Maximizing Progress for Children with Severe Speech Sound Disorders

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What is your biggest hurdle as a school-based SLP?

• Caseload
• Time
• Paperwork

Why focus on speech sound disorders?

• Incidence is 2-25%, depending on the definition

• 93% of school-based SLPs serve students with SSD (ASHA, 2012)

• Linked to reading difficulties (Foy and Mann, 2011; Catts, Fey, Shang and Tomlin, 2001)
Phonemic/Phonological

Severe to profound impairment
Focus on child’s sound system
Facilitation of patterns
Focus on assessment
Focus on target selection
Target occasional use
Consider stimulability

Implications for Clinical Practice

• Assessment
• Target selection
• Treatment

Assumptions about Target Selection

• Earlier or later developing sounds?
• Absent or inconsistent sounds?
• Stimulable or non-stimulable sounds?
• Less or more linguistic complexity?
• One or more than one target sound?
• Targets from the same class or different classes?
• Clusters or singletons?

Zack - Error Analysis


Red indicates non-stimulable phonemes consistently in error.
Black indicates inconsistent errors.
Target Selection based on work of Gierut and colleagues

How do we know what a child knows about the sound system?

• Perception
• Stimulability
• Production
• Acoustic/instrumental information

Perception (Rvachew, 2005)

• Structural and functional integrity of the auditory and speech perception mechanisms
• Appropriate input for contrasting phoneme categories
• Appropriate cognitive/linguistic processing

Stimulability (Rvachew, 2005)

• Structural and functional integrity of the speech mechanism
• Appropriate input (visual, tactile, kinesthetic information) about the required articulatory gestures
• Imitation skills
• Focus and motivation
Production

Gierut proposed 6 types of phonological knowledge demonstrated by production

Six types of Productive Phonological Knowledge - Type 1 (Gierut, 1987)

• A child displaying Type 1 knowledge of target /s/ would produce this sound correctly in all word positions and for all morphemes. /s/ would never be produced incorrectly.

Examples:

[si] see
[sup] soup
[mɛsi] messy
[mas] miss

Six types of Productive Phonological Knowledge - Type 2 (Gierut, 1987)

• A child displaying Type 2 knowledge of target /s/ would produce the sound correctly for all morphemes and positions. However, a phonological rule would apply to account for observed alternations between, for example, /s/ and /t/ in morpheme-final position.

Examples:

[si] see
[sup] soup
[mɛsi] messy
[aɪs] ice
BUT
[kts]–[kt] kiss
[mɪs]–[mit] miss

Six types of Productive Phonological Knowledge - Type 3 (Gierut, 1987)

• A child displaying Type 3 knowledge of target /s/ would produce this sound correctly in all positions. However, certain morphemes that were presumably acquired early and acquired incorrectly (fossilized forms) would always be produced in error.

Examples:

[si] see
[mɛsi] messy
[mɪs] miss
BUT
[nænɘ] Santa
[wu] juice
Six types of Productive Phonological Knowledge - Type 4 (Gierut, 1987)

- A child displaying Type 4 knowledge of target /s/ would produce the sound correctly for all morphemes in, for example, initial position. However, production of /s/ would be incorrect for all morphemes in medial and final positions.

Examples:
- [si] see
- [sup] soup
- [mɛtɪ] messy
- [mɪtɪŋ] missing
- [mɪt] miss
- [kɪt] kiss

Six types of Productive Phonological Knowledge - Type 5 (Gierut, 1987)

- A child displaying Type 5 knowledge of target /s/ would produce the sound correctly in, for example, initial position. However, only some morphemes in this position would be produced correctly. All /s/ morphemes in post-vocalic positions would be produced incorrectly.

Examples:
- [si] see
- [sup] soup
- [top] soap
- [tak] sock
- [mɛtɪ] messy
- [kɪt] kiss

Six types of Productive Phonological Knowledge - Type 6 (Gierut, 1987)

- A child displaying Type 6 knowledge of target /s/ would produce this sound incorrectly in all word positions and for all morphemes. /s/ would never be produced correctly.

Examples:
- [ti] see
- [tup] soup
- [mɪtɪŋ] missing
- [mɪt] miss
- [kɪt] kiss

Target Selection Issues: (Gierut et al.)

