Thinking Developmentally as It Relates to Articulation/Phonology

Why is this important?

Many clinical questions can be answered easily by taking a developmental perspective
Articulation and Phonology: There is a difference!

• **Articulation disorder** – the client knows the language has certain sounds but is unable to produce these sounds
  • Trouble with individual sounds and consonant clusters
  • Motor problems; trouble with timing and coordination

• **Phonological disorder** – the client has problems with speech because he lacks a certain knowledge about the language
  • Trouble with sound classes (e.g. fricatives or bilabials) or linguistic constraints (e.g. final consonants in syllables)
  • Speech is usually unintelligible
  • More prevalent in younger clients
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<thead>
<tr>
<th>Process by Age</th>
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Taken from Bernthal, Bankson & Flipsen, 2013)
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</table>

The data source for these norms are Prather, Hedrick, and Kern (1975); Sander (1972); and Smit, Hand, Freilinger, Bernthal, and Byrd (1990).
A child is referred to you by his preschool teacher. This child, Damien, was reportedly assessed by a speech language pathologist who recommended that Damien receive intervention before kindergarten. According to the report from the previous clinician, Damien uses the phonological processes of gliding, consonant cluster reduction, stopping, reduplication, and final consonant deletion. Your assessment confirms the presence of these phonological processes. You would begin treatment by addressing:

a. final consonant deletion
b. gliding
c. consonant cluster reduction
d. reduplication
e. stopping

ANSWER IS D
Classification Schemata of Consonants (and Vowels)

Why is this important?

Knowing where and how phonemes are produced Helps determine the type of problem or Characteristics of the client’s speech.
IT’S GOSSIP TIME!
PHONETICS – Please REVIEW

CONSONANTS
- P
  • Place
- M
  • Manner
- V
  • Voicing
    • Cognate pairs

VOWELS
- H
  • tongue Height
- A
  • tongue Advancement
- L
  • Lip configuration
- T
  • Tense/lax vocal folds
CONSONANT CLASSIFICATION CHART

• Traditional Classification – categorizes consonants in terms of 3 parameters - *Place, Manner & Voice Approach*

• Distinctive Feature Approach – created by linguists to describe the languages of the world. Each phoneme is described according to a cluster of features that are either present (+) or absent (+) in that phoneme
### Table 3

**Consonants of American English**

<table>
<thead>
<tr>
<th>Manner of Production</th>
<th>Bilabial</th>
<th>Labiodental</th>
<th>Interdental</th>
<th>Alveolar</th>
<th>Postalveolar</th>
<th>Palatal</th>
<th>Velar</th>
<th>Glottal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop</td>
<td>p b</td>
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<td>t d</td>
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<td>jη</td>
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<td>Fricative</td>
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<td>Affricate</td>
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<td>tʃ dʒ</td>
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<td>Liquid</td>
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</tbody>
</table>

### Table 3

**Sound Classes in Addition to Place, Manner, and Voicing**

<table>
<thead>
<tr>
<th>Sound Class</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approximate</td>
<td>Glides and liquids</td>
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<tr>
<td>Labial</td>
<td>Bilabial and labiodental consonants</td>
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<tr>
<td>Obstruent</td>
<td>Oral stops, fricatives, and affricates</td>
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<tr>
<td>Sibilant</td>
<td>Alveolar and postalveolar fricatives and affricates</td>
</tr>
<tr>
<td>Sonorant</td>
<td>Nasals, liquids, and glides</td>
</tr>
<tr>
<td>Strident</td>
<td>Labiodental, alveolar, and postalveolar fricatives and affricates</td>
</tr>
</tbody>
</table>
Manner of articulation refers to how the sound is produced and the way in which the airstream is modified as it passes through the vocal tract. Choose one of the buttons in the second row to see the list of sounds for that category.

https://soundsofspeech.uiowa.edu/main/english
Describing Consonants

- Voicing
- Place of articulation
- Manner of articulation

Let's talk about each of these in turn.

http://www.youtube.com/watch?v=dfoRdKuPF9I
Outline

I. Traditional Approach
   A. Vowels
      1. Tongue Height
      2. Tongue Advancement
      3. Lip Configuration
      4. Muscular Tension
   B. Consonants
      1. Place
      2. Manner
      3. Voicing

II. Distinctive features
The Consonants Carry the Load!

**Ys Lrd**

- **Consonants**
  - **Place**
    - Where the phoneme is produced
  - **Manner**
    - How the phoneme is produced
  - **Voicing**
    - Are the vocal folds vibrating?
Consonants

Place
- Where the phoneme is produced
  - Bilabial & Labiodental
  - Lingua-dental & Alveolar
  - Palatal & Velar
  - Glottal

Manner
- How the phoneme is produced
  - Plosives, Nasals
  - Fricatives
  - Affricates
  - Liquids and Glides

Voicing
- Are the vocal folds vibrating?
  - Voiced
  - Voiceless
PLACE
Bilabials

• Three of them - /p, b, m/
• Mutual contact of the upper and lower lips
• A cognate pair and a nasal
• The /w/ can be considered a bilabial but it is produced by rounding the lips
  • Classified as a bilabial or velar
Labiodental

