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2018 Nancy McKinley Lecture Series: Evaluating and Enhancing Children's Phonological Systems

Guest Editor: Linda R. Schreiber, M.S., CCC-SLP, BCS-CL, ASHA Fellow
In partnership with University of Wisconsin – Eau Claire

Assessing Children's Phonological Systems

Barbara W. Hodson, PhD

Moderated by:
Amy Hansen, MA, CCC-SLP, Managing Editor, SpeechPathology.com
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EVALUATING & ENHANCING CHILDREN’S
PHONOLOGICAL SYSTEMS:
Expediting Intelligibility Gains

Barbara Williams Hodson, PhD, Professor Emerita
bwhodson@icloud.com

Lecture Series by SpeechPathology.com
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Hodson, B. (2007, 2010). Evaluating and Enhancing Children’s
Phonological Systems: Research and Theory to Practice. Wichita,
KS: PhonoComp Publishing.

Hodson, B. (2004). Hodson Assessment of Phonological Patterns
(HAPP-3). Austin, TX: ProEd.

Hodson, B. (2003, 2012) Hodson Computerized Analysis of
Phonological Patterns (HCAPP). Wichita, KS: PhonoComp.

A Phonological Approach to Remediation. Austin, TX: ProEd.
Learning Outcomes
As a result of this course, participants will be able to:

Day 1
1) Identify a child's specific phonological deviations.
2) Identify the severity level of a child's phonology disorder.
3) Identify the phonological patterns that will increase the child’s intelligibility.

CYCLES PHONOLOGICAL PATTERN REMEDIATION APPROACH EVIDENCE.
Group Studies by INDEPENDENT INVESTIGATORS


PART I  INTRODUCTION

PHONOLOGY & INTELLIGIBILITY

SOME MAJOR CONSIDERATIONS

PHONOLOGICAL DEVIATIONS

SOME CONCERNS/CONSIDERATIONS

• “Critical Age” Hypothesis [by age 5;6] [Bishop & Adams]

• “Matthew Effects” [Stanovich]

• Later Years—Some Common Difficulties
  • Reading [Decoding, Comprehension, & Fluency]
  • Spelling & Writing
  • “Multisyllabic”
  • Imprecise Speech & Subtle Errors
  • Word Finding [Diane German]
SOME BASIC “PHONOLOGICAL” TERMS

PHONOLOGY* [Sounds/Patterns/Rules of a Language]

PHONEMIC; NOT Phonetic or Distortion [e.g., NOT lisp]

META-PHONOLOGICAL AWARENESS—Ability to attend to & reflect on sound structure of a language independent of meaning [Includes: Words, Syllables, Onsets & Rimes, & Phonemes]

PHONEME AWARENESS [Phonemes only]

PHONOLOGICAL PROCESSING [e.g., most encompassing; NOT synonymous with intelligibility difficulties]

NOTE: Many phonologists do not use the term, Phonological “Processes,” anymore [“Processes” commonly used by Literacy experts]

MAJOR PHONOLOGICAL “DEVIATIONS” [rather than “Processes”] includes Omissions & Substitutions from a different category
ADDITIONAL TERMS/EXPLANATIONS

SPEECH SOUND DISORDERS  [generic term]

ARTICULATION  Speech mechanism movements  
[e.g., tongue] to produce speech sounds

“Articulation” term commonly used by SLPs for the following:
1. “MILD” speech sound disorders
2. PHONEME-ORIENTED treatment & also TESTS that score Phonemes as totally correct or incorrect  
[i.e., no differentiation in final score for TYPES (e.g., omissions vs. distortions) weighted equally]

SOME CONCERNS REGARDING “APRAXIA” LABEL for CHILDREN

• OVERLABELING!! [Edy Strand, personal communications]
• Definitive CRITERIA lacking [Shriberg & Campbell]
• Children with CAS label often Treated Differently
  • Oral Motor Exercises [e.g., horns]
  • Lowered Expectations
  • Discounting/Exclusion of
    • Hearing & Perception Considerations
    • Phonology & MetaPhonological Awareness
    • Cognitive/Linguistic Aspects

