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# **Instructor's Manual and Test Bank**

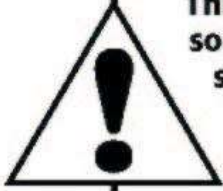
*For*

## **Articulation and Phonology in Speech Sound Disorders: A Clinical Focus**

**Sixth Edition**

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Boston Columbus Indianapolis New York San Francisco Hoboken  
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# Chapter 1

## Clinical Framework:

### Basic Terms and Concepts

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#### LEARNING OBJECTIVES

When you have finished this chapter, you should be able to:

- Define communication, speech, and language.
  - Define disorders of communication, speech, and language.
  - Distinguish between articulation and speech sounds (phones), phonology, and phonemes.
  - Define speech sound disorder and understand its relationship to articulation and phonological disorders.
  - Classify speech sound disorders according to specific parameters.
- 

#### CHAPTER OVERVIEW

This chapter introduced the reader to several fundamental terms that are important when assessing and treating speech sound disorders. Introductory terms such as communication, speech, and language were defined based on their normal processes and what a disorder of each would entail.

Language divisions of phonology, morphology, syntax, semantics, and pragmatics provided a further delineation which could aid the reader in understanding these basic concepts. Speech sound form versus linguistic function were used to distinguish between the speech sound and the phoneme. Also new to this chapter is the definition of Speech Sound Disorders (ASHA practice portal, n.d. American Speech-Language-Hearing Association).

Based on this definition, a differentiation between speech sound, articulation, and phonological disorders were presented as well as nomenclature that is widely used in clinic and research relative to these terms.

New to this chapter are two ways that speech sound disorders can be classified. The first is based on subtypes and etiological factors (Shriberg et al., 2010) and the second is a differential diagnosis system which was proposed by Dodd (1995, 2005). Both of these systems were examined, their clinical applicability discussed.

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## PRESENTATION OUTLINES

1. Review basic terms and concepts, such as communication, language, and speech. These terms were defined according to their professional usage, for example, as referenced by the American Speech-Language-Hearing Association (n.d.), and their practical application.
2. Examine the subdivisions of language: phonology, morphology, syntax, semantics, and pragmatics. Definitions were given as well as the application of these terms to the specific areas of language.
3. Define the broader term communication disorder as well as speech sound and language disorder. These divisions will be relevant within our clinical practice.
4. Introduce the concepts of articulation and speech sounds versus phonology and phonemes. This is a delineation which will be important in the discussion of speech sound disorders as well as phonological disorders.
5. Define and delineate the phoneme, allophone, phonotactics and minimal pairs as they apply to phonology.
6. Classify speech sound disorders according to subtypes and etiological factors (Shriberg et al., 2010) and a differential diagnosis system (Dodd, 1995, 2005).
7. Define several terms that are used in clinical and research settings to discuss speech sounds and speech sound disorders.

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## KEYWORD DEFINITIONS

**Communication** is any act in which information is given to or received from another person concerning facts, thoughts, ideas, and feelings (p. 1). Communication refers to any way that we convey information from one person to another.

**Speech** is the communication or expression of thoughts in spoken language (p. 1). It is oral, verbal communication. Speech can be further divided into articulation, fluency, and voice.

**Language** can be defined as a complex and dynamic system of conventional symbols that is used in various modes for thought and communication (p. 3). It is rule governed, includes variability and change, and can be used to communicate in many different ways. Language is described by at least five linguistic parameters: phonology, morphology, syntax, semantics, and pragmatics.

**Phonology** is the study of the sound system of language, and includes the rules that govern its spoken form (p. 2). Phonology a) analyzes which sound units are within a language, b) examines how these sounds are arranged, their systematic organization and rule system.

**Morphology** studies the structure of words; it analyzes how words are built out of morphemes, the basic unit of morphology (p. 2).

**Morpheme** is the smallest meaningful unit of a language (p. 2).

**Syntax** consists of organizational rules denoting word, phrase, and clause order. It also examines the organization and relationship between words, word classes, and other sentence elements (p. 2).

**Semantics** is the study of linguistic meaning and includes the meaning of words, phrases, and sentences (p. 2).

**Pragmatics** is the study of language used to communicate within various situational contexts (p. 2). Pragmatics examines language use in context.

**Communication disorder** is the impairment in the ability to receive, send, process, and comprehend concepts including verbal, nonverbal, and graphic symbol systems (p. 3).

**Speech disorder** indicates oral, verbal communication that is so deviant from the norm that it is noticeable or interferes with communication (p. 3). According to the American Speech-Language-Hearing Association (1993), speech disorders are divided into articulation, fluency, and voice disorders.

**Language disorder** refers to impaired comprehension and/or use of spoken, written, and/or other symbol systems (p. 3). A language disorder may involve one or more of the following areas: phonology, morphology, syntax, semantics, and pragmatics.

**Hearing impairment** results from impaired auditory sensitivity (p. 3). Individuals with hearing impairments are typically classified as either hard of hearing or deaf.

**Central auditory processing disorder** result in difficulties with information processing of auditory signals that are not related to impaired sensitivity of the auditory system.

**Articulation** refers to the totality of motor processes that result in speech (p. 4). It represents a highly complex activity in which - respiratory, phonatory, resonatory, and articulatory mechanisms included - as many as 100 muscles may be involved. In the articulatory mechanism alone up to 22 muscles may alter their degree of tension many times during the utterance of a simple sentence (Hanson, 1983). The sequencing and timing of speech muscle activity is an integral portion of articulation.

**Speech sounds** represent physical sound realities; they are end products of articulatory motor processes (p. 5).

**Phones** are another name for speech sounds (p. 5). They also represent physical sound realities

**Phoneme** is the smallest linguistic unit that is able, when combined with other such units, to establish word meanings and distinguish between them (p. 5). For example, in General American English /p/ and /s/ are phonemes because they function to distinguish between words such as "pat" and "sat". On the other hand, in General American English the aspiration of stop/plosives does not have phonemic relevance. The two words [p<sup>h</sup>it] and [pit], in spite of their differences in production, do not result in two words with different meanings. However, aspiration versus nonaspiration of stop/plosives is phonemically relevant in many languages. For example, in Swahili [pa] is the word for "climb", however, with an aspirated [p<sup>h</sup>a], signifies the name for a specific type of antelope. As linguistic units, phonemes characterize how speech sounds function within a language to differentiate word meaning. In everyday usage, professionals often do not distinguish between the terms speech sound and phoneme. One could hear someone say that they transcribed a particular phoneme, for example. However, theoretical and definitional differences do exist; these terms represent two distinct concepts. While the technical term speech sound stands for the physical reality of sound form, the term phoneme refers exclusively to how these forms function within a given language as linguistic units to differentiate between word meanings.

**Allophones** are variations in phoneme realizations that do not change the meaning

of a word when they are produced in differing contexts (p. 5).

**Phonotactics** refers to the description of the allowed combinations of phonemes and in a particular language (p. 6). Both the inventory of phonemes and their possible combinations are unique and vary according to the particular language.

**Phonetic variation** is another label for speech sound (p. 7).

**Minimal pairs** are two words that differ in only one phoneme value (p. 7). The words “cat” and “hat” are minimal pairs.

**Speech disorder** exists when difficulties making certain speech sounds continues past an age-appropriate time frame (pp. 7-8)

**Articulation disorder** as a subcategory of a speech disorder, is atypical production of speech sounds characterized by substitutions, omissions, additions, or distortions. It designates difficulties with the motor production aspects of speech, or an inability to produce certain speech sounds (pp. 8-9).

**Phonetic inventory** is a list of all phones within a child’s inventory (p. 9). It includes the sounds and their variations, thus, typically the phonetic marker and any diacritics noted.

**Phonological disorder** refers to impaired comprehension of the sound system of a language and the rules that govern the sound combinations (p. 9). Several reports (for example Fey, 1992; Pollack and Rees, 1972) have documented that children with phonological disorders can say the particular sound (thus, they do not have difficulties with the actual speech sound production) but, for some reason, do not understand the pattern of phoneme usage within the language system.

**Phonemic inventory** is the inventory of all phonemes within a child’s system (p. 9). These are phonemes which are used to contrast and differentiate meaning for the child.

**Phonotactic constraints** refers to a limited use of phonemes and the phonemes/phones that are possible in word positions (p. 9).

**Constraints** are any patterns noted that seem to limit or restrict the productional possibilities of our clients (p. 9). For example, if a child uses a correct [s] at the beginning of a word but deletes [s] at the end of a syllable or word, this would be considered a constraint.

---

## LEARNING MATERIALS: ANSWERS TO QUESTIONS

### FROM TEXTBOOK THINK CRITICALLY (PAGE 16)

The following small speech sample is from Tara, age 4;3.

rabbit	[wæbət]	ready	[wɛdi]
feather	[fɛdɚ]	arrow	[ɛwou]
green	[gwin]	toothbrush	[tutbwɚʃ]

this	[ðɪs]	thinking	[θɪŋkɪŋ]
that	[ðæt]	round	[waʊnd]
rope	[wouɹp]	bridge	[bɹɪdʒ]
rooster	[wʊstə]	street	[stɹɪt]
bathing	[beɪdɪŋ]	thin	[θɪn]
nothing	[nʌtɪŋ]	them	[ðɛm]
bath	[bæt]	breathe	[bɹɪd]

Which speech sound errors are noted in this sample?

**Answer:** Sounds in error are [ɹ], [θ], and [ð]. The [ɹ] is in error at the beginning of a word and in consonant clusters with [ɹ]. However, the vocalic [ə] is produced correctly. The [θ] and [ð] errors occur within a word or at the end of a word. Both [θ] and [ð] are produced correctly at the beginning of a word.

Which sounds are substituted for the sounds in error?

**Answer:** Substituted sounds are [w] for [ɹ], [d] for [ð], and [t] for [θ].

Can any phonotactic restraints be noted in the correct productions of “th” and “r”?

**Answer:** The [θ] and [ð] are produced correctly at the beginning of a word, however, [d] and [t] are used as substitutions when the sound is in the middle of a word or at the end of the word. The [w] is used as a substitution for [ɹ] initiating a syllable and in consonant clusters. It should be noted that the central vowel with r-coloring [ə] is produced correctly.

Based on this limited information, do you think the child has an articulation or a phonological disorder? Why?

**Answer:** An articulation disorder. The [ɹ] is a later developing sound and could be an articulation error. The fact that the child can produce the central vowel with r-coloring would support the fact that this sound is gradually appearing in Tara’s speech. Although phonotactic constraints can be noted on [θ] and [ð] productions, these errors could also be articulation-based. It is an easier task in the speech sound development of children to produce the sound correctly at the beginning, as opposed to the middle or end of words.

## ADDITIONAL LEARNING MATERIALS

### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

1. Discuss why the child's production of minimal pairs could be used in determining a phonological disorder?
2. What information could be a portion of the phonemic inventory? Discuss how you would gather information about the inventory of phonemes and phonotactic constraints.
3. What type of material could you use to examine the phonotactics of a child's inventory if the child has difficulties with the production of "s" in consonant clusters? Which words would test the possible phonotactics of s-clusters in American English occurring at the beginning and end of syllables?
4. Based on the results of a standardized speech assessment and/or a spontaneous speech sample have the students determine the phonetic inventory, the phonemic inventory, and the phonotactics of a child with an articulatory or phonological impairment. Note any patterns or constraints which are demonstrated.
5. Give one example of what could be assessed within each of the five areas of language (phonology, morphology, syntax, semantics, and pragmatics).
6. The following is a portion of a language sample from Jeannette, age 4;6.