• Two of them - /f, v/
• Formed by placing the lower edge of the upper incisors (teeth) on the upper portion of the lower lip
• A cognate pair
Linguadentals

- Two of them - /ð, θ/
  - Eth and Theta

- AKA interdentals

- Made by protruding the tip of the tongue slightly between the cutting edge of the upper and lower teeth

- A cognate pair
Alveolars

• Six of them - /t,d,s,z,l,n/
• Produced by the tongue tip approximating the alveolar ridge
• Two cognate pairs
Palatals

- Six of them - /ʒ, ʃ, tʃ, ʒ, j, r/
- /ʒ/ Yogh or Ezh
  - /ʒ/ Eshe
  - /j/ Lower case j
  - t-eshe ligature; d-yogh ligature
- Placement of the tongue blade against the hard palate forms the point of constriction
- Point of contact is just posterior to the alveolar ridge
- Two cognate pairs
Velars

- Three of them - /k, g, ɳ/
  - Eng
- Made by elevation of the tongue dorsum against the soft palate (velum)
- One cognate pair
Glottals

- Two of them - /h, ?/
  - The glottal stop
- Sounds made at the level of the glottis
- The /h/ is the only sound that has a phonemic property (related to meaning)
- The glottal stop is an allophone
  - Cotton produced with the /t/ or /?/ still have the same meaning
MANNERS
Stops (Plosives)

- 6 of them: /b/, /p/, /d/, /t/, /g/, and /k/
  - glottal stop /ʔ/
- formed by a complete closure of the vocal tract, so that air flow ceases temporarily and air pressure builds up behind a point of closure
- Cognate pairs
Fricatives

- Nine of them - /f,v,s,z,ʃ,ʒ,θ,ð,h/
- Think about friction
- Hissing-like or turbulent quality that results from the continuous forcing of air through a narrow constriction
- Cognate pairs
Affricates

- Two of them - /tʃ,dʒ/
- Consist of a stop and fricative component
- A combination of stop closure and a fricative segment, with the frication noise closely following the stop portion
- A cognate pair
Nasals

• Three of them - /m, n, η/
• Produced by lowering the velum so that the velopharyngeal port is opened; allows air vibrated by the vocal cords to enter the nasal cavity
• Oral tract completely closed
• No cognate pairs
Liquids

• Two of them- /l,r/
  • Lateral - /l/
    • Air directed through the sides of the tongue
  • Rhotic - /r/
    • Produced several ways:
      1. Curling the tongue tip back slightly so that it approximates the alveolar ridge or palatal region
      2. Bunching or humping the tongue to the palatal area
    • Produced with a vocal tract that is obstructed only slightly more than vowels
• No cognate pairs
Glides

• AKA semivowels
• 2 of them; /w, j/
• Produced by a quick transitioning of the articulators as they move from a partly constricted state to a more open state
• Formed by a relatively unrestricted and transitory point of constriction
• No Cognate pairs
http://www.youtube.com/watch?v=dfoRdKuPF9I Adapted from Small,
You are working as a clinician in a private clinic. A father brings his son **Johnny, age 4 ½ years old**, for an evaluation. According to his father, Johnny is “hard to understand and sometimes the kids at preschool make fun of him.” The pediatrician has told Johnny’s father that Johnny will “outgrow this speech problem on his own,” but the father wants to make sure that this advice is correct. Johnny will be starting kindergarten in 6 months, when he turns 5 years of age, and his father wants to be sure that Johnny speaks as intelligibly as possible so that he will not be teased in elementary school. When you evaluate Johnny, you find that he has th/s, t/f, w/r, d/ch, and j/l substitutions. You decide to place him into therapy. You begin therapy by addressing:

a. th/s substitution  
b. t/f substitution  
c. w/r substitution  
d. d/ch substitution  
e. j/l substitution

**ANSWER IS ‘B’**
Organically Based Disorders Associated With Articulation

Oral structure variables
- Ankyloglossia
- Dental Deviation
- Orofacial Myofunctional Disorders

Neuropathologies
- Dysarthria (caused by peripheral or CNS Damage; Paralysis, Weakness or Incoordination of speech)
- Apraxia (caused by CNS damage; No weakness or paralysis of muscles)
Organically Based Disorders

- Hearing loss
- Oral structure variables
  - Ankyloglossia (tongue tie)
    - Research indicates little effect on articulation
  - Dental Deviations
    - Children with malocclusions have a misalignment of the mandible and maxilla
  - Orafacial myofunctional disorders (tongue thrust)
    - Causes errors in /s, z/, /esh, ezh/, /ch/, and /j/
    - Causes errors in tip dental sounds /t, d, l, n/
ORGANICALLY BASED DISORDERS: DYSARTHRIA & APRAXIA

- R
  - Respiration
- A
  - Articulation
- P
  - Prosody
- P
  - Phonation
- R
  - Resonance
DYSARTHRIA VS APRAXIA

