

Evidence-Based Practice in Treatment of Preschool Children with Speech Delays:

What is the Evidence?

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Overview (*Holly L. Storkel*)

1. Evidence-Based Practice: Application of current best evidence to clinical decision making for individual clients (Apel, 2001; Dollaghan, 2004)
2. Children with functional phonological disorders: Significant delays in sound production with no obvious cause (Gierut, 1998)

Child Variables (*Jill R. Hoover*)

3. Generalization: learning beyond what is taught
 - a. Treated sound: change in the treated sound in untreated words
 - b. Untreated within class: change in untreated sounds that are similar to the treated sound (e.g., sounds that are the same manner as the treated sound)
 - c. Untreated across class: change in untreated sounds that are dissimilar to the treated sound (e.g., sounds that differ in manner from the treated sound)
4. Stimulability: ability to imitate a correct production of an error sound
 - a. Research evidence shows that stimulable sounds tend to improve without treatment
 - b. Research evidence shows that nonstimulable sounds require treatment
 - c. Recommendation: treat nonstimulable sounds
 - d. Readings: (Miccio & Elbert, 1996; Miccio, 1999; Powell, Elbert, & Dinnsen, 1991)
5. Consistency of substitutes: the stability of the production of a substitute across word positions and across words
 - a. Research evidence shows that treatment of a sounds with a consistent substitute leads to generalization of the treated sound across word positions
 - b. Research evidence shows that treatment of a sound with an inconsistent substitute leads to change in the treated sound in only the treated word position
 - c. Recommendation: treatment of sounds with inconsistent substitutes may require a specialized treatment approach
 - d. Readings: (Forrest, Dinnsen, & Elbert, 1997; Forrest & Elbert, 2001; Forrest, Elbert, & Dinnsen, 2000)
6. Productive phonological knowledge: accuracy of child's sound production
 - a. Knowledge continuum:
 - i. Least knowledge: sound always produced incorrectly or produced correctly in only a few words
 - ii. Some knowledge: sound produced correctly in only some word positions or sound produced correctly in all word positions but variability across words (i.e., inter-word variability)
 - iii. Most knowledge: sound produced correctly in all words or sound produced correctly in all words but variability across productions of the same word (i.e., intra-word variability)
 - b. Research evidence shows that treatment of most knowledge sounds leads to change in treated sounds only
 - c. Research evidence shows that treatment of least knowledge sounds leads to change in treated and untreated sounds
 - d. Recommendation: Treat least knowledge sounds to promote global sound change
 - e. Readings: (Gierut, Elbert, & Dinnsen, 1987)

7. Clinical Application Child A: 5;0 female 1st percentile
 - a. Most knowledge (high accuracy): m n ŋ w h p b t d
 - b. Some knowledge (mid accuracy): l k g v s z tʃ dʒ
 - c. Least knowledge (low accuracy): r f θ ð ʃ
 - d. Recommendation: select 1 least knowledge sound
8. Clinical Application Child B: 4;9 male 2nd percentile
 - a. Most knowledge (high accuracy): m n w j h p b t d
 - b. Some knowledge (mid accuracy): θ s z
 - c. Least knowledge (low accuracy): ŋ l r k g ð ʃ tʃ dʒ
 - d. Recommendation: select 1 least knowledge sound

Phonological Variables (*Junko M. Young*)

9. Phonetic complexity: based on cross-linguistic and developmental patterns with certain sets of sounds being viewed as less complex (e.g., nasals, stops, & glides) and other sets of sounds being viewed as more complex (e.g., nasals, stops, glides, fricatives, & 1 liquid)
 - a. Research evidence suggests treating less complex sounds (e.g., fricatives) leads to limited change
 - b. Research evidence suggests treating more complex sounds (e.g., liquids) leads to global change
 - c. Recommendation: treat complex sounds
 - d. Readings: (Tyler & Figurski, 1994)
10. Markedness: based on frequency of occurrence of sounds across languages as well as developmental patterns
 - a. Marked sounds: voiced, fricatives, affricates, clusters, liquids
 - b. Unmarked sounds: voiceless, stops, singletons, nasals
 - c. Research evidence suggests treating unmarked sounds leads to change in only unmarked sounds
 - d. Research evidence suggests treating marked sounds leads to change in unmarked and marked sounds
 - e. Recommendation: treat marked sounds
 - f. Readings: (Gierut, 1999, 2001; Gierut & Champion, 2001)
11. Developmental age norms: age when sounds are typically acquired (Smit, Hand, Freilinger, Bernthal, & Bird, 1990)
 - a. Research evidence suggests treating early acquired sounds leads to change in the treated sound and untreated within class sounds
 - b. Research evidence suggests treating late acquired sounds leads to change in treated, untreated within class, and untreated across class sounds
 - c. Recommendation: treat late acquired sounds
 - d. Readings: (Gierut, Morrisette, Hughes, & Rowland, 1996; Morrisette & Gierut, 2003; but see Rvachew & Nowak, 2001)
12. Clinical application child A: 5;0 female, least knowledge sounds: r f θ ð ʃ
 - a. Early acquired: f ð
 - b. Late acquired: r θ ʃ
 - c. Recommendation: select one least knowledge late acquired sound (e.g., /r/)
13. Clinical application child B: 4;9 male, least knowledge sounds: ŋ l r k g ð ʃ tʃ dʒ
 - a. Early acquired: k g
 - b. Late acquired: ŋ l r ð ʃ tʃ dʒ
 - c. Recommendation: select one least knowledge late acquired sound (e.g., /dʒ/)