I want some jelly beans and some chocolate.

[aɪ wʌn sʌm ʒɛli biːns æn sʌm ʃɑːklət]

I don't know.

[aɪ daʊn noʊ]

I don't know who that is.

[aɪ daʊn noʊ hu dæt ɪs]

Ninja turtles fight the evil Ninjas.

[nɪnʒə tuːtəls faɪt də ɪvəl nɪnʒəs]

Then Shredder just comes.

[ðɛn ʃɹɛdər ʒʌst kʌms]

And all of these other things.

[ænd ɔl əv dis ðvə tɪŋz]

- a. Write down the phonemic inventory of Jeanette using both the vowels and consonants that are presented in this small sample.
- b. Note which vowels and consonants that are normally a portion of the American English inventory are not demonstrated in Jeanette's speech sample.
- c. Make a list of the words that Jeanette pronounces differently than would be expected when compared to the adult model of pronunciation.
- d. Note any consistent patterns of substitution of one sound for another.

## MULTIPLE CHOICE QUESTIONS

1. The totality of motor processes involved in the planning and execution of sequences of overlapping gestures which result in speech refers to
  - a) phonology
  - b) phonetics
  - c) articulation
  - d) phonotactics
2. The subdivision of language dealing with the meaning of words, phrases, and sentences is
  - a) morphology
  - b) syntax
  - c) semantics
  - d) pragmatics
3. The end products of articulatory motor processes that represent physical sound realities are called
  - a) phonetic variations
  - b) speech sounds
  - c) allophonic variations
  - d) all of the above
4. The repertoire of phonemes which are used contrastively by an individual is the
  - a) phonetic inventory
  - b) phonemic inventory
  - c) phonotactics of a language
  - d) allophonic variations of a language
5. The clusters [sk] and [ks] cannot occur in the same word positions in General American English. This is an example of the
  - a) phonetic inventory
  - b) phonemic inventory
  - c) phonotactics of a language
  - d) allophonic variations of a language

6. Minimal pairs are exemplified by which of the following set of words?
  - a) [hit] and [sit]
  - b) [sit] and [sut]
  - c) [lun] and [mun]
  - d) all of the above
  
7. Which one of the following concepts would be associated with the assessment of a phonological impairment?
  - a) phonemic inventory
  - b) phonotactics
  - c) phonotactic constraints
  - d) all of the above would be important in assessing a phonological impairment
  
8. Articulation disorders reflect difficulties with
  - a) central linguistic abilities
  - b) phoneme function
  - c) relatively peripheral motor processes
  - d) phonemes and phoneme patterns within a particular language
  
9. Communication disorders include which of the following?
  - a) speech disorders
  - b) language disorders
  - c) hearing disorders
  - d) all of the above
  
10. Which one of the following is *not* a typical phonotactic possibility of General American English?
  - a) [sk] at the beginning of a word or syllable
  - b) [ŋz] at the end of a word or syllable
  - c) [lt] at the beginning of a word or syllable
  - d) [mp] at the end of a word or syllable

## TRUE/FALSE QUESTIONS

1. Articulation difficulties result from an impairment of central linguistic abilities.
2. Three subdivisions of language include pragmatics, articulation, and syntax.
3. Phonetic variations and allophonic variations represent phonemes.
4. Speech sounds and phonemes represent exactly the same concepts.
5. Impaired comprehension of the sound system of a language and the rules that govern the sound combinations represent a phonological disorder.
6. Speech sounds are transcribed using brackets [ ] while phoneme values are symbolized by slanted lines or so-called virgules / /.
7. The Differential Diagnosis System can adequately be used to classify speech sound disorders.
8. Phonology is not related to the other constituents of the language system such as morphology, syntax, semantics, or pragmatics.

9. The phonetic inventory includes all the speech sounds the individual uses including their specific production features.
10. Articulation and phonological disorders never co-occur.

## SHORT ANSWER QUESTIONS

1. Define communication disorder.
2. Explain why a child with “s” difficulties, might have problems in the area of morphology.
3. Contrast the terms speech sound and phoneme.
4. Contrast the terms articulation disorder versus phonological disorder.
5. Write a brief definition and give an example of each of the following terms: phonology, morphology, syntax, semantics, and pragmatics.

## ESSAY QUESTIONS

1. Discuss how articulation disorders represent difficulties with the physical production aspects of speech sounds. Utilize the terms "articulation", "physical sound realities", and "speech sounds" when developing your discussion.
  2. Discuss how phonological disorders represent difficulties with the linguistic function of phonemes. Utilize the terms "phoneme" and "phonology" when developing your discussion.
  3. Discuss the differences between a language and a speech disorder. Give specific examples for each.
  4. Articulation errors are referenced by a child's age. Referring to the definition and characteristics of the term “articulation” state why this is a meaningful reference point.
  5. Briefly discuss the differences between the Speech Disorders Classification System (Shriberg et al., 2010) and the Differential Diagnosis System (Dodd, 1995, 2005).
-



## REFERENCES

- American Speech-Language-Hearing Association. (n.d.). *Speech sound disorders: Articulation and phonology* (Practice Portal). Retrieved from <http://www.asha.org/Practice-Portal/Clinical-Topics/Articulation-and-Phonology>
- American Speech-Language-Hearing Association. (1993). *Definitions of communication disorders and variations* [Relevant Paper]. Retrieved from <http://www.asha.org/policy>
- Dodd, B. (1995). *Differential diagnosis and treatment of children with speech disorder*. London, UK: Whurr.
- Dodd, B. (2005). *Differential diagnosis and treatment of children with speech disorder* (2nd ed.). London, UK: Whurr.
- Fey, M. (1992). Clinical forum: Phonological assessment and treatment. *Articulation and Phonology: Inextricable constructs in speech pathology. Language, Speech, and Hearing Services in Schools, 23*, 225-232.
- Hanson, M. L. (1983). *Articulation*. Philadelphia: W. B. Saunders.
- Pollack, E., & Rees, N. (1972). Disorders of articulation: Some clinical applications of distinctive feature theory. *Journal of Speech and Hearing Disorders, 37*, 451-461.
- Shriberg, L. D., Fourakis, M., Hall, S. D., Karlsson, H. B., Lohmeier, H. I., McSweeney, J. L., . . . Wilson, D. (2010). Extensions to the speech disorders classification system (SDCS). *Clinical Linguistics and Phonetics, 24*, 795–824.

# Chapter 2

## Articulatory Phonetics: Speech Sound Form

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### LEARNING OBJECTIVES

When you have finished this chapter, you should be able to:

- Define and classify phonetics and the branches of phonetics.
  - Briefly review the anatomical-physiological foundations of speech production.
  - List the differences in production and function of vowels versus consonants.
  - Identify the descriptive parameters used for vowels of General American English and categorize the vowels accordingly.
  - Identify the descriptive parameters used for the consonants of General American English and classify the consonants accordingly.
  - Define coarticulation and assimilation, and list the different types of assimilatory processes.
  - Identify the various types of syllable structures, including phonotactic restraints that might be noted in children.
- 

### CHAPTER OVERVIEW

This chapter first presented a definition of phonetics and the three subdivisions of phonetics: articulatory, acoustic, and auditory phonetics. Second, this chapter reviewed the anatomical and physiological prerequisites for speech production. The structures involved in producing speech are cumulatively labeled the speech mechanism. The speech mechanism is further divided into the respiratory, phonatory, resonatory, and articulatory systems. These systems were briefly discussed.

Next within articulatory phonetics an overview of vowels and consonants was given and the form and function of vowels and consonants of General American English were discussed. Both vowels and consonants were classified according to their articulatory production features and their linguistic functions. Phonetic descriptors were given to provide the clinician with a detailed account of articulatory action during norm production of vowels and consonants. These features can later be contrasted to those noted in the impaired sound realizations of children and adults with articulatory-phonological impairments.

In the last portion of this chapter, coarticulation, assimilation processes, and syllable structure were defined and examined. Coarticulation and resulting assimilatory processes were described as possible normal articulatory consequences that regularly occur in the speech of individuals. Assimilatory processes were defined according to the type and degree of sound modification. Examples were given of assimilatory processes in children as well as of the possible impact these processes could have on standardized speech assessment results. The section on syllable structure defined the parts of the syllable. It was suggested that an analysis of syllable structures could provide the clinician with additional knowledge when evaluating individuals with speech sound disorders.

---

## PRESENTATION OUTLINES

1. Define phonetics and three subdivisions of phonetics: Articulatory phonetics, acoustic phonetics, and auditory phonetics.
2. Review the anatomical-physiological foundations of speech production relative to the respiratory, phonatory, resonatory, and articulatory systems.
3. Review basic vowel and consonant definitions. Both production aspects and linguistic function are highlighted.
4. Classify the vowels of General American English according to phonetic production parameters. These include the portion of the tongue involved in the vowel articulation (front versus back), the position of the tongue relative to the palate (high versus low), and the degree of lip rounding or unrounding.
5. Classify the consonants of General American English according to phonetic production parameters. These include the place of articulation, the type of constriction established between the articulators (manner), and the presence or absence of vocal fold vibration (voiced versus voiceless)
6. Describe coarticulation and identify various types of resulting assimilation processes and the implications for the assessment of children with speech sound disorders
7. Categorize the various parts of a syllable noting the impact syllable structure has on the articulation possibilities of children.

---

## KEYWORD DEFINITIONS

**Phonetics** is the study of speech emphasizing the description and classification of speech sounds according to their production, transmission and perceptual features (p. 18).

**Articulatory phonetics** deals with the production features of speech sounds, their categorization and classification according to specific parameters of their production. Central aspects include how speech sounds are actually articulated, their objective similarities, and their differences (p. 18). The motor processes which result in speech sounds are categorized according to several different parameters. For example, categories may include those speech motor processes which are coupled with vocal fold vibration (voiced sounds) versus those which are not (voiceless sounds), or those speech motor movements which result in a partial or total hindrance within the vocal tract (consonants) versus those which demonstrate a relatively open vocal tract, a vocal tract without significant obstructions (vowels).

**Acoustic phonetics** is the area of study related to speech sound transmission. The frequency, intensity, and duration of speech sounds, for example, are described and categorized (p. 18). The transmission of speech sounds can be exemplified by a display of the acoustic constituents of a particular speech sound. For example, the frequency of a voiced sound, i.e., the number of complete repetitions (cycles) of variations in air pressure occurring within a second's time, directly related to the opening and closing of the glottis, is a portion of acoustic phonetics. Another aspect of acoustics would be the intensity of a sound mirrored by the amplitude of these variations in air pressure.

**Auditory phonetics** pertains to speech sound perception (p. 18). For example, pitch and loudness are terms which are used to describe the perceptual categorization of frequency and intensity, which were noted parameters in acoustic phonetics.

Although pitch and loudness are related to frequency and intensity, equal steps of increasing frequency or intensity do not produce the perceptual effect of equal steps of pitch and loudness. These discrepancies between acoustic facts and their perceptual impressions are typical for studies within auditory phonetics.