**Dysarthria**

- **R**
  - **Respiration**
    - Air supply necessary for vocal fold vibration
- **A**
  - **Articulation**
    - Movement of the speech mechanism
- **P**
  - **Prosody**
    - Variations in rate, pitch, loudness, stress, intonation, and rhythm
- **P**
  - **Phonation**
    - Vibration of vocal folds
- **R**
  - **Resonance**
    - Forced vibration of a structure that is related to the source of sound

**APraxia**

- **A**
  - **Articulation**
  - Movement of the speech mechanism
- **P**
  - **Prosody**
  - Variations in rate, pitch, loudness, stress, intonation, and rhythm
Organically Based Disorders

● Neuropathologies
  ○ Dysarthria
    ● Common articulatory patterns
      • Voicing errors occur; especially devoicing of voiced sounds
      • Bilabial and velar sounds are easier than:
        • Alveolar fricatives and affricates, labiodentals fricatives, and palatal liquids
      • Stops, glides, and nasals are easier than:
        • Fricatives, affricates, and liquids
      • Treatment is very repetitive and structured; involves increasing muscle tone and strength, increasing range and rate of motion (these affect intelligibility)
      • Treatment involves intensive and systemic drill, modeling, phonetic placement, and emphasis on accuracy
      • Compensatory strategies (prosthetic devices) are often used to assist with communication
  ● Apraxia
Organically Based Disorders

- Neuropathologies
  - Dysarthria
  - Apraxia

- Common characteristics:
  - Prolongation of speech sounds
  - Repetition of sounds syllables
  - Most difficulty with consonant clusters followed by fricatives, affricates, stops, and nasals
  - More frequent occurrence of omissions and substitutions
  - Voicing and devoicing errors
  - Difficulty with volitional, oral, non-speech movements
  - Treatment involves extensive drills, stressing sequences of movement involved in speech production, imitation, decreased rate of speech
  - Treatment should be intensive due to slow gains
Populations with Respiration, Resonance, Phonation or Articulation Difficulties

- Clients With Cerebral Palsy
- Children With Cleft Palate
- Clients With Hearing Impairments
Children with Cerebral Palsy

- Degree of neuromotor involvement has a direct bearing on the degree of communicative impairment
  - Various types of dysarthria
- Speech is characterized as jerky, effortful, labored, and irregular
- Monotone or monoloudness
- Slow diadochokinetic syllable rates
- Predominance of omissions over substitutions or distortions.
Children with Cerebral Palsy Cont.

- Difficulty phonating or prolonging sounds
- Significant difficulty with tongue tip sounds
  - Esp. with spastic or rigid CP
- Less articulate speech is connected productions than in single words
- Difficulty of sounds in word-final position
- Phonological processes such as:
  - Cluster reduction, stopping, depalatization, fronting, and gliding
Children with Cleft Palate

- Greater difficulty with voiced sounds than unvoiced sounds
- Difficulty with sounds that require a buildup of *intraoral pressure*
  - Results in weak production of fricatives, affricates, and stops (pressure consonants)
- Substitute nasal sounds for non-nasal sounds; added nasal resonance may be due to *velopharyngeal inadequacy*
- Audible or inaudible nasal emission while producing voiceless sounds
- Distortion of vowel sounds
Children with Cleft Palate Cont.

- May exhibit reduced speech intelligibility depending on the number and type of articulation errors
- May exhibit *compensatory errors*; sound substitutions made in an attempt to remedy inadequate closure of the VP mechanism
  - Substitutions of non-English sounds made with posterior movement of the tongue
  - Substitution of glottal stops for stop consonants
  - Substitution of velar fricatives for velar stops
Speech in Children with Hearing Loss

- Omit final consonants and consonant clusters
- Omit /s/ across word positions
- Omission of initial consonants
- Substitution of voiced for voiceless consonants
- Substitution of nasal for oral consonants
- Distortion of sounds, especially stops and fricatives
- Vowel substitutions
Speech in Children with Hearing Loss Cont.

- Vowel substitutions
- Imprecise production of vowels
- Increased duration of vowels
- Breathiness before production of vowels
- Addition of sounds, especially an intrusive schwa between consonants in blends
Effects of Hearing Loss on Articulation Development

- **Slight** (16-25 dB HL) - No noticeable difficulty in relatively quiet listening environments

- **Mild** (26-40 dB HL) - Occasional difficulty with voiceless consonants; vowels and voiced consonants generally intact

- **Moderate** (41-70 dB HL) - Some difficulty in consonant production with additional confusion of voiced/voiceless consonants and omission of consonant blends
Effects of Hearing Loss on Articulation Development

- **Severe** (71-90dB HL)- Significant difficulty in consonant production with additional confusion of voiced/voiceless consonants and omission of consonant blends

- **Profound** (91 dB HL or greater)- Global speech production impairment with the addition of neutralization (schwa), substitution, addition, and nasalization of vowels as well as he omission of initial consonants
Anatomy and Physiology

● **Respiration**
  ○ Consists of lungs, diaphragm, rib cage, airway, and other structures
  ○ Inhalation and exhalation are necessary components

● **Articulation**
  ○ Production of speech sounds

● **Phonation**
  ○ Air travels upward from the lungs through the airway
  ○ Vocal fold vibration create phonation

● **Resonation**
  ○ Air continues to travel upward past the level of the vocal folds
  ○ Resonating bodies modify sound produced by another source (e.g. vocal folds, mouth, nasal cavity)
Typical Articulation Development and Assessment

Why is this important?