Note: According to CAS experts—NO child under the age of 3 years should be diagnosed as “apraxic”!
SOME CONSIDERATIONS/SUGGESTIONS re: CAS

- CAS & Phonology OVERLAP a great deal [rather than “vs.” & “either-or”]
- Better to specify level along a CONTINUUM [e.g., moderate, profound] rather than to say that a child is: “artic” or “phono” or “apraxic”!
- Consider Cognitive/Linguistic Aspects [rather than strictly Motor/Oral Motor]
- Include PERCEPTUAL considerations [see Rvachew] & Phonological Aspects, especially MetaPhonological Awareness [see Gail Gillon]

SEVERITY CONTINUUM: Speech Sound Disorders

- PROFOUND [Extensive OMISSIONS; Many Subs.] Phonemic & Phonotactic Repertoires Extremely Limited
- SEVERE [Many Omissions; Extensive Subs]
- MODERATE [Some Omissions; Some Substitutions]
- MILD [Omissions Rare; Few Substitutions]

Note: Distortions & Assimilations occur at ALL levels.
- Distortions observed most in utterances of children in Mild/Moderate levels
- Assimilations [unusual/unexpected] in Severe/Profound levels
- Remember to consider accepted/allophonic variations [e.g., regional/cultural dialects]
CLIENT APPROPRIATENESS for Phonological PATTERN Intervention

• NOT Candidates
  • Only 1 or 2 sound errors [e.g., lisps; /f/ for “th”]
  » Appropriate productions [for age & linguistic community]
  • Lack of potential for speech

• Appropriate* Clients are individuals with HIGHLY UNINTELLIGIBLE speech, including most children who have:
  • Label of Apraxia*/Dyspraxia
  • Hearing Impairment/Cochlear Implant
  • Cognitive Delay*
  • Orofacial Anomalies [e.g., repaired cleft palate]

*MUST, of course, have POTENTIAL for speech

PHONEME ACQUISITION AGES
Normative “Perfect**” Phoneme Data*
[Do Children Acquire /s/ at age 3 or 8 years???]

<table>
<thead>
<tr>
<th>Investigators</th>
<th>/l/</th>
<th>/rl/</th>
<th>/s/</th>
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<td>5:0</td>
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<td>Poole [1934]</td>
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<td>6:0</td>
<td>4:0</td>
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<td>Prather et al. [1975]</td>
<td>3:4</td>
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<td>Arlt &amp; Goodman [1976]</td>
<td>4:0</td>
<td>5:0</td>
<td>4:0</td>
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<tr>
<td>Smit et al. [1990]</td>
<td>6:0</td>
<td>8:0</td>
<td>8:0 ?</td>
</tr>
</tbody>
</table>

*Allophonic variation considerations lacking
TYPICAL EARLY “PHONOLOGICAL” ACQUISITION: 1-3 years

- Canonical Babbling & Vocables [12 months]
- Recognizable Words [by 18 months]
  - CV word structures [i.e., word-INITIAL Cs]
  - Stops, Nasals, & Glides [1st across languages of the world]
- Communication with Words [by 2 years]
  - “Syllableness”
  - VC & CVC [i.e., Word-FINAL Consonants]
- Velars & /s/* Clusters [by 3 years]
  *Note: /s/ may be distorted, but NOT omitted

TYPICAL PHONOLOGICAL ACQUISITION 4-7 Years

4-Year Olds
- Syllable Structures
  Omissions Rare [by age 4]
  Final “Consonantness”
  Consonant Clusters
- Few “Simplifications”
  [Most (e.g., Fronting) Eliminated]
- Intelligibility > 90%
  “Adult-LIKE” Speech

5-7 Years
- Phonemic Inventory
  Completed . . .
  Liquids [4-6 years]
  “th” [by age 7]
- Phonetic Distortions
  [e.g., Lisps—Eliminated by age 7]
  “Multisyllabicity”
  “Adult-STANDARD” Speech

continued
INTELLIGIBILITY PERCENTAGES

According to Coplan & Gleason (1988):

