If you are viewing this course as a recorded course after the live webinar, you can use the scroll bar at the bottom of the player window to pause and navigate the course.

This handout is for reference only. It may not include content identical to the powerpoint. Any links included in the handout are current at the time of the live webinar, but are subject to change and may not be current at a later date..
Sound Judgment: Using Effective Speech Therapy Techniques and Motor Learning Principles for Speech Sound Disorders with or without Related Structural Anomalies, presented in partnership with Cincinnati Children's

Presenter: Ann W. Kummer, PhD, CCC-SLP, ASHA Fellow

Moderated by: Amy Hansen, M.A., CCC-SLP, Managing Editor, SpeechPathology.com

SpeechPathology.com Expert eSeminar

Need assistance or technical support during event?
Please contact SpeechPathology.com at 800-242-5183
Earning CEUs

- Log in to your account and go to Pending Courses under the CEU Courses tab.
- Must pass 10-question multiple-choice exam with a score of 80% or higher
- Two opportunities to pass the exam

Peer Review Process

Interested in Volunteering to be a Peer Reviewer?

APPLY TODAY!

3+ years SLP Professional Experience Required

Contact Amy Natho at anatho@speechpathology.com
Sound Judgment:

Using effective speech therapy techniques and motor learning principles for speech sound disorders, with or without related structural anomalies, presented in partnership with Cincinnati Children's

Ann W. Kummer, PhD, CCC-SLP, ASHA Fellow

Financial Disclosures

Royalties:


• *Oral and Nasal Listener* (ONL) from Super Duper Publications, Inc.

• US Patent on *Nasoscope*, Number: 6656128. Issue date: 12/2/03.
Non Financial Disclosures

• None

SOUND JUDGMENT: INTRODUCTION
Objectives

As a result of this course, participants will be able to:

• Describe how to use auditory, visual and tactile-kinesthetic cues to enhance the child’s awareness of the misarticulated sound versus the correct sound production.

• Explain how to apply effective speech therapy techniques for typical speech sound errors.

• Explain how to use motor learning and motor memory principles to achieve carryover soon after acquisition of the appropriate placement.

Course Outline

• Anatomical requirements for normal speech
• Effects of abnormal structure on speech sound production
• Enhancing speech sound awareness
• Speech therapy “cookbook”
• Achieving carry-over using motor learning principles
• Summary
Normal Speech Production

Most speech sounds are produced in the front of the mouth:

• Bilabial sounds - p, b, m, w
• Labiodental sounds - f, v
• Lingual-alveolar sounds - t, d, n, l, s, z
• Palatal sounds - ʃ, ʒ, ʧ, ʤ
Normal Speech Production

• The only speech sounds produced in the back of the mouth are velar sounds (k, g, ŋ)

Normal Speech Production

• The lips should:
  • Approximate at rest without effort
  • Bilabial competence is important for production of bilabial and labiodental sounds
Normal Speech Production

• The tongue tip should:
  • Rest under the alveolar ridge
  • Be able to move up and down, back and forth without interference
  • Tongue tip movement is important for production of lingual-alveolar and palatal sounds.

Normal Speech Production

• In an evaluation of speech sound production, the following should always be assessed:
  • Bilabial competence
  • Tongue tip to alveolar ridge relationship
Normal Speech Production

• What about the teeth?
• What if you don’t have any?

Sibilants or the “teeth sounds” (s, z, ñ, ʒ, ʧ, ʤ) are not actually produced by the teeth
• Teeth are NOT necessary for normal speech production
• Teeth are not necessary for speech, but can actually interfere with normal speech production
Science Experiment

- Produce an /s/ sound
- Note the airstream flowing between the tongue tip and alveolar ridge
- Open the jaws and produce an /s/ sound
- Why do we close our teeth to produce /s/?
- Answer: To raise the mandible so the tongue is positioned just under the alveolar ridge

Normal Speech Production

- Sibilants are actually produced by forcing airstream between the tip of the tongue and the alveolar ridge
- Labiodental and interdental sounds can be produced with the lip/tongue and gum ridge
Video 1: Edentulous Speech

EFFECTS OF ABNORMAL STRUCTURE ON SPEECH SOUND PRODUCTION
Structural Abnormalities

Can causing either:

