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A-Z: Assessment for Severe Phonological Disorders

Presenter: Kathleen Fahey, PhD, CCC-SLP

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A-Z:
Assessment for
Severe
Phonological
Disorders

Presenter:
Kathleen Fahey, PhD, CCC-SLP

Speechpathology.com
2015
Learning Objectives
As a result of this Continuing Education Activity, participants will be able to:
1) Describe a complete assessment protocol for children with severe phonological disorders
2) Use analysis procedures to extend the information from assessment raw data
3) Describe how to interpret the results of the analysis to determine the nature and severity of the disorder for intervention planning

Differential Diagnosis - Phonological Disorders

Purposes of Assessment
To determine:
• if a disorder exists
• the nature of the disorder*
• the severity of the disorder*
• a plan for intervention – targets*
• progress during intervention
• research
Phonological Assessment

Assessment Protocol – Rule out factors:
1. Rule out motor issues with oral exam including AMR and SMR.
   Alternating motion rates: /pʌ,pʌ,pʌ/, /tʌ,tʌ,tʌ/, /kʌ,kʌ,kʌ/
   Sequential motion rates: /pʌ,tʌ,kʌ/, /pʌ,tʌ,kʌ/, /pʌ,tʌ,kʌ/
2. Rule out hearing problems with hearing screening and hearing evaluation as needed.
3. Rule out overall language disorder with screening and diagnostic test as appropriate.

Phonological Assessment

Assessment Protocol – Seek detail through assessment procedures and analysis of the sound system

4. A single word articulation/phonological test including singleton consonants, clusters, and vowels
5. Consistency of word production – give the test again
6. Stimulability of error phonemes
7. Connected speech sample
Phonological Assessment – Analysis of the Data

What information is obtainable from single word tests?

- Phonetic inventory
- Phonemic inventory
- Phoneme collapse
- Phonological knowledge
- Consistency
- Description of types of errors
- Phonological processes
- Syllable shapes
- Percentage of Consonant Correct
- Stimulability

Phonological Assessment – Analysis of the Data

**Phonetic Inventory**

For a child in the moderate to severe range of intelligibility, a list of the phonemes produced (regardless of context) is warranted. It will provide the array of vowels, consonants and clusters that the child can say.

Create a list for the initial position of words.

Example: [p, b, t, d, n, m, w, l, s, f, v, sp, st, sn, sm]

Create a list for the final position of words.

Example: [p, b, t, d, n, m]

These lists are descriptive data – useful for making clinical decisions. For example, increase the phonetic inventory to include different classes of sounds, especially fricatives and affricates.
Phonological Assessment – Analysis of the Data

Phonemic (Segmental) Inventory
Create a list of phonemes the child uses functionally (correctly in context) in the initial position of words.
Create a list of phonemes the child does not use correctly in initial position and note the error: p/f; t/k.
Create a list of phonemes the child uses functionally in the final position.
Create a list of phonemes the child does not use correctly in final position and note the error.

Phonemic Inventory

• Example phonemic inventory
  – Initial position – accurate /p, b, t, d, n, m, w, l, s, sp, st, sn, sm/
  – Initial position – not accurate /k, g, j, r, f, v, ñ, ðʒ, ðʒ, ðʒ, ðʒ/ and all other consonant clusters
  – Final position – accurate /p, b, n, m, s/
  – Final position – not accurate /t, d, k, g, l, s, r, f, v, ñ, ðʒ, ðʒ, ðʒ, ðʒ/ and all consonant clusters
Phonological Assessment – Analysis of the Data

Phoneme **collapse** occurs when the child uses one sound to represent many sounds. There is a lack of contrast and this results in homonymy. That is, different words sound the same.

Example:
/t/ is used for /t/, /k/, /s/, /l/, /ʃ/ - 5 sounds collapsed to 1
top, cop, sob, shop, chop (all are produced [tap])

Omissions: final consonant deletion (row-rope; bye-bike)
Cluster reduction (tree-tea)