Knowing developmental milestones help determine delay/deviance, type of assessment to administer and course of treatment
ASSESSMENT
(The HAND)

It's in your hands. You got this!

DEVELOPED BY IRIS JOHNSON ARNOLD
Scoring & Analyzing Assessment Data

Two Broad Categories

Independent Analysis

Relational Analysis
Articulation Development (0-12 months)

- Through babbling and vocalizations, infants practice the speech mechanism
- This babbling creates a loop between speech perception and speech production
- The infant learns a stock of sounds that can be used to make their first words.

Babbling creates a loop between speech perception and production.
Infant Development: Perception and Production

• PERCEPTION

• Research methods on infant perception:
  • High Amplitude Sucking
  • Visually Reinforced Head Turn

• Research reveals:
  • 4 – 17 week old infants can discriminate between the various vowels
  • 2-8 month old infants can discriminate between consonant + vowel /a/
  • Infants under 1 year of age are able to distinguish sounds that are not used in their language
Infant Development: Perception and Production

- **PRODUCTION**
- Structural differences (e.g. immaturity) constrains infant’s productions
- Vocalizations divided into two categories:
  - Reflexive vocalizations
    - Automatic responses; burping, crying, coughing and hiccups
  - Nonreflexive vocalizations
    - Voluntary productions; cooing, babbling and playful screaming
Infant Development:
Stages of Infant Vocal Development

- **Stage 1**: Phonation Stage (Birth to 1 month)
- **Stage 2**: Cooing and Gooing Stage (2 – 3 months)
- **Stage 3**: Exploration – Expansion Stage (4 – 6 months)
- **Stage 4**: Canonical or Reduplicated Babbling Stage (6 – 8 months)
- **Stage 5**: Variegated or Nonreduplicated Babbling Stage (8 Months – 1 year)
Infant Development:  
Stages of Infant Vocal Development

- **Stage 1:** Phonation Stage (Birth to 1 month)  
  - Crying, fussing, etc.  
  - Speech like sounds are rare  
  - Vocalizations resembling vowels occur; termed *quasi-resonant nuclei*  

- **Stage 2:** Cooing and Gooing Stage (2 – 3 months)  
  - Sounds are similar to back vowels and consonants (velars and uvulars); VC and CV  
  - Syllables sequences considered *primitive* because of the irregular timing of the segments
Infant Development: Stages of Infant Vocal Development

- **Stage 3: Exploration – Expansion Stage (4 – 6 months)**
  - Better control of laryngeal and articulation mechanisms
  - Squeals, growls, raspberries and friction noises
  - Vowels have better resonance; **fully resonant nuclei**
  - Marginal babbling appears

- **Stage 4: Canonical or Reduplicated Babbling Stage (6 – 8 months)**
  - Adult-like timing for closure and opening
  - Production repertoire may consist of stops, nasals, glides and a few lax vowels
  - [baba], [kaka], [dada] may resemble true word
  - No intention, not real word
Infant Development:
Stages of Infant Vocal Development

- **Stage 5**: Variegated or Nonreduplicated Babbling Stage (8 Months to 1 year)
  - Intonation patterns take on adult-like quality
  - Vowel and consonant repertoire increases
  - [madaga], [putika], and [tikadi]
- Sound classes produced:
  - Oral stops
  - Nasals
  - Glides
  - Occasionally a single fricative
Articulation Development
(Toddlers 12 – 24 months)

• Overlap of a few weeks to several months in the use of babbled and meaningful productions

• Protowords – babbling like sounds used meaningfully and consistently; absent of recognizable adult model
  • AKA – phonetically consistent forms, vocables, and quasi-words

• Sound classes produced:
  • Oral stops
  • Nasals
  • Glides
  • Occasionally a single fricative
Look at This Question:

Reduplicated babbling typically is well established by ________________?

a. 7 months
b. 2 months
c. 18 months
d. 12 months
e. none of the above

The answer is A
Assessing Toddlers Articulation Skills

• Produces so few sounds correctly
• **Independent analysis**
• Describe their capacity
• SLP uses phonetic inventory analysis
  • Show sounds the child produces
  • Not looking at correct production
The Toddler Becomes a Preschooler
Preschool Years (2 – 5 years old)

• Is able to produce numerous sounds

• Has difficulty with entire classes of sounds such as:
  • Glides
  • Velars

• Uses phonological processes such as:
  • Reduplication
  • Final Consonant Deletion
  • Cluster Reduction
Articulation Assessment
Preschool Years (2 – 5 years old)