WHAT to work on?
- Stimulable/non-stimulable
- Most/least phonological knowledge
- Early/late developing
- Least/most marked (linguistically complex)
Phonetics Review

- 3 phonetic characteristics of speech sounds
- 2 major classes of phonemes
- markedness

Markedness and Major Sound Classes

- Markedness
  - Order of least to most markedness
  - Obstruants
    - stops -- fricatives -- affricates
  - Sonorants
    - nasals -- glides -- liquids

Markedness and Major Sound Classes

- More marked assumes less marked
- If the child can make the more marked (harder) sound, he can make the less marked (easier) sound.

Clusters and Adjuncts

(Gierut, 1999)

Real clusters versus adjuncts
Clusters: from less to more sonority
stop glide, fricative glide
Adjuncts: /s/ stop

Sonority Sequencing Principle
Easier clusters are those which have the greatest difference in sonority between the first and second segment: /pl/ over /fl/
Clusters & Adjuncts
(Gierut, 1999)

Markedness
Distinctive feature markedness
- stops -- fricatives -- affricates
- nasals -- glides -- liquids

Sonority sequence markedness
- most to least sonorant versus similarity

More marked assumes less marked

Target Selection based on Phonological Knowledge
(Dinnsen & Elbert, 1984; Elbert et al., 1984; Gierut et al., 1987)

- Target selection based on sounds with most phonological knowledge provides faster generalization of the target sound to other contexts.
- Target selection based on least phonological knowledge provided greater generalization to other sounds and sound classes.

Implications for target selection based on Stimulability
(Powell, Elbert & Dinnsen, 1991)

- Targeting stimulable sounds provides faster generalization of production of the target sound in other contexts.

- Targeting non-stimulable sounds provides more widespread generalization to other sounds and sound classes.

Target selection based on Order of Acquisition of Sounds
(Powell & Elbert, 1984)

- Targeting earlier and later developing clusters both provided generalization to both treated and untreated categories.

- Differential learning patterns were noted among children.

- One child who was taught early developing did not generalize to later.

- All children who were taught later developing did generalize to earlier. (emphasis added)
Target selection based on Order of Acquisition of Sounds (Gierut, Morrisette, Hughes, Rowland, 1996)

- Greater learning occurred for later developing sounds.
- Later developing sounds showed more continued improvement post treatment.
- Teaching later developing sounds produced greater system wide change.

Target Selection based on Order of Acquisition of Sounds (Gierut, Morrisette, Hughes, Rowland, 1996)

- Targeting early developing sounds provided greater generalization of the target sound to other contexts.
- Targeting later developing sounds provided greater generalization to other sounds and sound classes.

Target Selection based on Order of Acquisition & Phonological Knowledge (Rvachew & Nowak, 2001)

- Improvement occurred for untreated stimulable phonemes, but little improvement occurred for untreated unstimulable phonemes
- Confirmed the need to find ways to help children imitate sounds

Target Selection - Clusters (Elbert, Dinnsen, Powell, 1984)

- Generalization occurred only to stop liquid when stop liquid was trained and child had no knowledge of fricative liquid.
- Generalization occurred to both stop liquid and fricative liquid when fricative liquid was trained and/or when child had some phonological knowledge of fricative liquid.
Teaching Clusters
(Williams, 1991)

- Hypothesis based on Gierut’s work:
  - Teaching two new sounds in a cluster may result in acquisition of two new sounds and clusters.
- Results:
  - If the child had some knowledge of the sounds and no sequences, learning occurred.
  - If the child had sequences and inventory constraints for the sounds, learning occurred.
  - If the child had inventory constraints for the sounds and did not have sequences, learning did not occur.

Clusters & Adjuncts
(Gierut, 1999)

- Adjuncts (s-stop clusters) are less marked (easier) than other clusters and therefore do not generalize to clusters.
- More marked clusters generalize to many clusters. /fl/ to /pl/, /br/, /kw/
- Less marked clusters generalize only to in-class clusters, not to others.
  - /pl/ to /bl/, /kl/, /gl/

Influence of Word Frequency on Phonological Change
(Morrisette & Gierut, 2002)

- Treatment of high frequency words resulted in greater generalization to treated and untreated sounds within and across sound classes.