**Speech mechanism** refers to those anatomical-physiological structures involved in producing speech (p. 19). The speech mechanism is functionally divided into respiratory, phonatory, resonatory, and articulatory systems.

**Pleural linkage** refers to the manner in which the lungs increase their volume during inspiration and decrease their volume during expiration (p. 21). A strong negative pressure exists between two pleurae (one covering the outer surface of the lungs and one covering the inner surface of the thorax and the top portion of the diaphragm) which are airtight and fused together. This negative pressure links the membranes so closely that any movement of the thoracic cavity results in movement of the lungs.

**Alveolar pressure** consists of the pressure within the lungs (p. 22). During rest the alveolar pressure is equal to the outside air pressure, however, as inspiration begins and the resulting expansion of the thoracic cavity, a negative alveolar pressure occurs. Air rushes in and inspiratory muscles cease their activity and air is forced out as the upward movement of the diaphragm and the decrease in the thoracic cavity occur. At this point, alveolar pressure again equals the outside air pressure.

**Subglottal air pressure** is that air pressure below the vocal folds (p. 22). The glottis is the space between the vocal folds, sub- indicating below.

**Extrinsic muscles of the larynx** are those having at least one attachment outside the larynx (pp. 22-23). These muscles are primarily responsible for supporting and anchoring the larynx.

**Intrinsic muscles of the larynx** are those having both attachments within the larynx (p. 23). These muscles are necessary for control during voice production such as opening and closing the vocal folds.

**Adduct** refers to closing the vocal folds (p. 23). The muscles responsible for adduction of the vocal folds are the lateral cricoarytenoid and the interarytenoid muscles (pp. 23-24).

**Abduct** refers to the opening of the vocal folds (p. 23). There is one muscle responsible for abduction of the vocal folds, the posterior cricoarytenoid (pp. 23-24).

**Fundamental frequency** is the average number of glottal openings per second (p. 23). The average fundamental frequency for males is between 120 and 145 cycles per second while for females it is approximately 200 to 260 cycles per second.

**Timbre** refers to the tonal quality which distinguishes two sounds of the same pitch, loudness and duration from one another, for example, between two different speakers (p. 24).

**Vocal tract** consists of all speech-related systems above the vocal folds (p. 24).

**Pharyngeal cavity**, a muscular and membranous tube-like structure extends from the epiglottis to the soft palate (p. 24).

**Oral cavity**, or mouth area, extends from the lips to the soft palate (p. 24).

**Nasal cavities**, or nose area, consist of two narrow chambers that begin at the soft palate and end at the exterior portion of the nostrils (pp. 24-25).

**Resonance** is the selective reinforcement and absorption of sound energy at specific frequencies. Certain frequencies are amplified or intensified (reinforced) while others are suppressed or damped out (absorbed) (p. 25).

**Velopharyngeal mechanism** consists of the structures and muscles of the velum, or soft palate, and those of the pharyngeal walls (p. 25).

**Velopharyngeal port** is the passage that connects the oropharynx and the nasopharynx. It can be closed by elevation and posterior movements of the velum and some forward and medial movements of the posterior and lateral pharyngeal walls. These combined movements resemble the action of a sphincter (p. 25).

**Dorsum** is the body of the tongue (p. 26).

**Alveolar ridge** is a prominent ridge-like structure located behind the front teeth (p. 26). The protuberance is formed by the alveolar process, which is a thickened portion of the maxilla (upper jaw) housing the upper teeth.

**Vowels** are speech sounds produced without a significant constriction of the oral (and pharyngeal) cavities (p. 27). The airflow from the vocal folds to the oral opening remains relatively unimpeded. Because of this production feature, vowels are often labeled open sounds.

**Consonants** are speech sounds produced with a significant constriction within the oral (and pharyngeal) cavities, foremost along the sagittal midline of the oral cavity (p. 27). The sagittal midline is the median plane dividing, in this case, the vocal tract into right and left halves. Sagittal midline constriction can be noted when articulating [s], or [l], for example. With [s], the air stream is directed over the tongue tip, while actual contact between the tongue tip and the alveolar ridge can be noted for [l] productions. Due to these production features consonants are often labeled constricted sounds.

**Sagittal midline** of the vocal tract refers to the median plane that divides the vocal tract into right and left halves (p. 27).

**Sonority**, when referring to speech sounds, is the loudness of a particular speech sound relative to others of equal length, stress, and pitch (p. 27). "There is roughly a 700-to-1 range of intensities between the weakest and strongest speech sounds made while speaking at a normal conversational level. The vowels are the strongest sounds but, even among these, there is a three-to-one range. The strongest vowel is the "aw" (as in "talk"), which is usually pronounced at three times the intensity of the weakest vowel, "ee" (as in "see"). The strongest of the consonants, the "r" sound, has about the same intensity as the "ee" vowel, but is two and a half times more intense than "sh" (as in "shout"); six times more intense than "n" (as in "no"); and 200 times greater than the weakest consonant, "θ" (as in "thin")" (Denes and Pinson, 1973, p. 150-151).

**Sonorants** are another name for vowels and diphthongs due to their greater sonority in relationship to consonants (p. 27).

**Sonorant consonants** are a group of consonants which have a relatively open expiratory passageway; they are produced with less obstruction of the air stream (p. 27). Sonorant consonants include the nasals, liquids, and the glides

**Obstruent consonants** are a group of consonants which are characterized by a complete or narrow constriction between the articulators hindering the expiratory air stream (p. 27). The obstruents include the stops, fricatives, and the affricates.

**Syllabics** are a small group of consonants which can function as the nucleus of the syllable (p. 28). Certain sonorant consonants can be syllabics. For example, [l, m, n]. For example, if the second syllable of “button” is reduced and pronounced without the vowel, as in [bʌtn], [n] now becomes the nucleus of the syllable and is termed a syllabic.

This also occurs with the second syllable of “bottle” when said as [bɒtl], [l] is a syllabic in this case. Syllabics are indicated by a small line placed under the symbol in question.

**Vowels** of General American English can be described according to the following parameters (pp. 29-31):

- 1) **the portion of the tongue that is involved in the articulation** which is correlated to the phonetic descriptors of front, central, and back vowels;
- 2) **the tongue’s position relative to the palate** translates phonetically into the labels high, mid, and low vowels. These descriptions can be directly related to the vowel quadrilateral (p. 29) with front vowels being at the far left of the quadrilateral, central vowels in the center, and back vowels on the right axis. The high vowels are at the top of the quadrilateral, the mid vowels further down when moving vertically, while the low vowels are at the bottom of the quadrilateral. The last parameter which is used to describe the articulation of vowels is
- 3) **the degree of lip rounding or unrounding** (p. 29). The high-back vowels, such as [u] and [ʊ] have a relatively high degree of lip rounding. As you move down the vowel quadrilateral with the back vowels the lip rounding decreases until [ɑ], which is considered an unrounded vowel. The front vowels are considered to be unrounded vowels or those produced with lip spreading. The high-front vowels [i] and [ɪ] have a high degree of lip spreading while the low-front vowels have less.

**Monophthongs** are vowels with a relatively constant quality throughout their production (p. 29). Monophthongs are also known as pure vowels. The vowel [i] is typically produced as a pure vowel.

**Diphthongs**, on the other hand, are vowels in which the quality changes during their production (p. 29). The term diphthong, meaning having two sounds, is used to refer to those vowels which vary in quality during the length of their production but are seen as representing one phoneme.

**Onglide** is the initial portion of a diphthong (p. 29).

**Offglide** is the second or end portion of the diphthong (p. 29). Thus, the diphthong that is typically heard in the word *pie*, [paɪ], has [a] as the onglide and [ɪ] as the offglide.

**Rising diphthongs** are those that the tongue moves from a lower positioned onglide portion to an offglide which has a higher tongue position. Thus, relative to the palate, the tongue moves in a rising motion (p. 31).

**Centering diphthongs** are a special class of diphthongs in which the offglide or less prominent element of the diphthong is a central vowel (p. 31). Depending upon the dialect of the speaker this may be a schwa vowel or a central vowel with r-coloring. Thus “farm” could be pronounced as [fɑəm] or [fɑɹm].

**Rhotic diphthongs** are centering diphthongs with [ɹ] as their offglide (p. 31).

**Rhotics** refers to the r-coloring noted in specific vowels or consonants of American English

(p. 31). The rhotics in American English are [ɹ, ʒ, ʒ̥]

**Nonphonemic** diphthongs are those that do not demonstrate phonemic value, i.e., the meaning of the word does not change, if the diphthong is reduced to a monophthong with only its onglide portion (p.32). For example, whether one pronounces “cake”, [keɪk] or [kek], the same word meaning will be perceived. The diphthongization of these vowels does not have phonemic value.

**Phonemic** diphthongs are those that do demonstrate phonemic value; the meaning of the word does change, if the diphthong is reduced to a monophthong with only its onglide portion (p. 32). For example, [ɔɪ] is a phonemic diphthong in that if it is produced as a monophthong, the phonemic value changes. The two words [sɔɪ], “soy”, and [sɔ], “saw” exemplify this, when the diphthong is produced without the offglide, a word with a different meaning results.

**Consonants** can be categorized according to their **voicing** features, **place** of articulation, and **manner** of articulation (p. 33).

**Voicing** is the term used to denote the presence or absence of simultaneous vocal fold vibration resulting in voiced or voiceless consonants (p. 33).

**Cognates** are pairs of sounds, such as [p] and [b] which differ only in their voicing features (p. 33).

**Place of articulation** describes where the constriction or narrowing occurs for the various consonant productions. The lip, teeth, portions of the palate and velum are the main places of articulation in the production of General American English consonants (p. 34).

**Manner of articulation** refers to the type of constriction the articulators generate (p. 34). This constriction may consist of a complete closure or a relatively wide opening between the articulators (p. 34).

In General American English, the manners of articulation consist of the **plosives** (sometimes referred to as **stops**), **fricatives**, **nasals**, **affricates**, **approximants** (**glides** and **laterals**), and **rhotics** (pp.34-35).

**Plosives** ([p, b, t, d, k, g]) are signaled by a complete occlusion between the articulators (p. 25). This complete closure results in the build-up of air pressure (stop phase) followed by a release phase in which the separation of the articulators allows for a burst of air (plosive phase) (pp. 34-35).

**Fricatives** ([f, v, s, z, ʃ, ʒ, θ, ð]) are the result of a very close approximation between the articulators, so close in fact that an audible friction-noise results (p. 35).

**Sibilants** [s, z, ʃ, ʒ] (literally hissing sounds) are one subcategory of fricatives which have a sharper sound than others due to the presence of high frequency acoustic components (p. 35).

**Nasals** ([m, n, ŋ]) are produced with the velum lowered so that the air passes freely through the nasal cavity giving them their characteristic quality (p. 25). The nasals are the only consonants in American English that are produced with the velum lowered, for all other consonants the velum is raised, closing off the passageway between the oral

and nasal cavities (p. 35).

**Affricates** ([tʃ, dʒ]) are a group of consonants that contain two phases: 1) a stop portion with a build-up of air pressure which is slowly released followed by 2) a friction portion of the speech sound (p. 35). The stop phase releases into a fricative portion which is produced at the same place of articulation. Although they are transcribed with two separate symbols, they are not consonant clusters but rather have one phoneme value.