<table>
<thead>
<tr>
<th>Phoneme Collapse</th>
<th>Phoneme Collapse</th>
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</thead>
<tbody>
<tr>
<td>/t/ - initial</td>
<td>/ʃ, tʃ, s/</td>
</tr>
<tr>
<td>/t/-medial</td>
<td>/ʃ, tʃ, θ, z/</td>
</tr>
<tr>
<td>/t/- final</td>
<td>/ʃ/</td>
</tr>
<tr>
<td></td>
<td>Total /t/- 5</td>
</tr>
<tr>
<td>/w/- initial</td>
<td>/r/ and r – blends: fr, gr, kr/ Total /w/- 3</td>
</tr>
<tr>
<td>/d/- initial</td>
<td>/dʒ, θ, z, st, tr/</td>
</tr>
<tr>
<td>/d/-medial</td>
<td>/dʒ/</td>
</tr>
<tr>
<td>/d/- final</td>
<td>/dʒ/</td>
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<tr>
<td></td>
<td>Total /d/- 6</td>
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<tr>
<td>/b/- initial</td>
<td>/v/</td>
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<td></td>
<td>Total /b/- 2</td>
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<td>/f/- initial</td>
<td>/v/</td>
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<tr>
<td>/f/-medial</td>
<td>/v/</td>
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<tr>
<td>/f/- final</td>
<td>/v/</td>
</tr>
<tr>
<td></td>
<td>Total /f/- 2</td>
</tr>
<tr>
<td>Empty Set: /ʃ, tʃ, r, dʒ, v, s, z, θ, l-blends, s-blends, r-blends</td>
<td></td>
</tr>
</tbody>
</table>
Phonological Assessment – Analysis of the Data

• **Phonological Knowledge** – Error patterns tell us what a child knows about the sound system (Gierut et al., 1987). 6 levels of knowledge:
  • Level 1 – Full knowledge (no errors in the sound in words)
    – Example: Child produces /s/ in all word positions (IMF) including the morpheme /s/ in plurals and possessive forms.
  • Level 2 – Target phonemes/morphemes produced; sounds appear in all positions, but errors occur on some words
    – Example: Child produces /s/ in all positions (IMF), but *inconsistently* uses a phonological rule to produce t/s, such as in the final position.
  • Level 3 – Sound errors occur on some fossilized morphemes
    – Example: Child produces the /s/ correctly in all positions, but some words learned early continue to be produced in error, such as Santa [næna]
  • Level 4 – Sound errors occur in certain word positions (positional constraints)
    – Example: The /s/ is accurate in the initial position of words, but inaccurate in the medial and final position or in one or the other.
      • Soup [sup]; messy [mɛtɪ], miss [mit]
  • Level 5 – Errors occur consistently in some word positions and inconsistently in other word positions
    – Example: The /s/ is consistently in error in medial and final positions. The /s/ is sometimes accurate in the initial position and sometimes in error.
  • Level 6 – Errors consistent on sounds or morphemes; never correct
    – Example: Every attempt at the sound regardless of word position is not correct. This group of sounds is called the “empty set.”
Phonological Knowledge

• Using the phonemic inventory, make a list of all phonemes that are correct all the time. Code = 1
• Make a list of all phonemes that are incorrect all the time. Code = 6
• Finally, code all the remaining phonemes according to the type of phonological knowledge as a 2, 3, 4, or 5

Phonological Assessment – Analysis of the Data

• Consistency – Stability in the use of sounds in words
• Children with phonological and articulation disorders do not typically have inconsistency errors. However, as we see with the levels of phonological knowledge, instability in the use of phonemes from one word position to another or from one word to the next is observed and it is also possible that phonology may be unstable within the same word.
• It is useful to observe this aspect as one feature of CAS (to help rule it in or out). Children with CAS may alter production of phonemes or syllables on multiple attempts.
• Connected speech sample is another observation, especially on words the child produces more than once.
Phonological Assessment – Analysis of the Data

• **Types of Errors** – Descriptions of errors can be done using several strategies.
  – Categorize errors: Omissions, Substitutions, Distortions
  – Describe by sound class: -/t, t/k (stops), D/s (fricative)
  – Describe by sound change: -/t, t/k, D/s
  – Describe by sound position (positional constraints): -/t (F), t/k (IMF), D/s (IMF)
  – Describe by features: substitution of velars, omission of stops, distortion of sibilants
  – Describe by feature change: place – alveolar to velar; manner
    – fricative to stop; voicing – voiced to voiceless

Karen’s Data

• Categories: substitutions IMF and omissions MF
• Sound class: fricatives, affricates, final stops, r, glides in blends
• Sound change: /t/, /d/, /b/ for fricatives and affricates; /f/, /s/ for some fricatives final; omission of /l/ in clusters and /s/ in clusters; w/r in all contexts (distortion?)
• Sound position: More voiced substitutions in I position, with voiceless subs in M and F. More omissions F
• Sound features: Preference for alveolar and bilabial stops I, but omission of these F
• Feature change: fricatives and affricates changed to stops; some changes in voicing
Phonological Assessment – Analysis of the Data

- **Phonological Processes** are simplification strategies that alter words through sound substitution, deletion (syllable structure), assimilation, vowel, and idiosyncratic processes.

