Phonological Intervention for Hypernasality Secondary to Bifid Uvula: A Case Study

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Why Consider a Phonological Approach with Hypernasality?

- Younger children (e.g., 3-4 year olds) with cleft palate displayed a significant increase in use of phonological processes when compared to typically developing peers (Chapman, 1993).
- Children with clefts use phonological processes longer than same aged non-cleft peers (Chapman, 1993; Chapman & Hardin, 1992; Powers, Dunn, Erickson, 1990)
- Children with cleft palates are delayed in speech sound development when compared to same aged non-cleft peers (Powers et al., 1999)
- Use of a phonological approach to correct a compensatory articulation disorder took less time than an articulatory approach (Pamplona, Ysunza, Espinosa, 1999).
Why Consider a Phonological Approach with Hypernasality?

- Children with repaired cleft palates may present with phonological patterns in speech (Hodson, Chin, Redmond, Simpson, 1983, Powers et al., 1990).
- Even following palatal closure, phoneme production patterns learned in the early years of speech development may have a significant impact on speech. (Kuehn & Moller, 2000).
- Following phonological intervention, children demonstrate narrow and broad changes in their sound systems that improve intelligibility and overall communication (Gierut, 1998).
- Phonological processes are patterns of errors and phonological intervention is well documented to remediate such errors efficiently. Phoneme specific compensatory articulation and nasal emission are also patterns of errors. Therefore, it logically follows that a phonological intervention approach should remediate these errors efficaciously as well.
Phonological Intervention

- Should consider phonological rules of child, target groups of errors based on rules, and focus on contrasts of sounds. Emphasis is on linguistics rather than phonetics (Pamplona et al., 1999).
- Should utilize a cognitive-linguistic approach as well as provide opportunities to practice production of articulation and motor components of speech (Chapman, 1993).
- Should begin at the word level, as opposed to the phoneme level, since a phoneme is the basic unit to differentiate word meanings (Bauman-Waengler, 2008).
Phonological Intervention

- **Naturalistic Play-Based Intervention**: Arranging the environment, incorporating strategies to provide communication opportunities, and providing natural consequences so that whole language (including phonology) is addressed in a meaningful, functional context. (Norris & Hoffman, 1990)

- **Minimal Pairs**: Pairs of words that differ by one phoneme with many articulation similarities (Bauman-Waengler, 2008).

- **Multiple Oppositions**: Address larger number of contrasts to increase speed of phonological learning (Bauman-Waengler, 2008).

- **Metaphon technique**: Uses a visual mnemonic (e.g., Phonic Faces cards; “nose tickling” sounds vs. “lip popping” sounds) to support metaphonological skills (Bauman-Waengler, 2008).
Purpose of Study

- Most speech-language pathologists use traditional articulation methods to treat children with speech sound disorders secondary to velopharyngeal incompetence (Kummer, 2008).
- While these techniques do provide some benefit, other research has indicated that a phonological approach to speech sound remediation is more efficacious than a traditional articulation approach (Pamplona, Ysunza, & Espinosa, 1999).
- However, the research evaluating which specific types of phonological approaches work best has been sorely lacking. This experiment is an attempt to fill that void by comparing two types of phonological intervention to determine which intervention is most effective.
Research Question

- Which phonological intervention is more efficacious in the treatment of phoneme specific compensatory articulation and nasal emission?
  - Naturalistic, play-based phonological approach incorporating visual cues
  - OR
  - Phonological therapy emphasizing phonological rules via minimal pairs, multiple oppositions, and metaphor techniques
Subject

- 3-year, 6-month-old male with a history of VPI and bifid uvula.
- Superiorly-based pharyngeal flap surgery was completed six months prior to onset of this study.
- The subject had received early intervention speech therapy since 20 months of age due to decreased receptive and expressive language skills. As language increased, speech sounds errors and hypernasality were perceived.
- The subject had received speech therapy at the UWSP clinic for approximately five months prior to this study. At that time, therapy implemented traditional articulation techniques and increasing awareness of hypernasality through nose clips, visual/auditory feedback, and discrimination of “nose” and “mouth” sounds.
- Phoneme specific compensatory errors included substituting /m, n/ for most fricatives and plosives and/or producing high pressure phonemes with nasal emission and/or nasal turbulence.
Method

- Single subject AB design*
- The subject participated in eight A-Phase sessions (2x/week) of speech therapy and eight B-Phase sessions provided by a graduate student in the UWSP Speech Pathology Graduate Program.
- The A-Phase of therapy focused on play-based phonological therapy. Emphasis was on visual cueing and four naturalistic techniques (i.e., recasting, expansion, feigned misunderstanding, and binary choice) during play.
- The B-Phase of therapy incorporated of minimal pairs, multiple oppositions, and metaphon techniques (Phonic Faces cards).

*Only the AB phases were completed due to the subject’s rapid progress and discharge from therapy.
Phase A

- **Recasting**
  - Child: /map/ for “pop”
  - Clinician: “Yes, pop.”

- **Expansion**
  - Child: /map/ for “pop”
  - Clinician: “Pop the bubble.”