• **Relational analysis**
  • Comparison to the adult model

• **Phonological Process analysis**
  • A relational analysis that describes the sound class errors
    • *Hodson Assessment of Phonological Patterns – 3 (HAPP-3)* by Hodson (2004)
    • *Bankson Bernthal Test of Phonology-2 (BBTOP-2)* by Bankson and Bernthal (1990)
Categories of Phonological Processes

- Omissions
- Assimilations
- Substitutions
Categories of Phonological Processes

- **Whole word processes**
  - Assimilation – results from modification of one phoneme to match the characteristics of a neighboring phoneme
  - Reduction – involves consonant or syllable deletion
  - Unstressed syllable deletion
  - Final consonant deletion
  - Reduplication
  - Consonant harmony
  - Consonant cluster simplification

- **Segment change processes**
  - Changes in specific segments or segment types occur regardless of syllable or word position
  - Velar fronting
  - Backing
  - Stopping
  - Gliding
Make a mental note…

- There are numerous ways of classifying phonological process
  - Omissions
    - Syllable reduction
    - Consonant cluster reduction
  - Assimilations
    - Nasal
    - Labial
    - Velar
  - Substitutions
    - Epenthesis
    - Stopping
    - Backing
    - Gliding
A child comes to you for an evaluation. According to her mother, Sharma has a history of middle ear infections. Sharma’s mother reports that Sharma is quite difficult to understand. For example, according to her mother, Sharma says things like /gʌk/ /dʌk/ and /koʊ/ /toʊ/. This child is manifesting the phonological process of:

a. Fronting  
b. Stridency deletion  
c. Backing  
d. Glottal replacement  
e. Progressive assimilation

c. The answer backing is correct. The /g/ and /k/ sound are made posterior or in the back.
Articulation Assessment Cont.  
Preschool Years (2 – 5 years old)

- Transcribe the entire word due to assimilations
- Use both standardized and nonstandardized assessments
- Compare to developmental age norms
- Compare to relative frequency of consonants
  - Think about the Wheel of Fortune
Articulation Assessment Cont. 
Preschool Years (2 – 5 years old)

• Intelligibility analysis of speech
  • How understandable is the child? 
  • Preschool Speech Intelligibility Measure (Wilcox & Morris, 1999)

• Severity analysis of speech
  • How disordered or deviant is the speech?
  • Percent Consonant Correct (PCC) (Shriberg & Kwiatkowski, 1982)

• Dialect comparison

• Analysis of better ability
  • Determines if the child has production capacity
    • **Stimulability
      • Refers to the child’s ability to imitate the clinician’s model. Researchers disagree about the prognostic value of stimulability.
    • Key words and key environments
The Preschooler Becomes a School Age Child

• Usually have mastered the sound classes
• May have difficulty with individual sounds
• May have difficulty with consonant clusters
• May have difficulty with unstressed syllables
Articulation Assessment
School Age Children

• Less motivation to transcribe entire word
• Standardized tests
• Intelligibility analysis
• Severity analysis
• Dialect analysis
• Production Capacity
  • Phonetic Placement and Shaping
Treatment Approaches and Techniques

Why is this important?

Knowing a variety of treatment approaches help provide individualized efficacious therapy
Treatment Considerations

• Most clinicians use a *multimodal approach* to treatment
  • Visual, auditory and kinesthetic

• Clinicians must decide between *training deep* or *training broad*
  • Deep – involves one or several sounds being treated intensively
  • Broad – treating several sounds simultaneously; practice is limited; child receives practice on a wide (broad) range of sounds

• The concept of *communication potency* looks at how functional words are within a child’s communication environment
Categorization Of Treatment Approaches

Motor Based
- Traditional Approach
- Multiple Phoneme Approach
- Sensory Motor Approach
- Paired Stimuli Approach

Cognitive-Linguistic
- Distinctive Feature
- Minimal Pair
- Cycles Approach

Phonological Awareness
- Metaphon Therapy
Underlying Principles to Treatment Approaches

• Motor Based Approach
  • **General Principle**: articulation errors are viewed as resulting from motor difficulties and faulty perceptual skills
    • Describes errors in terms of substitutions, distortions and omissions
    • Focuses on individual sounds

• Cognitive-Linguistic Approach
  • **General Principle**: primary goal is to establish phonological rules in a client’s repertoire
    • Focuses on relationship between individual sounds

• Phonological Awareness Approach
  • **General Principle**: primary goal is to heighten the client’s awareness and ability to manipulate and think about the structure of language and sounds
    • Focuses on increasing awareness of the sound structure of language; describing them as long vs short; front vs back
Motor Based Approaches (Phonetic)

• Traditional Approach (Van Riper)
  • Focused on phonetic placement, auditory discrimination/perceptual training and drill-like repetition

• Sensory Motor Approach (McDonald)
  • Advocates administering a deep test to determine difficulties/strengths with various phonetic environments
  • Principles of coarticulation are important

• Multiple Phoneme Approach
  • Emphasizes that all errors should be targeted in all sessions
  • Appropriate for children with six or more errors

• Paired Stimuli Approach
  • Based on operant reinforcement contingencies
  • Identified *key word* is used to teach the production of sounds in other contexts
Traditional Approach