- Recall that the pattern is evident through word analysis and that 20-40% of instances of a process is considered a guidepost and often the class of sounds is involved, not just individual phonemes.

- Severity indicators: omissions (ICD, syllables, FCD, clusters), vowels (centralized), absence of fricatives, glides and liquids.

Karen’s Data

Khan-Lewis Phonological Analysis: SS <40; %ile <1; AE <2-0

**Reduction Processes**
- Cluster Simplification: 73%
- Liquid Simplification: 71%
- Stopping: 52%
- Deletion Final Consonants: 18%
- Syllable Reduction: 11%

**Place & Manner Processes**
- Deaffrication: 67%
- Velar Fronting: 21%
- Palatal Fronting: 11%

**Voicing Processes**
- Final Devoicing: 28%
- Initial Voicing: 4%
Phonological Assessment – Analysis of the Data

• **Syllable Shapes**
  - When children omit phonemes, syllable shape is restricted. Limited syllable shape is characteristic of CAS, PD, and AD. But info is useful in intervention planning.
  - CV – open syllable; onset – no coda
  - VC – no onset, coda
  - CVC – onset and rime
  - CVCC
  - CCVC
  - CCCVCCC

Phonological Assessment – Analysis of the Data

• **Percentage of Consonants Correct** (Shriberg & Kwiatkowski, 1982)
  - Intelligibility is important indicator of severity, not necessarily the nature of the disorder.
  - Record each consonant in each word as correct or not (tally). You can keep track of each consonant and the releasing or arresting position for descriptive purposes:
  - Example:

<table>
<thead>
<tr>
<th>Initial</th>
<th>Final</th>
<th>Total</th>
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<tbody>
<tr>
<td>/b/ 111001100</td>
<td>00001000</td>
<td>6/17</td>
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<tr>
<td>/m/ 111111</td>
<td>1111o1o1</td>
<td>12/14</td>
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<tr>
<td>/t/ 111111111</td>
<td>001101</td>
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<td>/k/ 00000</td>
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<td>0/9</td>
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<td>/s/ 0001000</td>
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<td>6/16</td>
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<td>Total</td>
<td>36/71 = 51% (Mod-Severe)</td>
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Phonological Assessment – Analysis of the Data

- **Stimulability** – use of cues (ZPD) to reproduce a phoneme from a model and use it in syllables, words, and sentences.
- Children with PD often have good stimulability. Why? Because it taps the phonetic production of words (imitation), not the phonemic structure (use). It can help distinguish b/w CAS or AD as compared to PD.
- What does stimulability involve?
- Speech adaptability – the amount of cues needed along a continuum
  - Imitation of motor skill (structural and functional integrity)
  - Underlying representation of the phoneme (phonological level)
  - Skills involving accuracy, consistency, and phonological knowledge
  - Important in generalization and predicting progress, and now plays major role in target selection

<table>
<thead>
<tr>
<th>Syllable</th>
<th>Initial</th>
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Phonological Assessment – Analysis of the Data

• What information is available from a connected speech sample?

• Validity:
  – PCC is more authentic
  – Occurrences of phonemes may vary (phonemic inventory)
  – Note inconsistency of phonemes in same words and different words
  – Phonological processes may increase
  – Phoneme collapse may increase
  – Syllable structure may show more patterns of simplification (not many examples of complex syllable structure on single word tests)
  – Stimulability in a wider array/context

Using Data for Target Selection

**Phonetic Inventory:**
Increase the number of sounds the child is able to say

**Phonemic Inventory:**
Increase the use of consonants in words

**Phoneme Collapse:**
Determine which contrasts will eliminate homonymy. Select targets from different sound classes.

**Phonological Knowledge:**
Teach sounds that are absent/error from the phonetic and phonemic inventory based on the levels of knowledge.
Target Selection-Phonological Disorders

Phonological Processes:
Use assessment data to select patterns of errors for targets, especially those affecting intelligibility

Sound Error Descriptions:
Use descriptions to understand the types of changes being made on the sounds.

Target Selection-Phonological Disorders

Complexity:
Sounds that are acquired later are considered marked. They are more complex that early developing (natural) sounds. These sounds make good targets! Syllable shapes add complexity to words. These make good targets too!

Stimulability and Consistency:
Select non-stimulable sounds and include stimulability in intervention plan and take inconsistency related to motor planning into consideration.
Ultimate Goal

Intelligibility:

Use the PCC as an index of change.
Use connected speech samples and analysis procedures to monitor progress.

Strive for qualitative changes too!

Assessment should be dynamic and analysis should drive clinical decisions and progress monitoring.

Contact Us

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Questions

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