- Obligatory distortions
  OR
- Compensatory errors

Obligatory Distortions

- Articulation placement is NORMAL, but the structural abnormality affects sound production
- Corrected by changing structure only
- Cannot be corrected with therapy
Compensatory Errors

• Articulation placement is altered due to structural abnormality
• Corrected by changing structure first... and then by changing function (articulation placement) through speech therapy

Structural Abnormalities that Affect (or Do Not Affect) Speech

• Dental malocclusion
• Ankyloglossia- actually not a cause
• Velopharyngeal insufficiency/incompetence (VPI)
Dental Malocclusion

- The tongue rests in the mandible
- Wherever the mandible goes, so goes the tongue
- Biggest concern about malocclusion: It affects the position of the tongue tip relative to that alveolar ridge!
Class II Malocclusion

- If the mandible is in a posterior position relative to the maxilla (Class II malocclusion)—the tongue will be posterior to the alveolar ridge.

Class II Malocclusion

- Bilabial competence is compromised.
- Tongue tip is under the palate instead of the alveolar ridge.
Video 2: Class II Malocclusion

Class III Malocclusion

• If the mandible is in an anterior position relative to the maxilla (Class III malocclusion)— the tongue will be anterior to the alveolar ridge
Class III Malocclusion

- Bottom lip cannot articulate against the top lip or maxillary teeth
- Tongue tip is anterior to the alveolar ridge and maxillary teeth

Video 3: Class III Malocclusion
Video 4: Class III Malocclusion

Anterior Crossbite

• An anterior crossbite is when the maxillary incisors are inside the mandibular incisors
• Can occur with or without a Class III skeletal malocclusion
Video 5: Anterior Crossbite

Video 6: Anterior Crossbite
Ankyloglossia and Speech

Ankyloglossia ("Tongue Tie")

- Ankyloglossia is a congenital condition where the lingual frenulum is either abnormally short or has an anterior attachment near the tongue tip
Ankyloglossia: Functional Characteristics

• Patient cannot touch roof of mouth with tongue tip when the mouth is open

• Patient cannot protrude tongue past the mandibular incisors (or the lower gingiva)
Ankyloglossia and Speech

Common sense approach:
• The sound that requires the most elevation is /l/
• The sounds that require the most protrusion are /θ/ and /ð/
• These sounds can be produced with significant tongue tip restriction


Video 7: Ankyloglossia
Ankyloglossia and Speech

Common sense approach:
- Ankyloglossia is unlikely to affect the production of English sounds
- Ankyloglossia may affect the lingual trill sounds (i.e., the Spanish /r/)

Velopharyngeal Insufficiency (VPI) and Velopharyngeal Incompetence (VPI)
Effects of VPI on Resonance

• VPI causes hypernasality, which is a resonance disorder
• Hypernasality affects the quality of vowels and voiced consonants
• It does not affect articulation and therefore, hypernasality cannot be corrected with speech therapy

Effects of VPI on Speech

• VPI causes nasal emission on pressure sounds, which can affect production of plosives, fricatives, and affricates
• Due to the lack of oral airflow, the child may develop compensatory articulation substitutions
Compensatory Errors Due to VPI

• Most common compensatory articulation productions for VPI are:
  • Glottal stops substituted for plosives
  • Pharyngeal fricatives substituted for fricatives/affricates

Glottal Stop

• Produced by closing the vocal cords and then opening suddenly
• Can be co-articulated with oral placement
• Often used as place markers for “omissions”
**Pharyngeal Fricative**

- Air is forced through a narrow opening between the tongue base and/or velum and the pharyngeal wall
- Will result in phoneme-specific nasal emission (PSNE)
- May seem like there is VPI, but it is an articulation disorder instead

**Speech Therapy and VPI**

- Speech therapy IS appropriate for correction of compensatory articulation errors, preferably AFTER correction of the structure
- Pharyngeal fricative will cause nasal emission, even after VPI surgery
- Work on correction placement... NOT on airflow
Speech Therapy and VPI

• Speech therapy is NEVER appropriate for obligatory distortions (which occur with normal placement), including:
  • Distortion due to interference of the teeth
  • Hypernasality and/or nasal emission due to VPI but normal placement

ENHANCING SPEECH SOUND AWARENESS
Enhancing Awareness

• Use sensory cues to contrast the difference between the error sound and the correct sound
  • Visual cues
  • Tactile-kinesthetic cues
  • Auditory cues