<table>
<thead>
<tr>
<th>Age in Years</th>
<th>by Unfamiliar Listeners</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>50%</td>
</tr>
<tr>
<td>3</td>
<td>75%</td>
</tr>
<tr>
<td>4</td>
<td>100%</td>
</tr>
</tbody>
</table>

[i.e., Divide Child’s Age by 4]

How can we assess/analyze speech productions/deviations?
MAJOR OPTIONS for ASSESSMENT/ANALYSIS

1. Phoneme-Oriented “ARTICULATION” Tests
   • Totally correct or incorrect scoring
   • **NUMBER of TOTAL ERRORS** reported in final score [i.e.,
     types (e.g., omissions vs. distortions) usually not
differentiated]
   • “STANDARDIZATION” ISSUES!!!
     • Bell-shaped curves [per each age] impossible!
     • Cannot make words “more difficult” per age as can be done for most
tests [e.g., vocabulary]
     • “NORMING” procedures of publishers tend to “stretch out the tail,”
making “Mild” scores appear to be more severe than they really are
   • Publishers report using “linear transformation,” noting “it is NOT
     legitimate to interpret such scores in terms of normal distribution” [see
     Goldman & Fristoe (2000) p. 46]

ASSESSMENT/ANALYSIS OPTIONS-2

2. Distinctive Feature Analyses
   Can only score substitutions; can NOT account for
   omissions

3. CONNECTED “Conversational Speech” Sample
   Is sample intelligible enough to be analyzed?
   Percentage of Consonants Correct [PCC; Shriberg &
   Kwiatkowski]

4. NATURAL Simplification “Processes”
   [e.g., Fronting, Final C Deletion], but does not account
   for “non-natural” [e.g., Backing, Initial C Deletion]

5. NONLINEAR/Multilinear Analyses
   [e.g., Optimality, Feature Geometry]

6. Phonological Mean Length of Utterance
   [PMLU, Ingram]
BEYOND PHONOLOGICAL “PROCESSES”

7. Phonological “PROCESS” Tests primarily score examples of “processes” [e.g., Fronting]. Some children, however, totally lack a phoneme class/category [e.g., Velars], but don’t demonstrate expected substitution. [Thus, might not identify optimal “Target”]

8. Phonological PATTERNS/DEVIATIONS
   • SYLLABLE STRUCTURE OMISSIONS
     [e.g., Cluster Reduction]
   • CONSONANT CATEGORY DEFICIENCIES
     [e.g., Strident, Velars, Liquids]
   • SUBSTITUTIONS & OTHER STRATEGIES
     [e.g., Assimilations, Vowel Deviations]

PHONOLOGICAL DEVIATIONS OMISSIONS

• Syllables
  – Reductions to Monosyllables -basket → [bæ__]
  – Weak Syllable Deletions [“Normal”] probably → [pra__ bli]
  – “Multisyllabic” Difficulties escalator → [ɛk ə le tu]

• Singleton Consonants
  – Postvocalic [word-final]  boat → [bou_]
  – Intervocalic [word-medial] bucket → [bʌ_ et]
  – Prevocalic [word-initial]  boat → [___ oart]

• Consonant Sequences/Clusters**
  – Reductions truck → [t_ák]
  – Deletions truck → [___ak]
MAJOR SUBSTITUTIONS

- Stopping \( \text{leaf} \rightarrow [\text{dip}] \)
- Fronting [posterior→anterior] \( \text{gum} \rightarrow [\text{d} \text{m}] \)
- Backing [anterior→posterior] \( \text{tea} \rightarrow [\text{k} \text{i}] \)
- Gliding [substitution of /wl or lj/] \( \text{rock} \rightarrow [\text{w} \text{ak}] \)
- Liquid “Vowelization” \( \text{zipper} \rightarrow [\text{zi} \text{pu}] \)
- Vowel “Neutralization” \( \text{yellow} \rightarrow [\text{j} \text{lah}] \)
- Affrication/DeAf \( \text{chew/shoe} \)
- Palatalization/DePal. \( \text{shoe/sue} \)
*Glottal Replacement \( \text{boat} \rightarrow [\text{bou}?] \)