Is composed of 5 major phases:
1. Sensory-perceptual or ear training
2. Production training for sound establishment
3. Production training for sound stabilization
4. Transfer and carryover training
5. Maintenance of the learned behaviors across time.
TRADITIONAL APPROACH: Sensory-Perceptual Training (Ear Training)

The essence of sensory-perceptual training is that through auditory stimulation practice, the client will become aware of his own sound errors. There are 4 phases to Sensory-Perceptual Training:
- Phase 1: Identification
- Phase 2: Isolation
- Phase 3: Stimulation
- Phase 4: Discrimination
Paired-Stimuli Approach

• This approach is highly structured and carefully sequenced to progress from words to sentences to conversation.
• This method depends on the identification of a key word to teach correct production of a target sound in other contexts.
• This program teaches one sound at a time, and is most suited for children who have sound distortions or a few articulation errors.
Levels of Paired-Stimuli Approach

• Step 1: Word Level
• Step 2: Sentence Level
• Step 3: Conversational Level
Step 1: Word Level

- Target sound selected for remediation
- Clinician must identify four key words
  2 containing target sound in initial position and 2 in the final position
- A keyword is when child can correctly produce target sound at least 9 out of 10 trials
- Training words is when the target sound is misarticulated. Target sound should only occur once in either the initial or final position.
Cognitive Linguistic Approaches

• Distinctive Features
  • Assumes that teaching a feature in the context of a few sounds will result in generalization production
    • Across that class of sounds

• Minimal Pair Contrast Approach
  • Uses pairs of words that differ by only one feature
  • Word pairs are used so the child learns *semantic* as well as *motoric* differences between the phonemes

• Phonological Process Approach
  • Cycles Approach (Hodson & Paden)
    • Designed to treat children with multiple misarticulations and highly unintelligible speech
    • Error patterns are targeted for remediation based on stimulability, intelligibility and percentage of occurrence (40% or greater)
Phonological Awareness Approach

- **Metaphon Therapy**
  - Grew out of the dissatisfaction of the minimal pair approach
  - Based on metalinguistic skills
  - It focuses on feature differences between sounds to help children develop an awareness that sounds can be classified by characteristics such as place (front-back), duration (long-short) and others.
Treatment Continuum

Establishment  Generalization  Maintenance
Treatment Continuum

• Three Stages/Phases of Instruction
  1. Establishment
     • Elicit target behaviors from a client and then stabilize such behaviors at a voluntary level
     • Establish phonologic contrasts
  2. Generalization
     • Designed to facilitate generalization of correct sound productions to sound contrasts, words and speaking situations that have not been specifically trained
       • Recall positional generalization, contextual generalization, linguistic unit generalization.....etc.
  3. Maintenance
     • Stabilize and facilitate retention
     • Frequency and duration of instruction may be reduced
       • Client could be encouraged to keep track of sound productions at a certain time in the day
Motor Learning Principles

• Traditional approach or motor based approaches primarily focus on the motor skills involved in producing target sounds; may target perceptual skills.

• Speech production is viewed as a learned motor skills
  • Remediation requires repetitive practice at increasingly complex motor & linguistic levels

• NOTE:
  1. Phonological errors can be modified in two ways (when viewed from the motor perspective)
  2. There are critical features in motor skill development
Motor Learning Principles: Modifying Phonological Errors

- Errors can be modified in two ways:
  - Movements may be taught to replace incorrect movements
  - Movements may be taught where they were formally absent
- Critical features in Motor Skill Development:
Modifying Phonological Errors

- Critical features in Motor Skill Development:
  - Cognitive analysis
    - The learner evaluates his or her anticipated performance mentally and then makes necessary adjustments
  - Practice
    - Practice should be in limited contexts until correct execution is achieved
  - Stages of motor skill development
    - Execution may be sluggish at first but gets better with time
  - Feedback
    - Sensory feedback (internal and external); as the skills improve — feedback is less important
      - very important in the early development of a skill
TEACHING SOUNDS

Establishment
(where we start)
Teaching Sounds: Establishment of Target Behaviors

- Clients who enter the treatment continuum at the establishment phase often include those who:
  1. Do not have a specific sound in their repertoire and are not stimulable
  2. Produce a sound in their repertoire but only in a limited number of phonetic contexts
  3. Do not perceive the sound in minimal pairs
  4. Produce a sound on demand but do not easily incorporate the sound into syllabic units
Teaching Sounds:
Establishment of Target Behaviors

• Two basic teaching strategies are used to establish target behaviors:

  1. Discrimination/Perceptual training prior to direct production training

  2. Initiating treatment with a Production focus (assuming that the client learns to discriminate)
Production Training

• Goal of production training—stabilized production of a sound

• Where to Begin?
  • Isolation-
  • Syllabes
    • When a sound is not in a client’s repertoire, begin on the isolation or syllabe level

• Some sounds (stops & glides) are not loners....
  • It is best to begin with CV contexts
Production Training