Enhancing Awareness: Glottal Stops Example

[Diagram of vocal structures with labeled parts such as 'Vocal cord' and 'Soft palate']
Enhancing Awareness: Glottal Stops

Visual cues:

- Have the child watch your neck during correct and incorrect production
- Have the child watch his own neck in a mirror when:
  - producing syllables in which he does not use a glottal stop (i.e., ma)
  - producing syllables in which he does use a glottal stop (i.e., ba)

Tactile-kinesthetic cues

- Have the child feel your neck during correct and incorrect production
- Have the child feel his own neck in a mirror when:
  - producing syllables in which he does not use a glottal stop (i.e., ma)
  - producing syllables in which he does not use a glottal stop (i.e., ba)
Enhancing Awareness: Glottal Stops

Auditory cues

• Have the child listen to your productions of the correct and incorrect productions.
• Reverse roles: Have the child be the “teacher” and you be the “kid”

Auditory Awareness: Oral & Nasal Listener*

* Super Duper Publications- 2007
Auditory Awareness: Oral & Nasal Listener*

SPEECH THERAPY “COOKBOOK”
Therapy for Placement Errors

- Glottal stop
- /l/
- /k/ and /g/
- /ɚ/ and /r/
- Affricates: /tʃ/ and /dʒ/
- Lateral lisp
- Pharyngeal fricative
- Blends


Therapy for Glottal Stop

- Produce an isolated voiceless plosive (i.e., /p/)
- Produce the voiceless plosive and then the vowel, preceded by an /h/ (i.e., /p... ha/
- Produce the voiced plosive cognate (i.e., /b/) with a “whisper” and slowly transition to the /h/ and then the vowel (i.e., /b...ha/
- Do the same for the other voiceless/voiced plosives
Therapy /l/

- w/l is easy
- Place hands on the face and tell the child not to move the face during production to eliminate the lip movement.

Therapy /l/

- η/l is hard
- The child can co-articulate the alveolar (tongue tip) and velar placements, so it looks like placement is correct when it’s not.
Therapy /l/

- Begin with a big yawn to raise the velum up and bring the back of the tongue down
- Make the child aware of the open stretch in the back of the mouth
- Co-articulate the /l/ with a big yawn
- Gradually decrease the size of the yawn

Therapy /l/

- For feedback, use a listening tube or the ONL with the tube in the nose
- If sound is heard through the tube, the /ŋ/ (nasal sound) is still there
Video 8: Yawn Technique for /l/
Therapy for /k/ and /g/

If the child can’t produce an /ŋ/...

• Put a tongue blade on the middle of the tongue and push down and back
  
  OR

• Firmly press your thumb under the base of the child’s chin to push the back of the tongue up

Therapy for /k/ and /g/

• Have child take a breath, place his tongue in an /ŋ/ position, and drop the tongue to produce a /g/  
• If necessary, pinch his nose closed and then have him drop the tongue  
  • This will turn it into a /g/ with normal oral airflow  
• Have the child whisper the /g/ sound to achieve the /k/
Video 9:
Therapy for /k/ and /g/

Therapy for /ɬ/ and /r/
Science Experiment

• Prolong an /ə/ and feel where your tongue articulates under your molars on each side
• While prolonging an /ə/, move your tongue tip up and down
• Conclusion: /ə/ is produced in the back of the mouth; the tongue tip placement doesn’t matter
• Posterior sides of back of tongue articulate under maxillary molars

Therapy for /ə/ and /r/

• /ə/ is a continuant
• /r/ is a movement sound that begins with /ə/
• Slowly produce the syllable /ra/
• Therefore, always start with /ə/
Video 10: Therapy for /ə/  

Therapy for /ə/  

- With a tongue blade, stimulate both sides of the back of the tongue and then the upper gum ridge under the molars
Therapy for /ɑː/

• Show the child how the tongue forms the shape of a “boat”
• Ask the child to make a wide smile while “backing up the boat”

Therapy for /ə/  

• To help elevate the back of the tongue, push up against the base of the chin with your finger  
• Make sure it feels loose so you can push
Therapy for /ə/

- Assist placement by squeezing the cheeks with your thumb and forefinger to get lip rounding
- Use your middle finger to push up the back of the tongue