**Approximants** are a manner of articulation in which the articulators come close to each other but the constriction is far less than for the fricatives, i.e., the articulators approximate one another (p. 35). The liquids and glides are approximants.

**Glides** ([w, j]) are produced with a constriction that is wider than that necessary for fricative consonants. In addition, there is a gliding movement of the articulators to a more open position (p. 35). According to the International Phonetic Alphabet the glides are labeled as approximants. This term refers to those consonants which are produced with a wider passage of air resulting in a smooth, as opposed to a turbulent airflow.

**Laterals** are characterized by a midline closure with simultaneous lateral airflow. Thus, the air stream passes around one or both sides of the tongue (p. 35). There is one lateral consonant in American English, [l]. According to the International Phonetic Alphabet [l] is labelled a lateral approximant.

**Liquids** are collectively the lateral [l] and the rhotic [ɹ] which are grouped together under this heading (p. 35).

**Rhotic** consonants are produced with the articulators approximating one another and creating an r-quality sound. These sounds are variable in their production; there are three different productions 1) where the tongue tip is raised towards the alveolar ridge, 2) a retroflexed and 3) a bunched production (p. 35). According to the classification used within the International Phonetic Alphabet, the rhotics are considered central approximants (p. 35).

**Coarticulation** refers to the constant positioning of the articulators as they move over a stretch of speech (p. 38). Ladefoged and Johnson (2014) describe coarticulation as the overlapping of adjacent articulations while Shriberg, Kent, McAllister, and Preston (2019) use the term to refer to speech modifications in which the production of a sound is influenced by other sounds around it, that is, by its phonetic context. The effects of coarticulation are clinically significant in that the surrounding phonetic context may assert a positive or negative articulatory influence on a specific sound.

**Assimilation** refers to adaptive articulatory changes in which one sound becomes similar to (or identical to) a neighboring sound (p. 38). Many assimilatory changes are natural consequences of articulatory adjustments which make speech easier and faster.

**Assimilation processes** (also known as **harmony processes**) are categorized according to the type and degree of assimilatory changes (pp. 38-39).

**Contact** (or **contiguous**) assimilation denotes changes impacting directly adjacent sounds while **remote** (or **noncontiguous**) assimilation occurs when the assimilatory changes affect sounds separated by at least one other sound segment (p. 39).

**Progressive** (or **perseverative**) assimilations refer to a sound impacting a following sound while **regressive** (or **anticipatory**) assimilations designate an assimilatory change of a sound influencing a preceding sound (p. 39).



**Total** (or **complete**) assimilation occurs when two segments become identical while **partial** assimilation refers to changes in one or more phonetic features of the sound in question (p. 39).

**Peak** is a term used to denote the most prominent, the most acoustically intense part of the syllable, in other words the syllable nucleus (p. 40).

**Onset** of a syllable consists of all segments prior to the peak (p. 40). Those segments are also termed **syllable releasing sounds**.

**Coda** refers to those segments following the peak (p. 40). These are also labeled **syllable arresting sounds**.

**Rime** consists of the peak and coda of a syllable (p. 41).

**Open** or **unchecked syllables** are those that do not contain codas (p. 41).

**Closed** or **checked syllables** do have codas (p. 41).

**Syllable production** is affected by four factors (1) the number of syllables an utterance contains (fewer syllables are easier to produce), (2) the type of syllable relative to open versus closed syllables (open syllables are easier to produce), (3) the degree of syllable stress (stressed syllables are easier to produce than unstressed ones) (4) the number of consonants that are grouped together (singletons are easier to produce than consonant clusters) (p. 42).

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## LEARNING MATERIALS

### ANSWERS TO QUESTIONS FROM TEXTBOOK CASE

#### STUDY (PAGE 43)

The following sample is from Tina, age 3;8.

dig [dɪg] ⇒ [dɛg] vowel change: high-front vowel  
[ɪ] changed to a mid-front  
vowel [ɛ]

house [haus] ⇒ [haʊθ] consonant change: a voiceless  
alveolar fricative [s] changed to  
a voiceless interdental fricative  
[θ]

knife [naɪf] ⇒ [naf] vowel change: diphthong vowel  
[aɪ] changed to a  
monophthong [a]

duck	[dʌk]	⇒	[dʊt]	vowel change: a central vowel [ʌ] changed to a high-back vowel [ʊ] consonant change: a voiceless velar plosive [k] changed to a voiceless alveolar plosive [t]
fan	[fæn]	⇒	[vɛn]	vowel change: a low-front vowel [æ] changed to a mid-front vowel [ɛ] consonant change: a voiceless labio-dental fricative [f] changed to a voiced labio- dental fricative [v]
yes	[jɛs]	⇒	[wɛt]	consonant change: a voiced palatal glide (or approximant) [j] changed to a voiced labio- velar glide (or approximant) [w] consonant change: a voiceless alveolar fricative [s] changed to a voiceless alveolar plosive [t]
boat	[bout]	⇒	[bot]	no errors
cup	[kʌp]	⇒	[tʊp]	vowel change: a central vowel [ʌ] changed to a high-back vowel [ʊ] consonant change: a voiceless velar plosive [k] changed to a voiceless alveolar plosive [t]
lamp	[læmp]	⇒	[wæmp]	consonant change: voiced alveolar liquid (lateral approximant) [l] changed to a voiced labio-velar glide (approximant) [w]
goat	[gout]	⇒	[dout]	consonant change: a voiced velar plosive [g] changed to a voiced alveolar plosive [d]
cat	[kæt]	⇒	[tæt]	consonant change: a voiceless velar plosive [k] changed to a voiceless alveolar plosive [t]

bath	[bæθ]	⇒	[bæt]	consonant change: a voiceless interdental fricative [θ] changed to a voiceless alveolar plosive [t]
red	[ɪɛd]	⇒	[lɛd]	consonant change: a voiced palatal rhotic (or liquid, central approximant) [ɹ] changed to a voiced alveolar lateral approximant (liquid) [l]
ship	[ʃɪp]	⇒	[sɪp]	consonant change: a voiceless prepalatal (or postalveolar) fricative with lip rounding [ʃ] changed to a voiceless alveolar fricative [s]
ring	[ɪŋ]	⇒	[wɪŋ]	consonant change: a voiced palatal rhotic (or liquid, central approximant) [ɹ] changed to a voiced labio-velar glide (approximant) [w]
thumb	[θʌm]	⇒	[dʌm]	consonant change: a voiceless interdental fricative [θ] changed to a voiced alveolar plosive [d]
that	[ðæt]	⇒	[zæt]	consonant change: a voiced interdental fricative [ð] changed to a voiced alveolar fricative [z]
zip	[zɪp]	⇒	[wɪp]	consonant change: a voiced alveolar fricative [z] changed to a voiced labio-velar glide (or approximant) [w]
key	[ki]	⇒	[di]	consonant change: a voiceless velar plosive [k] changed to a voiced alveolar plosive [d]
win	[wɪn]	⇒	[jɪn]	consonant change: a voiced labio-velar glide (or approximant) [w] changed to a voiced palatal glide (or approximant) [j]

## THINKING CRITICALLY (PAGE 44): ANSWERS

1. The [θ] and [ð] sounds are produced with a more anterior constriction than [s] and [z]. Thus the th-sounds can be produced as interdental or as apico-dental fricatives. For the interdental production the tongue tip is located between the teeth, the air flow is between the bottom edge of the incisors and the tip of the tongue. For the apico-dental production the tip of the tongue is located slightly more posterior than for the interdental production. Here the tongue tip is located slightly behind the cutting edge of the incisors; the air flow is again between the teeth and the apex of the tongue.

To achieve an apico-alveolar [s] or [z], the child should be instructed to move the tongue back. The child could start by gliding the tongue tip back and forth from the front to the back of the palate and then from the [θ] or [ð] productions back to a perceptually normal s-sound.

2. news [nuz]                      however              newspaper              [nuspeɪpə]

The change that occurs is from a voiced [z] to a voiceless [s] in “newspaper”. This is contact assimilation, it is regressive in that the voiceless [p] is influencing the previous voiced [z] sound, it becomes voiceless.

panty [pænti]              ⇒              [pæni]

The change that occurs is that the [t] in “panty” is completely gone (total assimilation). It is contact, progressive assimilation as the [n] (an alveolar nasal) has completely assimilated the [t] (an alveolar plosive).

did you              [dɪd ju]              ⇒              [dɪdʒu]

This is progressive, contact assimilation as the [d] has influenced the [j] in “you”. The resulting affricate with its homorganic fricative portion is productionally very similar to the [d].

incubate              [ɪnkju**ɹ**ɪt ]              ⇒              [ɪŋkjubert]

This is regressive, contact assimilation as the placement of the [k] (velar) has changed the preceding nasal from an alveolar to a velar nasal [ŋ].

misuse              [mɪsju**ʃ**]              ⇒              [mɪs]

This is a contact, regressive assimilation as the more posterior placement of the [j] (palatal) has influenced the placement of the [s]. The [s] is an alveolar fricative which has now become a postalveolar [ʃ].

3. Identify the following syllable structures:

telephone	⇒	[tɛ.lə.fəʊn]	1 <sup>st</sup> syllable onset-peak, open syllable 2 <sup>nd</sup> syllable onset-peak, open syllable 3 <sup>rd</sup> syllable onset-peak-coda, closed syllable
wagon	⇒	[wæ.gən]	1 <sup>st</sup> syllable onset-peak, open syllable 2 <sup>nd</sup> syllable onset-peak-coda, closed syllable
shovel	⇒	[ʃʌ.vəl]	1 <sup>st</sup> syllable onset-peak, open syllable 2 <sup>nd</sup> syllable onset-peak-coda, closed syllable
banana	⇒	[bə.næ.nə]	1 <sup>st</sup> syllable onset-peak, open syllable 2 <sup>nd</sup> syllable onset-peak, open syllable 3 <sup>rd</sup> syllable onset-peak, open syllable
pajamas	⇒	[pə.dʒæ.məs]	1 <sup>st</sup> syllable onset-peak, open syllable 2 <sup>nd</sup> syllable onset-peak, open syllable 3 <sup>rd</sup> syllable, onset-peak-coda, closed syllable

4. Two syllable words with [k] in comparable syllable and stressing situation in initial-, medial- and final-word positions.

Initial:	cow – boys	co - llies
Medial:	ta – cos	ro - cket
Final:	sea – hawk	sea - sick

## ADDITIONAL LEARNING MATERIALS

### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

1. Difficulties with vowel productions may occur in children with phonological disorders. The following examples of vowel substitutions have been slightly modified from those presented in the article by Pollock and Keiser (1990). Students should compare the typical vowel production to the noted changes according to the parameters 1) the portion of the tongue which is involved in the articulation, i.e., front, central, back vowels; and 2) the tongue's position relative to the palate, i.e., high, mid, low vowels.