- Four methods used to establish the motoric production of a target sound:
  1. imitation
  2. Phonetic placement
  3. contextual utilization
  4. successive approximation
Production Training

• Four methods used to establish the motoric production of a target sound:
  – imitation
    • Use initially
    • Clinician instructs client to ‘look at mouth & listen; then child is asked to repeat
    • Clinician may wish to amplify the model with an auditory trainer
  – phonetic placement
Production Training

• Four methods used to establish the motoric production of a target sound:
  – imitation
  – phonetic placement

• When the client is unable to imitate a target sound, the clinician typically begins to cue or instruct the client regarding where to place his or her articulators to produce a particular sound

• Techniques include:
  • Mirror work
  • Drawings designed to show the position of the articulators
  • Use of tongue blades
Production Training

- Four methods used to establish the motoric production of a target sound:
  - successive approximation
    - Often viewed as an extension of phonetic placement; involves the shaping of a new sound from a sound that is already in a client’s repertoire.
    - Taking a behavior a client can perform and shaping that
    - Breaks down complex behavioral responses into a series of successive steps or approximations; shaping
  - contextual utilization
    - When the client can’t imitate, look for contexts in which facilitate production.
    - Utilize a particular phonetic context in which a client produced the sound correctly
Treatment Approaches – Linguistic Emphasis (Phonologically Based - Phonemic)

- Distinctive Feature Approach
- Minimal Pair Contrast Therapy
  - Multiple Oppositions Therapy
  - Minimal Oppositions Therapy
  - Metaphon Therapy
- Cycles Approach
Distinctive feature therapy focuses on elements of phonemes that are lacking in a child's repertoire (e.g., frication, nasality, voicing, and place of articulation) and is typically used for children who primarily substitute one sound for another.

Distinctive feature therapy uses targets (e.g., minimal pairs) that compare the phonetic elements/features of the target sound with those of its substitution or some other sound contrast.

Patterns of features can be identified and targeted; producing one target sound often generalizes to other sounds that share the targeted feature.

<table>
<thead>
<tr>
<th>Table 2: The Distinctive Feature Composition of Some English Segments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Syllabic</td>
</tr>
<tr>
<td>Contental</td>
</tr>
<tr>
<td>High</td>
</tr>
<tr>
<td>Low</td>
</tr>
<tr>
<td>Anterior</td>
</tr>
<tr>
<td>Coral</td>
</tr>
<tr>
<td>Round</td>
</tr>
<tr>
<td>Tense</td>
</tr>
<tr>
<td>Voice</td>
</tr>
<tr>
<td>Continuous</td>
</tr>
<tr>
<td>Nasal</td>
</tr>
<tr>
<td>Student</td>
</tr>
<tr>
<td>Lateral</td>
</tr>
</tbody>
</table>
### B. Chart of Feature Differences

<table>
<thead>
<tr>
<th>Sound</th>
<th>One Feature</th>
<th>Two Features</th>
<th>Three Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>p</td>
<td>b t k</td>
<td>d g f θ s j f m w h</td>
<td>v o z 3 d 3 n 1 r j</td>
</tr>
<tr>
<td>b</td>
<td>p d g m w</td>
<td>t k v o z 3 d 3 n v l r j</td>
<td>f θ s j f h</td>
</tr>
<tr>
<td>t</td>
<td>p d k s</td>
<td>b g f θ s j f n l r h</td>
<td>v o z 3 d 3 m v j w</td>
</tr>
<tr>
<td>d</td>
<td>b t g z n l r</td>
<td>p k v o s 3 d 3 m v j w</td>
<td>f θ s j f h</td>
</tr>
<tr>
<td>k</td>
<td>p t g</td>
<td>b d f θ s j f v h</td>
<td>v o z 3 d 5 m n 1 r j w</td>
</tr>
<tr>
<td>g</td>
<td>b d k o</td>
<td>p t v o z 3 d 3 m n l r j w</td>
<td>f θ s j f h</td>
</tr>
<tr>
<td>f</td>
<td>v θ s j</td>
<td>p t k o z 3 t h</td>
<td>b d g d 3 m n n 1 r j w</td>
</tr>
<tr>
<td>v</td>
<td>f o z 3</td>
<td>b d g θ s d 3 m n 1 r j w</td>
<td>p t k t h</td>
</tr>
</tbody>
</table>

**Distinctive Features**
THREE TYPES OF CONTRAST THERAPY APPROACHES

- A signature approach of linguistic-based remediation is contrast therapy, which employs pairs of words that differ only by a single phoneme (e.g., bat – pat, move – mood, sun – ton). The underlying concept of this type of therapy is that the client learns that different sounds signal different meanings in words.

- This approach simultaneously contrasts several target sounds with a comparison sound as opposed to the singular contrastive approach (i.e., including either minimal or maximal oppositions), which addresses sound errors or contrasts one at a time. The multiple oppositions approach is designed for children who have multiple sound errors, which usually result in severe to profound phonological impairments.
Different Kinds of Minimal Pairs

Minimal Oppositions Therapy

- The Minimal Pairs Approach is suitable for children with mild or moderate speech sound disorders, with one or two phonological processes that are no longer age-appropriate. It can also be used with people who are looking to modify their accent.