SYLLABLE-STRUCTURE/CONTEXT-RELATED

- Metathesis \( \text{mask} \rightarrow [\text{m} \text{æks}] \)
- Migration \( \text{smoke} \rightarrow [\text{m} \text{ouk}s] \)
- Coalescence \( \text{smoke} \rightarrow [\text{fouk}] \)
- Epenthesis \( \text{black} \rightarrow [\text{b} \text{ælæk}] \)
- Diminutive \( \text{sheep} \rightarrow [\text{ipi}] \)
- Cluster Creation \( \text{soap} \rightarrow [\text{sto} \text{p}] \)
- Reduplication \( \text{basket} \rightarrow [\text{bæbæ}] \)
MAJOR ASSIMILATIONS

- Labial [regressive & progressive] \( \text{spoon} \rightarrow [\text{fpum}] \)
- Velar \( \text{duck} \rightarrow [\text{gʌk}] \)
- Alveolar \( \text{cat} \rightarrow [\text{tæt}] \)
- Nasal \( \text{thumb} \rightarrow [\text{nʌm}] \)
- Palatal \( \text{juice} \rightarrow [\text{dʒu]}] \)
- Liquid \( \text{yellow} \rightarrow [\text{ləlo}] \)

VOICING ALTERATIONS

- Prevocalic Voicing [common] \( \text{cup} \rightarrow [\text{gʌp}] \)
- Prevocalic Devoicing [some] \( \text{zoo} \rightarrow [\text{su}] \)
- Postvocalic Devoicing [“normal”] \( \text{page} \rightarrow [\text{petʃ}] \)
- Postvocalic Voicing [rare] \( \text{leaf} \rightarrow [\text{lɪv}] \)
MINIMAL PLACE of ARTICULATION SHIFTS

• /f, v, s, z/ for “th” (e.g., thumb → [fʌm])
• DISTORTIONS [Phonetic vs. Phonemic]
  • Frontal Lisp [Stridency Maintained]
  • Other Tongue Protrusions
  • Lateral Lisp

Reminder: Frontal/Interdental LISP is a DISTORTION—NOT a “th” substitution. Stridency is maintained for lisps.

• The “th” phonemes are NONstrident.
• Lisps can occur for all Sibilants /s, z, ʃ, ʒ, tʃ, dʒ /
• Stridents—including Sibilants & also /f, v /

PART II

PHONOLOGICAL INTERVENTION
What would you do when planning and implementing treatment for a highly unintelligible client?

What are the major options?

MAJOR OPTIONS for TREATMENT/INTERVENTION

Emphasis: Mastering INDIVIDUAL Phonemes
- Traditional” STIMULUS Approach [Van Riper] with current Behavioristic Overlay [NOT Van Riper]
- “Complexity”/Least Phonological “Knowledge” [Gierut et al.] Advocate targeting most difficult “NONstimulable,” Least knowledge sounds/clusters (e.g., /skr/) first

Note: Refuted by Rvachew et al. (in Randomized Control Trial)
MAJOR OPTIONS for TREATMENT/INTERVENTION-2

- Maximal Oppositions [Gierut] (e.g., contrast /k/ & /m/)
- Multiple Oppositions [Williams] (e.g., contrast /t/ with all errors simultaneously, such as with /s/, /kl/, other sibilants, & all /s/ clusters)
- Oral Motor Exercises [Evidence lacking; See Lof et al.]
- Whole Language [Hoffman, Norris, & Monjure]
- Phonological PATTERNS [e.g., /s/ clusters] (Including MINIMAL PAIRS [Fairbanks] that contrast child’s ACTUAL deviations)