Example	Word	Target	Child's Production
1.	pillow	[pɪlou]	[balou]
2.	eight	[eɪt]	[aɪt]
3.	red	[ɪɛd]	[wɑd]
4.	cat	[kæt]	[kɑt]
5.	wagon	[wæɡən]	[wɪɡən]
6.	foot	[fʊt]	[fɔt]
7.	duck	[dʌk]	[dɑk]
8.	cow	[kaʊ]	[kɑ]
9.	toy	[tɔɪ]	[dʌ]
10.	rock	[ɪɑk]	[wɪk]

See Test Bank for more detailed answers.

Example 1: a high-front vowel changes to a low-back vowel

Example 2: a diphthong with a mid-front onglide changes to a diphthong with a low-front onglide

Example 3: a mid-front vowel changes to a low-back vowel

Example 4: a low-front vowel changes to a diphthong with a low front onglide and a high-front offglide.

Example 5: a low-front vowel changes to a high-front vowel

Example 6: a high-back vowel changes to a mid-back vowel

Example 7: a central vowel changes to a low-back vowel

Example 8: a diphthong changes to a monophthong with only the onglide

Example 9: a diphthong with a mid-back onglide and a high-front offglide changes to a central monophthong vowel

Example 10: a low-back vowel changes to a high-front vowel

2. Students should compare the typical consonant productions to the noted misarticulations according to the voicing, place of articulation and manner changes.

Example	Word	Target	Child's Production
1.	swing	[swɪŋ]	[θwɪŋ]
2.	shovel	[ʃʌvəl]	[ʃɒbəl]

3.	frog	[fɾɑg]	[fwɑg]
4.	thumb	[θʌm]	[fʌm]
5.	knot	[nɑt]	[dɑt]
6.	coat	[kɔʊt]	[tɔʊt]
7.	fishing	[fɪʃɪŋ]	[fɪtɪŋ]
8.	lamp	[læmp]	[wæmp]
9.	zoo	[zu]	[du]
10.	three	[θɹi]	[tɹi]

See Test Bank for more detailed answers

Example 1: a voiceless alveolar fricative has been replaced by a voiceless dental fricative

Example 2: a voiced labiodental fricative has been replaced by a voiced bilabial plosive

Example 3: a voiced alveolar approximant has been replaced by a voiced labio-velar approximant

Example 4: a voiceless dental fricative has been replaced by a voiceless labiodental fricative

Example 5: a voiced alveolar nasal has been replaced by a voiced alveolar plosive

Example 6: a voiceless velar plosive has been replaced by a voiceless alveolar plosive

Example 7: a voiceless postalveolar fricative has been replaced by a voiceless alveolar plosive

Example 8: a voiced alveolar lateral approximant has been replaced by a voiced labio-velar approximant

Example 9: a voiced alveolar fricative has been replaced by a voiced alveolar stop

Example 10: a voiceless dental fricative has been replaced by a voiceless alveolar plosive

3. Based on the results from question #2, discuss which production parameters have been altered for each of the misarticulations. For example, are all four articulatory parameters different, that is, are there changes in the place of articulation, the manner, and voicing between the target realization and the actual production? Also, discuss in general terms what these changes mean. For example, has the place of articulation moved forward, backward, or has the manner of articulation changed from a complete closure to a wider opening?

See Test Bank for more detailed answers.

Example 1: a voiceless alveolar fricative has been replaced by a voiceless dental fricative  
Place of articulation has been moved forward from from alveolar to dental,

Example 2: a voiced labiodental fricative has been replaced by a voiced bilabial plosive  
Place of articulation has moved somewhat forward to a bilabial and the manner has changed from a fricative to a plosive

Example 3: a voiced alveolar approximant has been replaced by a voiced labio-velar approximant

Place of articulation has changed from a forward alveolar position to one with lip rounding and a high back tongue placement

Example 4: a voiceless dental fricative has been replaced by a voiceless labiodental fricative  
Place of articulation has changed from the tongue approximating the teeth to one with involvement of the bottom lip

Example 5: a voiced alveolar nasal has been replaced by a voiced alveolar plosive  
Manner of articulation has changed from a nasal to a plosive

Example 6: a voiceless velar plosive has been replaced by a voiceless alveolar plosive  
Place of articulation has changed from a back velar to a more fronted alveolar plosive

Example 7: a voiceless postalveolar fricative has been replaced by a voiceless alveolar plosive

Place of articulation has changed minimally (a bit more forward), manner of articulation has

changed from a fricative to a plosive

Example 8: a voiced alveolar lateral approximant has been replaced by a voiced labio-velar approximant

Place of articulation has changed from alveolar to one with lip rounding and a high back tongue position

Example 9: a voiced alveolar fricative has been replaced by a voiced alveolar plosive

Manner of articulation has changed from a fricative to a plosive

Example 10: a voiceless dental fricative has been replaced by a voiceless alveolar plosive

Place of articulation has been moved back and the manner of articulation has changed from a fricative to a plosive

Voicing always remains the same. Fricatives are replaced by plosives. Place of articulation changes the most.

4. Ingram (1974) and Smith (1973) offer case studies of children with assimilation processes. A few examples are offered here for discussion. What types of assimilation processes (progressive, regressive, contact, remote) are being seen in these examples?

Example	Word	Target	Child's Production
1.	talk	[tak]	[kak]
2.	doggie	[dagɪ]	[gagɪ]
3.	blankie	[blæŋki]	[bæmbi]
4.	stop	[stap]	[bap]
5.	snake	[sneɪk]	[ŋeɪk]

#### Assimilation Processes

1. Regressive (anticipatory), remote (noncontiguous) assimilation. This is called back assimilation in Ingram (1974) and velar harmony in Smith (1973).
2. Regressive (anticipatory), remote (noncontiguous) assimilation. This is similar to the first example.
3. Progressive (perseverative), remote (noncontiguous) assimilation. Note: The reduction of [bl] to [b] would be a normal production for a young child.
4. Regressive (anticipatory), remote (noncontiguous) assimilation. The changes in voicing from two voiceless sounds [st] to a voiced sound [b] could be discussed. This might be a case of prevocalic voicing (in addition to the assimilation process) which is often seen in young children.
5. Regressive (anticipatory), remote (noncontiguous) assimilation.

5. Analyze an articulation test noting the number of syllables which are used to test the [s] and [z] sounds and how the syllable structures vary when analyzing the sounds tested in the *medial* position.



## MULTIPLE CHOICE QUESTIONS

1. Which group of speech sounds is produced with a significant constriction within the vocal tract?
  - a) consonants
  - b) onsets
  - c) vowels
  - d) syllable nuclei
2. Within the group of consonants, which specific speech sounds are produced with a relatively more open expiratory passageway?
  - a) fricatives
  - b) obstruents
  - c) sonorants
  - d) affricates
3. Which one of the following sounds is not considered a sonorant?
  - a) [ɹ]
  - b) [m]
  - c) [w]
  - d) [s]
4. A consonant that functions as a syllable nucleus is referred to as a
  - a) releasing sound
  - b) syllabic
  - c) obstruent
  - d) coda
5. Which of the following is not a parameter used to describe vowel productions?
  - a) the part of the tongue that is raised
  - b) the extent to which the tongue is raised
  - c) the manner of articulation
  - d) the kind of opening made at the level of the lips
6. Vowels which are labeled front vowels are
  - a) acoustically more intense
  - b) occur more often at the beginning of words
  - c) are produced with the front articulators such as the teeth and lips
  - d) are produced by articulatory adjustments made by more anterior portions of the tongue
7. The terms rounded and unrounded refer to
  - a) the degree of muscular activity involved in the articulation
  - b) the relative closeness of the tongue to the roof of the mouth
  - c) the positioning of the lips during vowel articulations
  - d) the position of the vowel within the syllable
8. Which one of the following is a diphthong?
  - a) the vowel usually produced in "beet"
  - b) the vowel usually produced in "in"
  - c) the vowel usually produced in "pie"
  - d) the vowel usually produced in "moon"
9. Which one of the following diphthongs is considered to be a nonphonemic diphthong?
  - a) [eɪ]
  - b) [aɪ]
  - c) [ɔɪ]
  - d) [ɑʊ]
10. Which one of the following diphthongs has a back vowel offglide?

- a) [eɪ]
  - b) [aʊ]
  - c) [ɔɪ]
  - d) [aɪ]
11. Which one of the following vowels is a high-back vowel?
- a) [u]
  - b) [ɔ]
  - c) [ʌ]
  - d) [o]
12. Diphthongs which are produced with a central vowel as the offglide are referred to as
- a) phonemic diphthongs
  - b) falling diphthongs
  - c) centering diphthongs
  - d) rising diphthongs
13. During consonant production, which one of the following refers to the vocal fold vibration?
- a) coarticulation
  - b) place of articulation
  - c) manner of articulation
  - d) voicing
14. Sibilants are a subcategory of
- a) plosives
  - b) fricatives
  - c) nasals
  - d) affricates
15. According to the International Phonetic Alphabet, what is the label given to consonants in which there is a much wider passage of air resulting in a smooth (as opposed to turbulent) airflow?
- a) laterals
  - b) approximants
  - c) plosives
  - d) fricatives
16. Why are rhotic consonants difficult to describe?
- a) because there is a gliding movement during their production
  - b) because they occur infrequently in General American English
  - c) because their production is context- and speaker dependent
  - d) because there is confusion between the rhotic consonants and the central vowels with r-coloring
17. According to the International Phonetic Alphabet, which one of the following consonants is not considered an approximant?
- a) [j]
  - b) [ɹ]
  - c) [w]
  - d) [ŋ]
18. Which one of the following descriptions describes the consonant [l̥]?
- a) voiced alveolar lateral approximant
  - b) voiced velar lateral
  - c) voiceless postalveolar lateral
  - d) voiced labiodental lateral
19. Which consonant is described as a voiceless velar plosive?

- a) [t]
  - b) [p]
  - c) [k]
  - d) [f]
20. If the word "unpredictable" is pronounced as [ʌm.prə.dɪk.tə.bəl], this is an example of a
- a) progressive assimilation
  - b) regressive assimilation
  - c) noncontiguous assimilation
  - d) perseverative assimilation
21. If the phrase "want to" is pronounced [wʌ.nə], this is an example of a
- e) noncontiguous assimilation
  - f) contact assimilation
  - g) regressive assimilation
  - h) remote assimilation
22. Given the typical pronunciation, which one of the following words has two unchecked syllables?
- i) away
  - j) captain
  - k) balloon
  - l) upset
23. What are the syllable arresting sounds of the two syllables in the word "today"?
- a) [t] and [d]
  - b) [u] and [eɪ]
  - c) [ɪ]
  - d) the word "today" has no codas, therefore, it does not have syllable arresting sounds

## TRUE/FALSE QUESTIONS

1. Only vowels can function as syllable nuclei.
2. Typically consonants have more acoustic intensity than vowels.
3. The vowel [i] is a high vowel that is unrounded.
4. In the standard pronunciation of General American English, only rising diphthongs are typically produced.
5. There is no difference in the production of diphthongs versus two vowels following one another.
6. The manner of articulation describes what type of constriction the articulators produce for the realization of a particular consonant.
7. Assimilation processes are typically classified as sound errors.
8. A syllable must have a peak and either an onset or a coda.
9. The number of syllables, the type of syllable, and the degree of syllable stress affect syllable production.
10. Standardized speech assessments account for syllable structure when establishing the words that will be used in the testing procedure.