Maximal Oppositions (Complexity) Therapy (Geirut)

- The Maximal Pairs Approach is geared towards children with at least six sounds missing from their speech sound inventories with normal oral and speech motor abilities.

Multiple Oppositions Therapy

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Different Kinds of Minimal Pairs

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</tr>
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<td>• Minimal contrast approach the clinician might work on three separate minimal pair contrasts (i.e., bat – back; bat – batch; bat – bass).</td>
</tr>
</tbody>
</table>

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<th>Maximal Oppositions (Complexity) Therapy (Geirut)</th>
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<td>• Teach two new sounds that differed in place, manner, and voicing (maximal oppositions).</td>
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The cycles phonological pattern approach (also simply called the cycles approach; see Hodson and Paden, 1991)

- Represents another linguistic approach designed for children with multiple sound errors.
- This approach targets deficient phonological patterns for instruction, uses sounds to teach appropriate phonological patterns, and moves through these targets in a sequential manner that is not based on a criterion level of performance before moving onto another sound and/or pattern.
- The CPPA is designed to assist children in the acquisition of appropriate phonological patterns rather than focusing on helping children eliminate inappropriate patterns or deviations.
The Cycles Approach

• Each Treatment Session includes:
  1. Review
  2. Listening activity (with amplification)
  3. Target word cards
  4. Production Practice
  5. Stimulability probing
  6. Listening activity
  7. Phonological awareness activity*** (new)
  8. Home Program
Categorization Of Treatment Approaches

Motor Based
- Traditional Approach
- Multiple Phoneme Approach
- Sensory Motor Approach
- Paired Stimuli Approach

Cognitive-Linguistic
- Distinctive Feature
  - Minimal Pair
  - Cycles Approach

Phonological Awareness
- Metaphon Therapy
Metaphon Therapy

- **Metaphon therapy** is designed to teach *metaphonological awareness*—that is, the awareness of the phonological structure of language.
- This approach assumes that children with phonological disorders have failed to acquire the rules of the phonological system.
- The focus is on sound properties that need to be contrasted. For example, for problems with voicing, the concept of "noisy" (voiced) versus "quiet" (voiceless) is taught.
- Targets typically include processes that affect intelligibility, can be imitated, or are not seen in typically developing children of the same age (Dean, Howell, Waters, & Reid, 1995; Howell & Dean, 1994).

https://www.youtube.com/watch?v=jZdmgFEOtgc
Adults who Speak English as a Foreign Language (EFL)

Why is this important?

The U.S. is continually evolving and the SLP may be called upon to provide accent training.
Adults who Speak EFL

● Principles of Assessment
  ○ The client’s first language may impact English so greatly that their intelligibility is reduced.
  ○ These clients may wish to enhance their communication in English
  ○ Assessment procedures:
    ● Make a high quality recording of the client’s conversational speech and transcribe the recording thoroughly. Determine PCC and PVC.
    ● Have unfamiliar listener rate the percent of intelligible words.
    ● List the client’s speech sound errors completely, using a phonemic inventory for both consonants and vowels.
    ● Determine client’s speaking rate.
    ● Assess word-level and sentence level stress and prosody.
    ● Perform an oral peripheral examination.
  ○ Administer an instrument such as the Proficiency in Oral English Communication: An Assessment of Accented Speech (Sikorski, 1997)
Principles of Accent Training

1. The term accent training is the preferred term
2. Determine the factors which contribute most to reduced intelligibility.
   - E.g. – if the client’s speaking voice is too soft, target increasing the volume.
3. Select vowels and consonants the client rarely produces correctly in English and that contribute to reduced intelligibility.
   - E.g. – many Asian clients may have difficulty with the /r/ phoneme
4. Use culturally sensitive training activities
5. Encourage client to listen to English tv, radio or both
6. Treatment should be multimodal; use visual cues, tactile cues and auditory cues.
   - The use of a VisiPitch is helpful because of the visual and auditory feedback.
STRATEGY QUESTION 3

The question posed relates to working with an English as a Foreign Language Client (client’s name--Dr. Kim Lee)...The answer choices are:

a. give Dr. Lee standardized language and articulation tests in English because it is clear that Dr. Lee has a communication disorder that needs to be remediated, and these tests will spotlight Dr. Lee’s weaknesses.

b. tell Dr. Lee that her accent makes her special, and that no accent training is necessary because Dr. Lee’s accent is “a unique and beautiful part of who you are.”

c. tell Dr. Lee that you will assess her English intelligibility using an accent assessment instrument as well as analysis of a conversational sample; if she would like to participate in elective accent training to become more intelligible, such training is available to her.

d. tell Dr. Lee to listen to more English tv and radio, and come back in 6 months if her {student} evaluations have not improved.

e. tell Dr. Lee that she has a communication disorder in both Korean and English, and that she will need intensive therapy to remediate this disorder.
During your down time, simply memorizing the consonant/vowel classifications and the phonological process terms will prove very beneficial. TRUST ME!