Designing Phonological Intervention
Minimal Pair Selection

The work of Gierut and Others
Applying Learnability to Therapy

- Based on Gierut's principles, phonemic targets for therapy should consist of:
  - phonemes about which the child has little or no productive phonologic knowledge
  - nonstimulable phonemes
  - at least two phonemes that are from different sound classes
  - late-developing phonemes
  - most marked consonants

Phoneme Selection Process - the Phonology Funnel

1. Least Productive Phonological Knowledge
2. Non-stimulable Phonemes
3. Later Acquired Phonemes
4. Most Linguistically Complex Phonemes
5. # of Contrast Pairs
6. # of High Frequency Words

Principles of Phonological Intervention (Fey, 1992)

- modification of groups of sounds that share a common pattern
- less emphasis on correct sound production and focus on neutralized contrasts
- more emphasis on using speech sounds for communication purposes

Phonological Intervention (Fey (1992))

“I believe that there is only one therapy procedure that embodies all of the three principles ... the notion of minimal contrasts ... and the functional use of speech to transmit unambiguous messages.”
Minimal Pair

- two words that differ in meaning and have only one phonemic difference between them (cape/cake)
- for linguistic purposes, the existence of a minimal pair demonstrates that the contrasting sound is actually a phoneme, and not simply an allophone

Maximal Contrast Pair

- A minimal pair in which the differing consonants differ on multiple features: place, voice, manner, sound class.
- Examples:
  - hair/dare
  - coo/ Lou
  - rat/ cat

Note: it's not always possible to fully achieve maximal phonetic contrast when choosing target phonemes.

Use the phonology funnel to arrive at the best workable targets!

Types of Contrasting Pairs

- Target versus substituted sound
- Target versus another established sound
- Multiple targets versus substituted sounds
- Two new target sounds which have multiple phonetic differences
Maximal contrast pairs resulted in greater improvement in target sounds, more additions of untreated sounds and less over generalization to known sounds. May result in a complete reorganization of the child's system!

Learning is enhanced by maximal phonetic differences and major class distinctions.

Greatest widespread system change:

Minimal pairs comparing two new phonemes differing by maximal and major class features.

The major class distinction may be more important than the number of features.

Hierarchy of Pair Effectiveness

- multiple and major class distinctions
  - multiple distinctions
    - few distinctions

Getting the BIG picture
Individual Plan + Global Plan = Success!

Components of an Effective Individualized Therapy Plan

- Careful selection of targets
- Use of selected targets in meaning-based therapy - maximal contrasts that convey meaning (real words!)
- Flexibility to accommodate rapid, widespread phonological change

What contrast should we choose for Zack?

<table>
<thead>
<tr>
<th>Consonant Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Obstruent</strong></td>
</tr>
<tr>
<td>Stops</td>
</tr>
<tr>
<td>Fricatives</td>
</tr>
<tr>
<td>Sibilant</td>
</tr>
<tr>
<td>Nasals</td>
</tr>
<tr>
<td>Liquids</td>
</tr>
<tr>
<td>Glides</td>
</tr>
</tbody>
</table>


*Red indicates non-stimulable phonemes consistently in error. Black indicates inconsistent errors.*

final complex targets = individual plan - focused targets selected after careful analysis and planning
Individual plan
Initial targets: \([r, s]\)

- Maximal contrast:
- place
- voice
- manner
- sonorant v. obstruent

Contrast Pair Examples -
2 New Target Sounds

<table>
<thead>
<tr>
<th>([r])</th>
<th>([s])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roo</td>
<td>Sue</td>
</tr>
<tr>
<td>run</td>
<td>sun</td>
</tr>
<tr>
<td>road</td>
<td>sewed</td>
</tr>
<tr>
<td>rip</td>
<td>sip</td>
</tr>
</tbody>
</table>

Global plan
combining serious
therapy with functional
(and fun) communication

A Winning Formula for Therapy
(Rvachew, 2004)

traditional articulation therapy
+ perceptual training
+ training in letter identification
+ training in sound-symbol relationships
+ onset identification

= greater progress than in articulation therapy alone
Three Key Components

- Auditory development
- Phonologic awareness
- Bridge to phonics

4 Principles for Language Intervention (Gillam and Loeb, 2010)

- Four essential components of language therapy:
  - Intensity
  - Active Attention
  - Immediate Feedback
  - Rewards

Additional Principles for Speech Sound Disorders

- Use targets in meaningful language (Hoffman, Norris, and Monjure, 1990)
- Develop stimulability (Rvachew and Nowak, 2001)