## SHORT ANSWER QUESTIONS

1. Give the definition of vowels.
2. Which vowels are considered rounded vowels?
3. Define monophthong.
4. Which four phonetic categories are used to describe consonants?
5. Define phonetics and the three subdivisions of phonetics which were discussed.
6. What are the active articulators for consonants of General American English?
7. What are the passive articulators for consonants of General American English?
8. Define coarticulation.
9. Define assimilation.
10. List the peak, onset, and coda for the word "stretch".

## ESSAY QUESTIONS

1. List the production and linguistic function differences between vowels and consonants.
  2. The vowel quadrilateral reflects the production features of the various vowels. Discuss how the quadrilateral reflects the oral dimensions of vowel production.
  3. Distinguish between nonphonemic and phonemic diphthongs. Give word examples for both phonemic and nonphonemic diphthongs.
  4. A child says [s p] for "ship". Explain the difference phonetically between the child's production and the typical pronunciation.
  5. How might syllable structure be helpful when structuring word materials for therapy?
-

## REFERENCES

- Denes, P.B., & Pinson, E.N. (1973). *The speech chain: The physics and biology of spoken language*. Garden City, NY: Anchor Press/Doubleday.
- Ingram, D. (1974). Phonological rules in young children. *Journal of Child Language*, 1, 49-64.
- International Phonetic Association: International Phonetic Alphabet Chart. (2015). Retrieved from <http://www.langsci.ucl.ac.uk/ipa/ipachart.html>
- Kent, R. D. (1997). *The speech sciences*. San Diego, CA: Singular Publishing Group.
- Ladefoged, P., & Johnson, K. (2014). *A course in phonetics* (7th ed.). Boston, MA: Cengage Learning
- Pollock, K. E., & Keiser, N. J. (1990). An examination of vowel errors in phonologically disordered children. *Clinical Linguistics and Phonetics*, 4, 161-178.
- Shriberg, L. D., Kent, R. D., McAllister, T., & Preston, J. L. (2019). *Clinical phonetics* (5th ed.). Boston, MA: Pearson.
- Smith, N. (1973). *The acquisition of phonology: A case study*. Cambridge: Cambridge University Press.
- Weiss, C. (1980). *Weiss Comprehensive Articulation Test*. Allen, TX: DLM
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# Chapter 3

## Phonetic Transcription and Diacritics

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### LEARNING OBJECTIVES

When you have finished this chapter, you should be able to:

- Define phonetic transcription as a notational system.
  - Explain the use and value of phonetic transcription for speech-language therapists.
  - Define diacritics.
  - Identify the diacritics used to delineate consonant sounds.
  - Categorize the diacritics used to describe vowel sounds.
  - Characterize the diacritics used to mark stress, duration, and syllable boundaries.
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### CHAPTER OVERVIEW

Assessment procedures and results should be accurate, professional, and accomplished in an objective manner. This chapter introduces the International Phonetic Alphabet (IPA) as a widely used system that can provide these requisites for the assessment of speech sound disorders. The IPA system was developed to document actual phonetic realizations of speech events. It is a means of transferring highly impermanent speech events into more durable graphic representations. Such a system offers the speech-language specialist a way to substantiate assessment results as well as to communicate effectively with other professionals. Transcription should never be considered as an option; accurate transcription is a necessity for professional evaluations.

To increase the effectiveness of the IPA system, certain diacritic markers are used to add production details to the meaning of the basic symbol. These markers are indispensable to the documentation of many of the unusual realizations of our clients. One current diacritic system used for disordered speech, the extIPA, is introduced. Such diacritics are itemized, explained, and exemplified in the second section of the chapter. This section also offers clinical comments on many of the diacritics as well as actual phonetic transcriptions utilizing these marks.

The last section of this chapter demonstrates how phonetic transcription, and the detailed knowledge acquired through its use in assessment procedures, also benefit the intervention process. First, the accuracy needed for the transcription task promotes the fine-tuning of perceptual skills, a clinical proficiency that will, by its very nature, enhance the likelihood of successful intervention. Second, the specificity gained through phonetic transcription, including diacritics, translates into a far more goal-directed treatment approach, which increases clinical efficacy.

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## PRESENTATION OUTLINES

1. Underline the importance of phonetic transcription and its role in the assessment of articulatory and phonological impairments.
2. Introduce diacritic markers (narrow transcription) for the transcription of aberrant speech sound production.
3. Demonstrate how these diacritics can be used by providing examples of their clinical application.
4. Promote discussion on how phonetic transcription, and especially the diacritics, can be used within the assessment process.

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## KEYWORD DEFINITIONS

**Phonetic transcription systems** were devised to document real speech events (p. 40). There is a long history of attempts to develop phonetic notation systems. One of these systems is the International Phonetic Alphabet (IPA) which originated at the end of the 1800's. The IPA has been revised several times, most recently in 2005. It is important to realize that the IPA is a dynamic, evolving system (pp. 48-49).

**International Phonetic Alphabet (IPA)** is the most widely accepted transcription system in the world (pp. 48-49). (Note: This system was largely attributed to Paul Passy who was the Secretary of the International Phonetic Association. It was first published in 1888 and was originally designed as an aid in teaching the exact pronunciation of foreign languages.)

**Broad transcription** is a more general type of transcription based on the phoneme system of a specific language. Each symbol represents a phoneme (p. 48). Due to the fact that this system represents phonemes, broad transcription is also referred to as **phonemic transcription** (p. 48).

**Narrow transcription** is a system based on recording as much production detail as possible (p. 48). This notation uses both the symbols of broad transcription as well as extra ones. These extra symbols are added to give a specific phonetic value, in other words, to exemplify explicit production features. This type of transcription is also referred to as **phonetic transcription** to denote the inclusion of phonetic production features (p. 48).

Phonetic transcription is a **descriptive not a prescriptive system** (p. 50). The term descriptive implies that actual articulatory events are described. All symbols used stand for a defined articulatory event. For example, [b] stands for a voiced bilabial plosive. If there is not voicing or if this articulation changes in any way, these variations must be noted. It is not a prescriptive system in that "words" are not transcribed in an invariable manner. For example, the word "tan" is often produced and thus transcribed as [tæn]. However, if someone says [tɛn], which can be heard in Pittsburgh, ([ju hæv ə naɪs tɛn]), then it must be transcribed accordingly.

There are many reasons **why** phonetic transcription should be used (p. 51). First and foremost, it is the basis for the assessment of individuals with speech sound disorders. Although standardized speech assessments are often used as a portion of the diagnostic process, they are only as good as the transcription skills of the examiner. Learning phonetic transcription is a skill; It not only is an indispensable portion of the education of speech-language specialists, it is also a means by which auditory perceptual competency is trained. As practitioners become more trained in transcription, their perceptual and discrimination proficiency for speech sounds

becomes more fine-tuned.

**Diacritics** are additional transcription marks which are added to sound symbols to demonstrate a particular phonetic value, to denote modifications of the original sound (pp. 51-52). When diacritics are added, this is known as narrow transcription. Many of the diacritics used in this text are from the IPA, however, due to the range of speech aberrations practitioners encounter; often new diacritics must be devised. Various revisions have attempted to correct some of these problems. Recently specialized diacritics were developed to specifically address the transcription of disordered speech. These extensions to the IPA (extIPA) were published in 1990 and revised in 2015 (p. 52).

### **Diacritics Used With Consonants**

**Dentalization** refers to an articulatory variation in which the tongue approaches the upper incisors (p. 53). It is only used with consonants that are not normally articulated with this place of articulation. Dentalized sounds are those produced with the tongue tip further forward than is normally the case.

**Palatalization** refers to an articulatory variation in which the tongue approaches the palate (p. 53). This diacritic is only used for sounds in which their articulation does not involve the palate, for example dental or alveolar sounds. In this case, palatalized sounds are those produced with the tongue tip further back than is normally the case. Velar sounds, such as [k] and [g], can also be palatalized. In this case, palatalization refers to a more forward placement of the articulators. Palatalized [k] and [g] sounds may be produced if they are in a phonetic context with [i], for example, in [kip]: The high-front vowel placement can move the [k] production more anteriorly.

**Velarization** refers to an articulatory variation in which the tongue approaches the velum (p. 53). A prominent example of a velarized sound is the production of the so-called dark l-sound. See pages 306-311 for additional information about the dark l-sound.

**Lateralization** refers to an articulatory variation in which the airstream is released laterally (pp. 53-54). There is one lateral sound in General American English, [l]; for this sound the lateralization symbol would not be used. Clinicians often encounter lateral [s] and [z] which are considered misarticulations. The IPA symbols [ɬ] (voiceless) and [ɮ] (voiced) lateral alveolar fricatives, are used to transcribe these sounds (p. 54).

There are two types of **voice symbols**: Partial devoicing (of voiced consonants) and partial voicing (of voiceless consonants) (pp. 55-56). Partial devoicing and voicing are perceptually difficult to discern. There is a general tendency for partial devoicing at the end of words or utterances. This can often be heard in standardized speech assessments.

**Aspiration** of plosives is marked by a small elevated [h] following the consonant, for example [p<sup>h</sup>it], for “Pete” (p. 56). Normal aspiration usually remains unmarked. If a normally aspirated stop-plosive is not aspirated, the diacritic [=] is placed following the consonant in question, for example [p=a], for *pie*. Edwards (2003) states that voiceless plosives are aspirated at the beginning of words but not in consonant clusters; word-final aspiration appears to be variable. Kantner and West (1960) state that voiceless unaspirated plosives occur in three contexts: 1) when a voiceless plosive is followed by a voiced plosive as in “sit down” or “right door”, 2) initiating unstressed syllables, for example “city”, “pretty”, and 3) directly linked with a



preceding [s] as in “stand”, “school”.

**Nonaspiration** refers to a sound which is typically aspirated (in this case, plosives) produced without this aspiration (p. 56). The diacritic for unaspirated plosives is [=] which is placed after the symbol in question. Therefore, [t̚i] is the production of “tea” without the aspiration of [t].

**Unreleased** refers to a modification of plosives in which the articulatory closure is maintained and not, as usual, released (pp. 57-58). The symbol for this is ̚ placed following the consonant, for example [t̚p̚] indicates an unreleased [p]. Only plosives can be unreleased.

**Syllabic consonants** are sonorant consonants or semivowels which represent nuclei of syllables (p. 57). Syllabics are marked with a straight line under the consonant in question, for example [lɪ̩t̩l̩] for “little”.

**Labialized** and **nonlabialized** sound productions indicate consonants normally produced without lip rounding which are now rounded (labialized) as well as those consonants which are normally produced with lip rounding which become unrounded (nonlabialized) (pp. 57-58). The diacritic for a labialized production is a superscript “w” placed to the right of the symbol; for nonlabialized productions a double-sided arrow is placed under the symbol (see page 58 and the clinical comments on pages 58-59).

The consonant [ʃ] can be nonlabialized while other consonants may become labialized primarily due to the phonetic context in which they occur. Unrounded consonants may become labialized when followed by, for example, rounded vowels such as [u].

**Derhotacization** is the loss of r-coloring for the consonant [ɹ] and the central vowels with r-coloring (p. 58). The central vowels with r-coloring lose the rhotic symbol [ɹ], thus becoming [ə] or [ɜ]. Depending on the production, a derhotacized [ɹ] may be transcribed as [ʋ] which is a voiced labiodental approximant.