Lexical Variables (*Holly L. Storkel*)

14. Many phonological treatment programs treat sounds in real words. Does word selection matter in promoting sound change?
15. Review lexical characteristics (Storkel & Morrisette, 2002)
 - a. Word frequency: how often a word occurs in a language
 - i. High frequency advantage for word recognition, production, and learning
 - b. Neighborhood density: number of words phonologically similar to a given word based on a 1 phoneme difference (i.e., minimal pairs)
 - i. Neighbors of "sit" = "hit, sat, sip, spit, it" + many others
 - ii. High density disadvantage in word recognition
 - iii. High density advantage in production, learning, and phonological awareness
 - c. Additional readings: (De Cara & Goswami, 2003; Garlock, Walley, & Metsala, 2001; German & Newman, 2004; Metsala, 1997; Rice, Oetting, Marquis, Bode, & Pae, 1994; Storkel, 2004)
16. Effect of lexical characteristics on phonological treatment
 - a. Research evidence suggests that treatment of a sound in low density words leads to change in the treated sound only
 - b. Research evidence suggests that treatment of a sound in low frequency words leads to change in untreated sounds only
 - c. Research evidence suggests that treatment of a sound in high frequency words leads to change in the treated sound and untreated sounds
 - d. Recommendation: Treat sounds in high frequency words
 - e. Readings: (Gierut, Morrisette, & Champion, 1999; Morrisette & Gierut, 2002)
17. Clinical application child A: Treatment of /r/ in high frequency words (balanced in density)
 - a. Dr. Mitchell Sommers' website (Washington University in St. Louis)
<http://128.252.27.56/neighborhood/Home.asp>
Select Item search
 - b. High frequency = 100+ (low frequency = 99-)
 - c. Low density = 9- & High density = 10+
 - d. Searching
 - i. Target box: r% phonology use wildcards
 - ii. Filter options: low frequency 100
 - iii. Variables for output: orthography frequency density B
 - e. Selected words: run (high density), radio (low density), read (high density), river (low density)
18. Clinical application child B: Treatment of /dʒ/ in high frequency words (balanced in density)
 - a. Searching
 - i. Target box: J% phonology use wildcards
 - ii. Filter options: low frequency 100
 - iii. Variables for output: orthography frequency density B
 - b. Selected words: job (high density), justice (low density), j (high density), general (low density)
19. Additional information:
 - a. Klatt -- IPA symbol conversion
 - i. G for /ŋ/
 - ii. y for /j/
 - iii. T for /θ/
 - iv. D for /ð/
 - v. S for /ʃ/
 - vi. Z for /ʒ/
 - vii. C for /tʃ/
 - viii. J for /dʒ/

- b. Varying word position
 - i. Sound% = initial only
 - ii. %sound% = initial, medial, final
 - iii. %sound = final only
- c. Additional filter options
 - i. High frequency: set frequency low filter to 100
 - ii. Low frequency: set frequency high filter to 99
 - iii. High density: set density B low filter to 10
 - iv. Low density: set density B high filter to 9

Summary (*Holly L. Storkel*)

20. Resources for evidence

- a. ASHA journals on-line <http://www.asha.org/default.htm>
- b. Cochrane collaboration <http://www.cochrane.org/index0.htm>
- c. Word & Sound Learning lab (Storkel, Hoover, Young) <http://www.ku.edu/~wrdlrng/>
- d. Learnability Lab (Gierut, Morrisette) <http://www.indiana.edu/%7Esndlrng/>

21. Conclusion: Evidence from clinical research can enhance clinical practice

22. Word & Sound Learning Lab (Storkel, Hoover, Young) Contact Information

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(Many are available on the ASHA website to ASHA-members)

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