ENHANCE PATTERNS

PHONOLOGICAL

&

METAPHONOLOGICAL
UNDERLYING CONCEPTS

1. PHONOLOGICAL ACQUISITION IS GRADUAL [Ingram]
2. ROLE OF LISTENING [Van Riper] & IMPORTANCE OF INCORPORATING AMPLIFICATION [O’Neill]
3. ASSOCIATION OF AUDITORY & KINESTHETIC SENSATIONS for eventual self-monitoring [Fairbanks]
4. PHONETIC ENVIRONMENT CONSIDERATIONS for SELECTING PRODUCTION-PRACTICE WORDS [Kent]
5. GENERALIZATION OCCURS [McReynolds]
7. ACTIVE INVOLVEMENT/PARTICIPATION/ENGAGEMENT
8. ENHANCE METAPHONOLOGICAL SKILLS [Gillon]

TREATMENT SESSIONS—BASIC STRUCTURE

- Review last session’s production-practice words
- Listening Activity [approximately 30 seconds]
  Approximately 20 Words containing target [NOT carefully selected]
  Child listens, but must NOT repeat these words
  Have child say a couple potential-practice words using amplifier
  [microphone near clinician’s mouth; then child’s mouth]
- Production Practice
  4-8 words carefully selected (phonetic environment)
- Activities for Eliciting Productions
  Use cues/assists/models as needed [Goal is 100%]
  Child “takes turn” after saying “target pattern” correctly in production-practice word [change activities every 8 to 10 minutes]
- Metaphonological Activity [e.g., rhyming, syllable segmentation]
- Probe for Next Session’s Target
- Repeat Listening Activity [with slight amplification]
- Home Practice [2-5 minutes EVERY day; child names week’s production-practice words; parent reads listening list & nursery rhyme]
PRIMARY TARGETS
for BEGINNING CYCLES

• Word Structures [OMITTED Segments]
  • “SYLLABLENESS” [i.e., number of vowels/diphthongs]
    ▪ Compound words [e.g., *cowboy, baseball*]
    ▪ 3-syllable/word combinations [e.g., *cowboy hat, baseball bat*]
  • SINGLETON Consonants [Syllable/Word Structures]
    ▪ CV [word-initial /p, b, m, w/ if lacking “initial” Cs]
    ▪ VC [voiceless final Stops /p, t, k/; final /m, n/ if lacking]
    ▪ VCV [e.g., *apple*]

PRIMARY TARGETS-2
for BEGINNING CYCLES

• “Syllableness” [via compound words] IF talking in monosyllables only
• Voiceless Final Stops (e.g., /p/, /t/) if no word endings
• /s/ CLUSTERS [for omissions, NOT for substitutions/distortions]
  – Word-initial [e.g., /sp/, /st/, /sm/]
  – Word-final [e.g., /ts/, /ps/]
  * Note: Add /s/ to consonant child already produces [e.g., if child produces /b/ or /p/ can target /sp/]
• Incorporate phrase: “It’s a [/s/ cluster word]” after child demonstrates facility producing /s/ clusters in production-practice words [typically by 3rd cycle]
  * Reminder: Model SOFT, short, PRECISE /s/!
“Back up” your model as needed if child “distorts” sibilants
### PRIMARY TARGETS-3 for BEGINNING CYCLES

- **Anterior/Posterior CONTRASTS** [when stimulable]
  - Velars [if “Fronter”]
    - Word-final /k/ [before prevocalic velars never final /g/]
    - Word-initial /k, g/ [occasionally /h/]
  - Alveolars [if “Backer”; sometimes Labials]

- **Facilitation of LIQUIDS** [even if not stimulable]
  - Word-Initial /l/ [preceded by week of tongue-tip clicking]
  - Word-Initial /r/ [suppress gliding initially] Exaggerate VOWEL [open mouth wide at first]
  - Do NOT blend INITIALLY

Incorporate /kr/, /gr/ [when child “has” Velars typically by 3rd cycle]

---

### INAPPROPRIATE TARGETS for PRESCHOOLERS

Do NOT target aspects that PEERS are fully producing—[It is **NOT** appropriate to ask our clients to speak more perfectly than their typical peers]

