females</td>
<td>Ma: All participants have a diagnosis of CP and dysarthria</td>
<td>COS values from EPG patterns</td>
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<tr>
<td>Preston, Brick, &amp; Landi, (2013)</td>
<td>To determine if a treatment approach that includes biofeedback of tongue movements would improve the accuracy of articulation in school-age children with persisting speech sound errors associated with Childhood Apraxia of Speech (CAS).</td>
<td>N = 6&lt;br&gt; Age: 9.10 - 15.10 years&lt;br&gt; Gender: All male</td>
<td>Ma: All participants had a diagnosis of Childhood Apraxia of Speech (CAS)</td>
<td>Percent (s) Accuracy</td>
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</tr>
</tbody>
</table>

Discussion

External Evidence: The external evidence, thus far, has found that biofeedback therapy increases speech accuracy for children with persistent errors. McAllister Byrne & Hitchcock (2012) discovered that biofeedback can facilitate perceptually appropriate /r/ production in school-age children whose errors did not correct with traditional therapy. Additionally, Carter & Edwards (2004) found that all children increased dramatically from pre- to post-treatment probing in their accuracy after using biofeedback therapy with these children. These results further emphasize that using biofeedback within intervention periods can lead to these children reaching their articulation goals quicker than with traditional therapy.

Evidence Internal to Clinical Practice: I have completed training by Complete Speech on how to use the Smart Palate technology in therapy. I have my own Smart Palate and getting a Smart Palate for Ben is easily accessible. The software is readily available at my clinic. My supervisor believes using biofeedback could be beneficial.

E8BP Decision: The research has indicated that children with persistent errors can benefit from using biofeedback as additional input to learning correct /r/ production. My client is interested in trying biofeedback therapy and the equipment is available to use for the treatment period. Ben will begin using biofeedback within the therapy sessions to improve his vocalic and prevocalic /r/ productions. Ben will attend therapy once a week for a 90 minute session while practicing for 15 minutes at home 3-4 days a week. I will evaluate the effect of biofeedback therapy in three months after a complete treatment period using prevocalic and vocalic /r/ probe lists.

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