Video 11: Therapy for /ə/
Therapy for /ə/:

- Once final /ə/ is achieved, work on initial /r/ by showing the forward movement of the tongue with your hand.
- If the child goes to a /w/, have him hold his hands on his face and tell him not to allow the face to move while going from /ə/ to /r/.
Therapy for Affricates: /ʧ/ and /ʤ/

- Reminder: Affricates are a combination of a plosive and a fricative:
  - ʧ = t + ʃ
  - ʤ = d + ʒ

- Make sure the child can produce the individual components of the affricates first:
  - Plosives: t/d
  - Affricates: ʃ/ʒ
- Have the child produce the plosive component with the teeth closed and lips rounded, which will result in the affricate
Lateral Lisp

- A lateral lisp is caused by interference of the anterior airflow during sibilant production
- Interference can be caused by:
  - Abnormal position of the teeth (obligatory distortion)
  - Abnormal placement of the tongue tip or dorsum of the tongue (articulation error)

Science Experiment

- Hold your tongue on your alveolar ridge while you prolong an /s/ sound
- Produce a /t/ sound but don’t drop your tongue during the airflow release
- Both of these will cause a lateral lisp
Lateral Lisp

• To determine if the airflow is central or lateral, put a straw in front of the teeth and then to the sides during the production of the /s/

Lateral Lisp

• If normal, air through straw will be heard when it is in front of the central incisors
• If lateral, air through straw will be heard somewhere on the side of the dental arch
Pharyngeal Fricative

- Pharyngeal fricative is a common compensatory production for kids with VPI
- This placement will persist after surgical correction.
- A pharyngeal fricative substitution can also be found in children with NO history of cleft or VPI

Pharyngeal Fricative

- Because the pharyngeal fricative uses airflow in the pharynx, it causes phoneme-specific nasal emission (PSNE)
- It sounds like VPI but it’s not.
Therapy for a Lateral or Pharyngeal Fricative

- The technique for correction is exactly the same
- The beginning incorrect placement (whether in the pharynx or the oral cavity) is irrelevant
- The goal of therapy for both is to achieve normal placement and anterior airflow in the oral cavity

Therapy for a Lateral or Pharyngeal Fricative

- Have the child produce a /t/ sound
- Provide auditory and tactile feedback of the anterior airflow:
  - Have the child put his hand in front of his mouth and feel the airstream during production
  - Have the child put a straw in front of his teeth and push the air into the straw during production
Therapy for a Lateral or Pharyngeal Fricative

- Have produce the /t/ with the teeth closed
- Have the child prolong the production until it becomes /tssss/ with air going through the straw
- Transition to the syllable by inserting an /h/ between the /s/ and vowel
- Use this technique for /ʃ/ if needed
- Note: /h/ is a good transition sound between corrected sounds and the vowel

Video 13: Therapy for a Lateral or Pharyngeal Fricative
Video 14: Therapy for a Lateral or Pharyngeal Fricative

• Insertion of /h/ for transition from consonant to the vowel
Video 16: Therapy for a Lateral or Pharyngeal Fricative

• Feedback using a straw

Video 17: Therapy for a Lateral or Pharyngeal Fricative

• Feedback using a straw or a listening tube
Video 18: Therapy for a Lateral or Pharyngeal Fricative

- Correcting placement eliminates the phoneme-specific nasal emission (PSNE)

Blends

- It’s important to divide the consonants into individual components and then blend them together slowly
/l/ Blends

• Plosives + /l/: Add the /ah/ vowel as a transition
  • Play = pa... lay
  • Blue = ba... lu
  • Clay = ca... lay
  • Clue = ca... lue

• Fricative + /l/: Prolong the fricative and then produce the /l/ with the rest of the word
  • flew = fff... lu
  • slay = sss... lay
/s/ Blends

- When /s/ is followed by the letters “p,” “t,” or “k,” these sounds are actually voiced.
- Therefore, /s/ blends with a plosive should be divided as follows:
  - spell = s... bell
  - stop = s... dop
  - skate = s... gate

/r/ Blends

- Have the child produce the sound before the “r” in a syllable with the vocalic /ɚ/
  - Tree = ter... ee
  - Fry = fer... y
Priorities

Considerations in determining phoneme priorities:

• Stimulability
• Intelligibility
• Continuants
• Placement of production
• Word position
Stimulability

- Determine the sound(s) with good stimulability
- Start out with the easiest sounds for quick success

Intelligibility

- Choose the sound(s) which will have the greatest impact on intelligibility (i.e., /s/ before /f/)
Continuants

• When working on placement, always start with a continuant (which you can hold), if possible
• Examples include:
  • Bilabials: /m/
  • Lingual-alveolars: /n/
  • Velars: /ŋ/

Place of Production

• Start with anterior sounds before posterior sounds
• Examples: bilabials and lingual-alveolars before velars
Word Position

• Start with CV productions, and then the initial position before the medial or final position
• The exception is “r”
  • Final /ə-/ should be corrected before the initial or medial /r/)

Oral-Motor Exercises

• “Exercises” do not work!!!
• There is NO evidence that exercises help with speech sound disorders
• Strengthening muscles doesn’t even make sense

Motor Learning & Motor Memory

• Speech requires motor movement that is *fast*, *complex*, *automatic* and *effortless*

• This is accomplished by *motor learning* and *motor memory*

Motor Learning

**Motor learning:** Acquisition of new motor skills in order to execute complex motor movements and sequences

Motor learning is dependent on:
- Instructions
- Trial and error
- Feedback

Motor Learning

- Results in the development, change or refinement of a motor program (i.e., change in production of a speech sound)
- This is what occurs in speech therapy when the SLP teaches placement and provides feedback
Motor Memory

- **Motor memory**: Develops automaticity of the newly learned motor movement
- Is dependent on constant repetition (e.g., PRACTICE!)

Practice

- Results in brain reorganization due to neural plasticity
- Allows movement to be done without conscious thought
- Results in “carry-over” into connected speech
Practice

• Practice is necessary for all types of motor learning

• Examples:
  • Ballroom dancing
  • Sports
  • Playing a musical instrument
  • Speech


Practice Dose

• **Dose:** Number of correct responses in a practice session (in therapy or at home)

• Higher dose per practice session is directly related to the rate of progress

Practice in Therapy

• Use tokens and work quickly
• DRILL to increase the dose

Practice in Therapy

Procedure
• Hold the token by the side of your mouth
  • This brings the child’s attention to your face
• Have the child imitate a sound or word
• Put the token in the container quickly and say “Good talking” or something similar
• Work fast to get as many tokens as possible
Practice Distribution

- Distributed practice (practice throughout the week) facilitates both short-term performance and long-term learning
- Home practice is ESSENTIAL!

Practice at Home

- Speech therapy is like taking piano lessons—if you don’t practice at home, you don’t learn to play the piano!
Practice at Home

• Need to train the parents/family members to work with the patient at home

Practice at Home

• Frequent short practice sessions throughout the day and week are better than a few long sessions
• A 30 second practice session counts
Practice at Home

- Practice throughout the day (i.e., while doing daily chores, just before dinner, during a bath)
- Have practice material in the car and on the iPad.
- Have the child sing with favorite songs using the target sound and a vowel.
- Incorporate practice into homework. Have the child read out loud.

| Practice Log Start Date: ____________ |

Practice between sessions will greatly increase your child’s success in speech therapy. It is better to practice several times each a day, than to practice a long time once a day. A practice session can be as short as 30 seconds.

<table>
<thead>
<tr>
<th></th>
<th>Mon</th>
<th>Tues</th>
<th>Wed</th>
<th>Thurs</th>
<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Child’s Name: ____________________
Summary: What to Do

- Increase sensory awareness of correct versus incorrect sound production
- Use appropriate placement techniques
- Incorporate daily practice and drill work for motor memory and carry-over
Summary: What NOT to do

• Do not work on obligatory distortions due to abnormal structure
• Do not use oral-motor “exercises” or blowing and sucking

Goal of Treatment

• Normal speech production in connected speech
Handouts

www.cincinnatichildrens.org/speech
For Healthcare Professionals
Lecture Notes

Expand your Expertise with “Speech Tools”

“Speech Tools” will be delivered to you monthly from the speech-language pathology experts at Cincinnati Children's.

Sign up below:
https://www.cincinnatichildrens.org/service/s/speech/hcp/newsletter
QUESTIONS?

Thanks for your interest!