- **Feigned Misunderstanding**
  - Child: /map/ for “pop”
  - Clinician: “Mop the bubble? I don’t see a mop.”

- **Binary Choice**
  - Child: /map/ for “pop”
  - Clinician: “Should we mop or pop?”

- **Visual Cues**
  - Finger aside nose for nasal phonemes
  - Finger touching lips for oral plosives and fricatives
Method

- The subject was given an experimenter-designed test before A-Phase, after A-Phase, and after B-Phase.
- Each test was rated by three volunteer graduate students in the UWSP Speech Pathology Graduate Program.
- The tests were given in random order to the three raters. They wrote down the single words and sentences as they heard them (no phonetic transcription). They listened to a connected speech sample and indicated with a +/- if an utterance was intelligible and a percentage of intelligibility was computed. They ranked each test as more hypernasal or less hypernasal according to personal perception.
Test

- The test consisted of 13 words embedded with plosives, fricatives, and affricates such as “patch, bubble, shop” with 2 nasal foils such as “monkey” for a total of 15 words.
- The test consisted of 5 sentences that the subject was asked to repeat. These include 3 sentences with no nasal phonemes (e.g., Go get a cookie), 1 sentence with heavy nasal phonemes (e.g., My mama made some muffins), and 1 sentence with minimal nasal phonemes (e.g., Yummy chocolate chips)
- The subject was asked to retell a story using a picture-book to provide visual cues so that a conversational speech sample could be collected
Results

- Session to session data was inconsistent. There was a slight upward trend with production of fricatives, but production of plosives and ability to discriminate oral/nasal phonemes was highly variable.
- **Single Word Intelligibility: Mixed Results.** At its lowest after Phase A. It improved after Phase B, but was only higher than before intervention in one instance.
- **Sentence Intelligibility: Large Increase.** There was a slight increase after Phase A, but a large increase after Phase B.
- **Connected Speech Intelligibility: Moderate Increase.** There was a slight decrease after Phase A, but a moderate increase after Phase B.
- **Nasalance: Perceptual Decrease.** All raters noted that there was less hypernasality in the post-test speech sample as compared to the two previous samples.
Session Data: Production of Plosives and Fricatives

Percentage of Consonants Correct

Sessions across A and B phases

Plosives
Fricatives
Session data: Oral/Nasal Discrimination (Phase B only)
Single Word Intelligibility

<table>
<thead>
<tr>
<th>Rater</th>
<th>Pre-Test</th>
<th>Mid-Test</th>
<th>Post-Test</th>
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<tbody>
<tr>
<td>Rater 1</td>
<td>75</td>
<td>73</td>
<td>53</td>
</tr>
<tr>
<td>Rater 2</td>
<td>60</td>
<td>60</td>
<td>87</td>
</tr>
<tr>
<td>Rater 3</td>
<td></td>
<td></td>
<td>67</td>
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</tbody>
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Connected Speech Intelligibility (retelling a story)

Pre-Test  Mid-Test  Post-Test

Rater 1  Rater 2  Rater 3
Subjective Evaluation of Hypernasality
(1=most hypernasal, 3=least hypernasal)

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<thead>
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<th>POST-TEST</th>
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<tr>
<td>1</td>
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Results

- The subject demonstrated increased intelligibility in sentences and connected speech and decreased hypernasality after Phase B. The reason for this is unclear. It may be attributed to maturity, reorganization of the phonological system, or practice effects independent of intervention.

- The subject tended to have decreased intelligibility in words and connected speech following Phase A. The reason for this is unclear. It may be attributed to lack of explicit instruction provided during Phase A.

- Although a second AB phase would have provided “cleaner data,” the two phonological approaches were efficacious for this particular client in that he made significant progress in only eight weeks.
Discussion

- Anecdotally, the subject seemed most responsive to the Phonic Faces cards. He often thoughtfully looked at the cards before saying words containing the target phoneme. Contrasting and discrimination between “mouth” and “nose” sound minimal pairs was confusing to him and he tended to guess at discrimination.
  - Consider that /m/ is a “nose sound” (nasal) and /p, b/ are “mouth sounds” (orally produced plosives). However, all three phonemes are obviously produced with the lips, as can easily be observed.
  - To a 3-year-old with immature metalinguistic skills, all three are perceived as “mouth sounds” (i.e., produced by the lips) and there is no distinction.
  - But…the Phonic Faces cards were able to illustrate a visual difference that may have been more understandable to a preschooler.
Discussion

LIMITATIONS

• Single subject
• Since there was only one A and one B phase the effects of maturity and practice cannot be ruled out.
• Unable to conclude that the Phase B was more effective than Phase A.

FUTURE RESEARCH

• There is a need for further research evaluating the efficacy of phonological approaches with children with VPI and compensatory articulation
• Comparison of a variety of phonological approaches
• Comparison of phonological approaches to more traditional (i.e., placement) and/or instrumental means (i.e., Nasometer) of treatment


Norris, J. A. Phonic Faces Cards. www.elementory.com/cards.html