Global Therapy Plan

- Foundational elements of all phonology therapy:
  - Target multiple phonemes simultaneously (selected for each individual)
  - Develop stimulable phonemes
  - Build a bridge to phonics
  - Use real language applications - such as meaningful contrast pairs and use of sounds in sentences
  - Plan for active attention, high rate of response, feedback, and rewards
Developing Stimulability while Building a Bridge to Phonics

| m | b | p | w |
| f | v | th | th |
| t | d | n | l |
| s | z | sh | zh |
| ch | j | y | r |

Develop stimulability
- Visual Feedback
- Auditory Feedback
- Kinesthetic Engagement

Building a Bridge to Phonics using Real Language Applications

- Say-it-and-Move-It (from Road to the Code, an evidence-based program for phonemic awareness)
- Provides focused, active practice for maximal contrast pairs and learning unknown phonemes

Real Language and A Bridge to Phonics

- Modeled and independent use of contrast pairs in simple games
- Immediate Feedback
- Rewards
Sources for Contrast Pairs

- www.lessonpix.com
- slpath.com
- apps
- teacherspayteachers.com
- Contrast word list handout
- SCIP app

Real Language

- Modeled and independent use of target phonemes in formulaic sentences
  - “I want to look at that card.”
  - “Can I look at that card?”
  - “She can run.” “She likes to run.”

Putting it All Together: What does a session look like?

- Phoneme Inventory: 5 minutes or less
  - Stimulability, letter-sound correspondence

- Say-It-And-Move-It: 5-8 minutes
  - Phonologic awareness, meaning-based production (maximal contrast pairs)
Putting it All Together:
What does a session look like?

- Maximal opposition pairs and sets used meaningfully in a familiar context (games): 10 minutes
- Optimize number of responses

Target sounds in high frequency words used in sentences: 5-10 minutes
- Meaningful use of target phonemes

Writing goals and objectives
What is the main thing?

Writing An Annual Goal

- Think in terms of intelligibility - the main thing
- Clearly define the intelligibility target in the goal statement. Example: “80% of words will be spoken correctly during a 10 minute language sample”
- Objectives may be written with respect to maximal pairs, processes or specific phonemes, OR for all potential targets referenced to the global process
Annual Goal - The Main Thing!

During a spontaneous language sample of at least 50 utterances, at least 60% of the words Colton uses will be spoken correctly.

Intermediate Objectives - Refer to the Global Therapy Process

Intermediate Objective: **Stimulability:**
Colton will imitate the consonant sounds of English in isolation with at least 80% accuracy (# of consonants imitated correctly/23).

Intermediate Objective: **Phonologic Awareness/Maximal Contrasts:**
Colton will segment 3-5 phoneme words into phonemic segments 6/8 trials with a model.
Intermediate Objective: Phonologic Awareness/ Maximal Contrasts: Colton will imitate 8/10 high contrast word pairs containing target phonemes correctly. Target phonemes include: [g, k, s, z, ʃ, ʧ, ʤ, ʒ, r, l, θ, ð] (May add an objective for independent use of targets in contrast pairs)

Intermediate Objective: Meaningful Use of Targets in High Frequency Words: Colton will use target phonemes in high frequency words in formulaic sentences 8/10 trials correctly independently. Target phonemes include: [g, k, s, z, ʃ, ʧ, ʤ, ʒ, r, l, θ, ð]

Data Collection - Keeping things in perspective

Keeping data in perspective
Collect data on the “little things” (discrete skills)
- during Phoneme Inventory
- during Say-It-and-Move-It
- during single-word pair practice

Take the “big look” when collecting data

Let data drive therapy decisions, *not* therapy momentum

Who is a candidate for this type of therapy?
- Children with unintelligible speech, multiple speech sound errors and/or severe apraxia
  - Trial therapy is essential to differential diagnosis of apraxia vs. phonological disorders
- Children with substitutions
- Children with deletions - *Deletions should be addressed early*
- Children with both phonological and cognitive disabilities
Remember that the cascade starts in the heights!
To achieve system-wide improvement, use the productive phonologic knowledge approach - aim high!

References


References

Downloaded From: http://jslhr.pubs.asha.org/ by a ReadCube User on 04/06/2016
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