- **Word-final Voiced Obstruents** [e.g., final b, d, g, z]
- **Unstressed [weak] Syllables** [e.g., refrigerator]
- /θ, ð/ [e.g., mouth]
- /ŋ/ [e.g., going]
- Vocalic /l/ [e.g., ball]

**Note:** SIBILANTS are appropriate targets for Preschoolers ONLY if stridency is lacking [e.g., /t/ for /s/; /s/ cluster reduction], but **NOT** for LISPS [which maintain stridency and do not have a particularly adverse effect on intelligibility].
GENERAL COMMENTS
Regarding Targets

- Approximately 60 mn. per PHONEME target [120 mn. for children with cognitive delay]
- At least 2 phonemes per target PATTERN
- Reassess phonology between cycles
- Recycle Primary Patterns as needed [until begin to emerge in conversation]
- Proceed to SECONDARY Patterns AFTER
  - Early developing patterns established
  - /s/ clusters emerging in conversation
  - Contrastive use of velars & alveolars
  - Practice words for liquids—produced without glide insertion

What techniques have been effective for eliciting major target patterns/sounds?
SOME SUGGESTIONS for ELICITING SOUNDS

• Final C [e.g., final /p/—pop lips & feel puff of air] Prolong vowel slightly in your model

• /s/ Clusters [move finger along child’s arm for /sl and tap for the 2nd consonant for initial /s/ clusters]

• Velars [tap throat for /k/ to indicate “back” ness]

• Sometimes use “dum dum” sucker to stimulate back of tongue; occasionally model Velar Fricative /x/]

SOME SUGGESTIONS for ELICITING SOUNDS

• Liquids

  ▪ /l/ —one week before targeting /l/ tongue-tip clicking independent of jaw

  ▪ /r/—open mouth as wide as possible & emphasize/prolong vowel. Do NOT blend during initial cycles [i.e., Eliminate /w/ first]

• Palatal Sibilants

  ▪ /s/ plus /j/ for /ʃ/ (e.g., “missyou”)
  ▪ /ts/ + /j/ for /tʃ/; /z/ + /j/ for /ʒ/; /dʒ/ + /j/ for /dʒ/

[Reminder: AMPLIFICATION often helps child produce troublesome sounds]
What should we remember when choosing target words for production practice?

SELECTING OPTIMAL PRODUCTION-PRACTICE WORDS for BEGINNING CYCLES

- Monosyllabic Words [Real]
- FACILITATIVE Phonetic Environment!!!

- Words in Child’s Lexicon [e.g., not *small*]
- Avoid selecting words with consonant at same place of articulation as substitute
  - [e.g., NOT *cat, coat, can, kiss, corn, candy, gas, goat, gate, sock, tack, dog* (if substituting /t/ for /kl; /dl/ for /g/)]
  - [e.g., NOT *rope, robe, row, room, roof, rabbit; leaf, lamb, lamp, lip, loop, laugh* (if substituting /wl for /l/, /r/)]
POTENTIAL “SECONDARY” TARGET PATTERNS

*Target any of the following Secondary Patterns that are still CONSISTENTLY lacking/deficient/problematic.

Note: Important to incorporate MINIMAL PAIRS for Production Practice for Secondary Patterns when possible

ALL Other Consonant Clusters/SEQUENCES!
- Word-medial/Intervocalic CC [e.g., basket]
- Word-final CC with /s/ inside word [e.g., desk]
- CC with Glides [e.g., /kj/] & Liquids [e.g., /tr/]
- CCC [e.g., /skw/, /skr/]

Palatals
- Glide /j/
- Palatal Sibilants [e.g., /ʃ/, /tʃ/]
- Word-Medial (intervocalic) /r/
- Vocalic (r) [unless dialectal]
OTHER SECONDARY POTENTIAL TARGET PATTERNS