### Diacritics Used With Vowels

**Rounding** occurs when vowels which are typically not rounded are produced with more lip rounding than is usual (p. 59). For example, [i] is normally articulated with no lip rounding. If [i] were produced with lip rounding then this would be a case of rounding. The rounding symbol may be used with front vowels to denote that their characteristic lip spreading has changed. See page 59 for examples of the symbols.

**Unrounding** is the opposite: vowels are produced with no rounding which typically evidence lip rounding in their production (p. 59). The symbol for unrounding can be used with back vowels which (with the exception of [ɑ]) typically display some degree of lip rounding. See page 59 for examples of the symbols.

**Raised** tongue position for vowels refers to an articulation in which the tongue is somewhat elevated, in the direction of the next highest vowel (pp. 58-59). A raised [ɪ], for example, will change in the direction of [i] while still being identifiable as [ɪ]. A

raised [æ] would be noted as [æ̈́] with a t-shaped arrow pointing upward.

**Lowered** tongue position refers to a vowel which is produced with the tongue elevation somewhat lowered, perceptually in the direction of the next lowered vowel on the quadrilateral (pp. 59-60). A *lowered* [i] will attain certain [ɪ] like qualities but, again, still be perceived as an [i] vowel. A lowered [i] would be transcribed as [i̯], with the t-shaped arrow pointing downward.

**Advanced** tongue positions occur when the specific vowel production is somewhat frontalized, positioned more anterior in the mouth than is normally the case (p. 60). This is transcribed with a small diacritic mark + placed under the vowel sign in question.

**Retracted** tongue positions occur when the vowel production is somewhat further back in the mouth than is normally the case; the tongue position is more posteriorly located (p. 60). The diacritic for a retracted tongue position is a small – placed under the vowel in question.

### Nasality Symbols

**Nasality** and **denasality** are also marked by diacritics (pp. 61-62). **Nasality symbols** can only be added to consonants and vowels which are not generated with the velum in a lowered position, i.e., non-nasal sounds. In American English this consists of all consonants and vowels except for the nasals. These diacritics are not typically used unless the nasality is perceived as being excessive. The diacritic for nasality is a tilde ~ placed above the symbol in question. The diacritic for **denasality** is reserved for nasal consonants, [m], [n], and [ŋ]. The diacritic consists of the tilde ~ with a line through it.

### Diacritics For Stress, Duration, And Syllable Boundaries

**Primary** and **secondary stress** are commonly the only stress features marked with diacritics (pp. 62-63). Primary stress is marked with a superscript short straight line placed before the syllable while secondary stress is indicated by a subscript short straight line in front of the syllable in question. The word “away” would be transcribed with primary and secondary stress as [ə<sup>ˈ</sup>wɛɪ<sub>ˈ</sub>].

**Lengthening** of a sound is marked by one or two dots placed vertically following the respective sound (p. 63). Two dots indicate a longer duration than one dot.

**Shortening** of a sound uses a rounded u-type diacritic which is placed above the sound in question. See page 63 for an example of the symbol. Unlike lengthening, different degrees of shortening are not marked.

**Syllable boundaries** are marked by a period placed between the syllables (p.63).

### Additional Symbols

There are several additional symbols which might prove helpful when transcribing the speech of children with speech sound disorders. This list is not meant to include all symbols which might be necessary.

A **glottal stop** is produced when a closed glottis is suddenly released after a build-up of subglottal air pressure (p. 63). The symbol [ʔ] indicates such a stop production. Children with speech sound disorders may use glottal stop substitutions.

**Bilabial fricatives** can also be seen as sound substitutions in aberrant productions. The symbol [ɸ] represents the voiceless bilabial fricative while [β] denotes the voiced bilabial fricative (p. 64).

**Palatal fricatives** are produced with the tongue in a more posterior position than [ʃ] or [ʒ] and may be heard as substitutions for these sounds (p. 64). The IPA symbol for the voiceless palatal is [ç]; the voiced is transcribed as [j̃].

**Postdorsal-velar fricatives** may be produced by children who are attempting to articulate [k] and [g] but do not elevate the tongue enough to create complete closure between the articulators (p. 64). The voiceless velar fricative is transcribed as [x]; its voiced counterpart is noted as [ɣ].

**Postdorsal-uvular stops** are another possible misarticulation of [k] and [g]. Relative to [k] and [g], the place of articulation is more posterior for the uvular plosives (p. 64). The voiceless and voiced uvular plosives are transcribed as [q] and [g̃].

The **flap, tap, or one-tap trill**, [ɾ], is a frequent allophonic variation of [t] and [d] in words where these plosives are preceded and followed by vowels, as in “city”, “butter”, or “ladder” (p. 64). It is produced by a single tap of the tongue tip against the alveolar ridge.

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## LEARNING MATERIALS: ANSWERS TO QUESTIONS

### FROM TEXTBOOK CASE STUDY (PAGES 68-69)

What additional information do the diacritics provide?

The broad transcription results indicate that Jordan is producing [s] and [z] accurately, both at the beginning and end of a word. The only exception to this is “bus” in which the [s] is produced as [θ]. However, the narrow transcription indicates both dentalized and palatalized [s] and [z] productions on a fairly consistent basis. Therefore, narrow transcription results demonstrate the use of distortions for both [s] and [z].

Do you see a pattern for the palatalized versus dentalized [s] and [z]?

When [s] or [z] are followed or preceded by front vowels a dentalized production is used. On the other hand, when [s] or [z] are preceded or followed by back vowels,

the palatalized [s] or [z] is demonstrated. With central vowels the pattern is variable. It appears that when [s] precedes a central vowel the palatalized [s] is shown, however, when [s] follows a central vowel, as in “bus”, the [θ] is produced. More examples would need to be tested to confirm this hypothesis.

### THINK CRITICALLY: ANSWERS (PAGE 69)

1. The [θ] production is an dental or interdental articulation. The dentalized [s] indicates that the tongue tip is approaching the teeth; however, the tip of the tongue is not as far forward as for the [θ] production. Thus, one hears the characteristic difference in sound quality between [θ] and [s̺].

The feature that would need to be changed to produce a standard [s] would be the place of articulation. If the substitution is a [θ] or a [s̺], the place of articulation is too far forward. Thus, the interdental or dental [θ] and the dentalized [s] both have a place of articulation that is more anterior in the mouth than is normally the case for [s].

In an attempt to explain this to a child it would be important that he/she understands that the tongue tip needs to be moved back. Several possibilities would exist from demonstrating this to a child to using some type of mechanical device (such as the flat side of a tongue depressor) to push the tongue back.

2. The [ʃ] symbol with the two-sided arrow under it indicates that the [ʃ] lacks its characteristic lip rounding. To change the production to a standard one, the clinician would need to introduce simultaneous lip rounding to the sh-production. Vowel contexts which would assist this necessary lip rounding would include back vowels with their characteristic lip rounding. Especially the high-back vowels [u] and [ʊ] placed before or after the [ʃ] production would enhance lip rounding.

3. Context related or aberrant productions:

[aɪ wʌnt t̺u go t̺u s̺ʌ bɪt ʃ ]

I want to go to the beach

Note: There should be a dentalized symbol above and below the [t] transcriptions in [tu] (two times) indicating an interdental production.

The interdentalized production of [t] would be considered aberrant as well as the dentalized [s] for th-production. Also the lack of lip rounding on [ʃ] “beach” would not be considered a standard production.

[sʲæli ʔɛd wi kʊdʹ goʊ]

Sally said we could go.

The palatalized [s] in “Sally” would not be characteristic, especially as the following vowel is a front vowel. The lateralized [s] in “said” is also an aberrant production. The unreleased [d] (“could”) is considered normal, it could happen at the end of a word or phrase.

[  
[dæŋ wʌnt̩s tu s<sup>w</sup>wɪm]  
]

Daddy wants to swim.

The flap, tap, one-tap trill in “Daddy” is a normal production. The dentalized [s] preceded and followed by [t] would probably be considered aberrant, the alveolar placement of [t] would not typically cause the [s] to be more anteriorly articulated. The labialized [s] in “swim” could be considered context related. The lip rounding of [w] could influence the [s] causing it to be rounded as well (regressive contact assimilation).

[ɪt wɪl bi fʌn] Note: The [f] in “fun” should be marked with a partial voicing diacritic.

It will be fun.

The dark [ɪ] or velarized [ɪ] would be considered a standard production. The dark [ɪ] can be heard at the end of words. This might be a bit untypical as the [ɪ] is preceded by a high-front vowel which could result in a light [ɪ] articulation. The partially voiced [f] in “fun” would probably be a normal realization. The [f] is preceded and followed by voiced vowels.

4. Syllable boundaries and primary stress markers:

out. 'spo.kən [aʊt. 'spou.kən]

in.spir. 'a.ti.ən [ɪn.spə. 'ei. ʃən]

na.ti.ə.nəl [ 'næ. ʃə.nəl]

mon.u. 'men.təl [mɑn.u. 'mɛn.təl]

Ok. 'to.ber [ɑk. 'tu.ber]

5. Identify the symbols and possible substitutions:

[x]: voiceless velar fricative. Could be used for a substitution for [k] in which complete closure is not established as air escapes through a narrow opening.

[ʔ]: voiceless glottal stop. Could be used for a sound substitution for [k] but is also used as a sound substitution for other sounds at the beginning of a word or syllable.

[ɬ]: voiced lateral fricative. Could be used for a sound substitution for [z] in which the tongue tip has contact with the alveolar ridge but the lateral edges are lowered and there is lateral air flow. Thus, the articulators are similar to [z], however, the manner

of articulation is lateral, not central air flow.

[ʋ]; voiced labiodental approximant. Could be used as a substitution for [ɹ] in which the articulators are shifted to a more anterior position.

## ADDITIONAL LEARNING MATERIALS

### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

1. Have the students attempt to produce various sounds with and without the diacritic specifications. For example, they could produce a typical release of a plosive versus one with an unreleased realization, or a voiced consonant versus one that is partially devoiced. Have them tape-record these productions and listen to them. Discuss the differences they hear between the two productions.
2. Have the students observe a diagnostic session with a child who has a speech sound disorder. (A good video recording might be substituted). They should then transcribe the child's productions using diacritic markers where appropriate.
3. Bring a phonetic transcription of a child to class in which diacritics were extensively needed. Discuss how these diacritics contributed to the understanding of the production characteristics of the child.
4. The following transcriptions (Questions # 4 and 5) have been slightly modified from the examples given in Ball and Kent (1997), p. 2.

Speaker A. Age 7;3. Broad transcription

Word	Transcription	Word	Transcription
shop	[ʃɑp]	shoe	[ʃu]
see	[ʃi]	seat	[ʃit]
ship	[ʃɪp]	wash	[wɑʃ]
sip	[ʃɪp]	yes	[jɛʃ]
rush	[ɹʌʃ]	kiss	[kɪʃ]
cushion	[kʊʃən]	messy	[ˈmɛʃi]

Discuss which speech sound difficulties this child demonstrates. Which phonemic contrasts are not evidenced?