- Other Singleton Stridents [e.g., /f/, /s/] [Note: Exaggerate Vowel rather than Strident to eliminate intrusive C]
- Vowel Contrasts [nondialectal]
- Voicing Contrasts [prevocalic only]
- Assimilations [if any remain problematic]
- Any remaining “Idiosyncratic” Deviations
- “Multisyllabicity” [words appropriate for age]

INCREASE COMPLEXITY GRADUALLY & FACILITATE GENERALIZATION

Incorporate words with more DIFFICULT phonetic environments
Expand student’s use of all consonant clusters/SEQUENCES
Incorporate appropriate MULTI-SYLLABIC words [e.g., astronaut, microscope] IF child is able to read, incorporate oral reading [lower than child’s current reading level]; Student NOT allowed to continue reading until sound[s] produced appropriately
* Check child’s rendition of ALPHABET song—Evaluate productions of all letter names, including “Q” “X” “J” “W”
POTENTIAL “ADVANCED” Target PATTERNS

• For students [above age of 8 years] who typically perform well on standardized “articulation” tests, but have major intelligibility issues in connected speech

• “Multi-syllabicity” [helps for connected speech]

• Complex Consonant Sequences
  • [e.g., extra – Word-Medial CCCC /kstr/]

• Combinations of Nasals [e.g., unanimous]

SAMPLE MULTISYLLABIC WORD PRODUCTIONS: “R” [age 12 years]

• *mosquito* \(\rightarrow [\text{mə}_\text{ito}]\)
• *extra* \(\rightarrow [\text{ɛks}_\text{wə}]\)
• *escalator* \(\rightarrow [\text{ɛks}_\text{letu}]\)
• *unanimous* \(\rightarrow [\text{numənəməs}]\)
• *aluminum* \(\rightarrow [\text{numinəm}]\)
• *immediately* \(\rightarrow [\text{imi}_\text{lətli}]\)
• *object* \(\rightarrow [\text{o}_\text{dʒεk}]\)
TREATMENT SUGGESTIONS for “MULTISYLLABICITY” SKILLS

• Develop list [with assistance of caregivers and teachers] of troublesome words
• Help student divide words into syllables
• Use “phonic writing” for each syllable to help client know what sounds should be produced in each
• Practice producing all sounds for each syllable [one-by-one]—then two syllables together, etc. until AUTOMATICITY reached
• Then have student generate & say sentences using the MULTISYLLABIC words

APPENDIX A—PHONETICS REVIEW

PLACE of Articulation

- Anterior
  - Labials /p, b, m, w/ [bi-]; /f, v/ [labiodental]
  - Interdentals /θ, ð/
  - Alveolars /l, d, n, l, s, z/
- Mid
  - Palatals: /ʃ, ʒ, tʃ, dʒ, r, j/
- Posterior
  - Velars /k, g, n/
  - Glottal /ʔ/

MANNER of Articulation

- Obstruents
  - Stops /p, b, t, d, k, g/
  - Fricatives /h, f, v, ɵ, ð, s, z, j, ʒ, ɹ, ɾ, ʔ/  
  - Affricates /tʃ, dʒ/
- Sonorants
  - Glides /w, j/
  - Nasals /m, n, n̄/
  - Liquids /l, r/

VOICING

- Voiced /b, d, g, v, z, ʃ, ʒ, ɹ, ɾ, m, n, ɲ, ɹ, ɾ, ʔ/
- Voiceless /p, t, k, f, s, ɵ, tʃ, ʰ/
APPENDIX B—MAJOR PHONOLOGICAL THEORIES

• Structural/Universal Order [Jacobson]
• Behavioral [Mowrer]
• Generative [Chomsky & Halle]
• Natural [Stampe]
• Prosodic [Waterson]
• Interactionist-Discovery/Cognitive [Ferguson et al.]
• Complexity/Learnability [LEAST Phonological Knowledge/Complexity; Gierut et al.]
• Multilinear/Nonlinear [e.g., Optimality, Metrical]
• *GESTURAL [Browman & Goldstein]
• *DYNAMIC SYSTEMS [Thelen & Smith]