5. The following is a transcription of the same child using narrow transcription.

Speaker A. Age: 7;3. Narrow transcription

Word	Transcription	Word	Transcription
shop	[ʃɑp]	shoe	[ʃu]
see	[s <sup>j</sup> i]	seat	[s <sup>j</sup> it]
ship	[ʃɪp]	wash	[wɑʃ]
sip	[s <sup>j</sup> ɪp]	yes	[jɛs <sup>j</sup> ]
rush	[ɹʌʃ]	kiss	[kɪs <sup>j</sup> ]
cushion	[kʊʃən]	messy	[ˈmɛs <sup>j</sup> i]

The [s<sup>j</sup>] is a palatalized [s]

What additional information has this narrow transcription provided? Does this possibly have a bearing on the diagnosis for this child?

6. The following transcription is from Matthew, age 4:6. Discuss what the diacritics/transcriptions indicate for each of the sounds. Which productions would be considered typical articulations, possibly resulting from assimilation processes, and which would be considered misarticulations?

This morning I snuck up on my cat.

[ðɪz mɔːnɪŋ aɪ snʌk ʌp ɒn maɪ kæt ɪ]

I like my cat, Tigger.

[ɪ laɪ k maɪ : k = æt tɪg ə]

He's a big fur ball.

[hɪz<sup>j</sup> ə bɪg fɜː p ɔːl]

He's brown and his tummy he has white all over him

[hɪz<sup>j</sup> braʊn ænd hɪz tʌ mɪ hi hæz waɪ t ɔːl ovə hɪm]

## MULTIPLE CHOICE QUESTIONS

1. The International Phonetic Alphabet offers a one-to-one correspondence between phoneme realizations and?
  - a) perceptual categories
  - b) sound symbols
  - c) diacritical markers
  - d) listening skills
2. Phonetic transcription is descriptive. What does this mean?
  - a) that every sound has many different symbols
  - b) that there is a right and wrong way to transcribe a word
  - c) that diacritical marks must always be used
  - d) that special symbols are used to indicate the articulatory makeup of real utterances
3. Why should clinicians use phonetic transcription?
  - a) it provides a verifiable documentation of the sound productions at a specific point in time
  - b) it is widely used by other clinicians and can be interpreted by them as well
  - c) it is the basis for an accurate assessment
  - d) all of the above
4. Diacritics are
  - a) phonetic symbols for specific phonemes
  - b) marks added to sound transcription symbols to give them a particular phonetic value
  - c) a portion of a perceptual system
  - d) never used when transcribing deviant articulatory patterns
5. Which one of the following would indicate a dentalized [s] production?
  - a) [ ]
  - b) [s:]
  - c) [ ]
  - d) [ ]
6. The posterior movement of the tongue placement in the direction of the velum for palatal sounds is referred to as
  - a) palatalization
  - b) dentalization
  - c) velarization
  - d) lateralization
7. Palatalized [s] sounds approach the quality of
  - a) [tʃ]
  - b) [j]
  - c) [ʃ]
  - d) [θ]
8. Which one of the following sounds is typically produced as a lateral?
  - a) [d]
  - b) [n]
  - c) [p]
  - d) [l]
9. If the transcription is [kʌp̚], this indicates that
  - a) the [p] sound was produced with lip rounding
  - b) the [p] sound was unreleased
  - c) the [p] sound was partially voiced
  - d) the [p] sound was overly long
10. The transcription is [hɑps̚] for "hops". The mark after the [s] indicates that



- a) it was partially devoiced
  - b) it was denasalized
  - c) labialization occurred, the [s] was produced with lip rounding
  - d) the [s] was produced posteriorly, it was palatalized
11. The child says "Sue" and produces a labialized [s]. This is
- a) a misarticulation
  - b) due to the lip rounding of the following high-back vowel
  - c) correct, [s] is normally labialized
  - d) marked [s̠]
12. A raised [ɔ] would basically be perceived as [ɔ], however, it would sound as if it had qualities of which vowel sound?
- a) [o]
  - b) [ɑ]
  - c) [ʌ]
  - d) [u]
13. If a front vowel is produced with a retracted tongue position, it might be perceived as if it had qualities of which vowel?
- a) a back vowel
  - b) a central vowel
  - c) a high-front vowel
  - d) a low-front vowel
14. Which one of the following would indicate the typical primary stressing of the word "umbrella"?
- a) [əm.'brɛ.lə]
  - b) [əm.brɛ.'ʌ ]
  - c) ['ʌm.brɛ .lə ]
15. If "cool" is transcribed [ku:l], this indicates that
- a) there was a pause between the [u] and [l] sounds
  - b) the [u] sound was produced with a retracted tongue position
  - c) the [l] sound was shortened in duration
  - d) the [u] sound was produced clearly longer than normal in duration
16. If a child is attempting to produce [g], creating a complete closure but the place of articulation is uvular, which of the transcriptions would you use?
- a) [g]
  - b) [r]
  - c) [ɣ]
  - d) [ʔ]
17. Which one of the following phonetic symbols indicates a closed glottis that is suddenly released after a build-up of subglottal air pressure?
- a) [x]
  - b) [r]
  - c) [v]
  - d) [ʔ]
18. Which one of the following symbols indicates a voiceless bilabial fricative?
- a) [ɸ]
  - b) [β]
  - c) [x]
  - d) [v]
19. Which one of the following symbols indicates a sound produced by a single tap of the tongue tip against the alveolar ridge?
- a) [x]

- b) [ɹ]
- c) [ʊ]
- d) [ʔ]

20. Rather than just noting a distorted [s] production, using diacritic markers to signal a palatalized versus a dentalized [s] production
- a) provides a better basis for goal-directed therapy
  - b) fine-tunes our auditory perceptual skills to aid the assessment process
  - c) increases the effectiveness of the assessment process
  - d) all of the above

## TRUE/FALSE QUESTIONS

1. A high-quality audio-recording alone is sufficient for documenting assessment and therapy progress.
2. Our own perceptual biases may play a role in our transcription abilities.
3. The diacritic marker for a dentalized production should be used with interdental sounds such as [θ] and [ð].
4. The dark [ɫ] sound is an example of velarization.
5. The [ɹ] sound is typically used with the diacritic for nonlabialization.
6. Changes in tongue placement for vowels do not alter the vowel quality.
7. If [u] is produced with a slightly lowered tongue position, the resulting vowel quality will approximate [o].
8. Secondary stress is marked with a straight superscript line in front of the syllable.
9. The glottal stop can be noted as a sound substitution in children with speech sound disorders.
10. Normal aspiration is typically marked in utterances.

## SHORT ANSWER QUESTIONS

1. What are diacritics?
2. Why are diacritics important when transcribing disordered speech?
3. Explain what is meant by the statement that phonetic transcription is not a prescriptive system.
4. Contrast the productions of a dentalized versus a palatalized [s] sound.
5. Explain how a lateralized [s] sound is produced.
6. Discuss why it is important to note an unreleased plosive as you transcribe rather than relying on the audio recording.
7. Explain how diacritics are used with vowel deviations.
8. Explain the differences in production between a light [ɹ] sound, an alveolar lateral, and a dark [ɫ] sound, a velarized production.

9. Explain how the voiced and voiceless velar fricatives are produced. Why might the velar fricatives be used as a substitution for [k] and [g]?
10. Explain how the voiced and voiceless bilabial fricatives are produced.

## ESSAY QUESTIONS

1. Explain why clinicians should use phonetic transcription in the assessment and treatment process?
2. There are also several problems which must be considered when using phonetic transcription. What are some of the factors which may affect our transcription?
3. A distinction is made between a labiodental approximant production and a [w] for [ɹ] substitution. Why would this distinction be important when assessing a child?
4. Using the vowel quadrilateral as a reference point, discuss the production and perception of [o] if it is raised, lowered, and produced with a more forward tongue articulation.
5. Give examples of words which might result in a labialized [s] due to coarticulation factors.

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## REFERENCES

- Ball, M. J., & Kent, R. D. (1997). *The new phonologies: Developments in clinical linguistics*. San Diego: Singular Publishing.
- Edwards, H. T. (2003). *Applied phonetics: The sounds of American English* (3rd ed.). San Diego: Singular Publishing.
- Kantner, C., & West, R. (1960). *Phonetics* (rev. ed.). New York: Harper & Brothers.
- Shriberg, L. D., Kent, R. D., McAllister, T., & Preston, J. L. (2019). *Clinical phonetics* (5th ed.). Boston, MA: Pearson.
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# Chapter 4

## Theoretical Considerations and Practical Applications

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### LEARNING OBJECTIVES

When you have finished this chapter, you should be able to:

- Describe the evolution of the phoneme concept and its clinical application
  - Define distinctive features and classify sounds according to these parameters.
  - Describe generative phonology and how it can be applied to disordered speech.
  - Identify naturalness, markedness, implicational universals, and their clinical applications.
  - Define natural phonology and give examples of phonological processes.
  - Differentiate nonlinear phonologies, specifically feature geometry and optimality theory.
  - Introduce the sonority sequencing principle and its application to selecting targets.
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### CHAPTER OVERVIEW

This chapter first introduced some of the basic terminology and principles underlying contemporary phonological theories. The relationship between the sound form and the sound function (the phoneme) was established as a basis for the understanding of phonological theories. The development of the phoneme concept was traced historically to provide a foundation for the understanding of how phonological theories could evolve from this “new” concept. Clinical application of these basic principles stressed the interrelationship between sound-form and sound-function.

The remainder of this chapter was a summary of several different phonological theories that have impacted the assessment and treatment of phonological disorders. These theories were enumerated in a historical sequence. The linear phonologies were represented by distinctive feature theory, generative phonology, and natural phonology. The nonlinear phonologies included feature geometry, and optimality theories. Each phonological theory was discussed in respect to what the theoretical framework stands for, how it developed, how it functions, and its clinical implications.

The field of phonology is constantly evolving. Current phonological theories are an attempt to describe the phonological system with all its complexity in a different manner. Although some of the newer models have yet to stand the test of time and research, all offer new insights into the intricate nature of normal and impaired phonological systems.

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## PRESENTATION OUTLINES

1. To reintroduce the basic concepts of the phoneme and phonology as they relate to the development of phonological theories.
2. To acquaint students with the following contemporary phonological theories: distinctive feature theory, generative phonology, natural phonology, and the nonlinear phonologies exemplified by feature geometry, and optimality theory.
3. To trace the development of each of the aforementioned theories and underline their basic components.
4. To demonstrate how each of these theories can be applied to the assessment of children with speech sound disorders.

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## KEY WORD DEFINITIONS

**Distinctive features** are phonetic constituents that distinguish between phonemes (p. 77). Certain sound properties might be similar between phonemes, others dissimilar. Take [m] and [n] as examples. Both are similar in respect to manner of articulation, both are nasals. However, they are dissimilar in respect to place of articulation, bilabial in the case of [m], alveolar in the case of [n]. These dissimilar features establish [m] and [n] as separate phonemes of General American English. Distinctive features are used to analyze these similarities and dissimilarities. Distinctive features were envisioned as a means to categorize all the speech sounds in all the languages of the world.

**Binary systems** use + and - signs to indicate presence or absence of distinctive sound features (p. 77). Both /m/ and /n/ are + nasal whereas /n/ is + coronal, /m/ is - coronal.

**Major class features** characterize and distinguish between three production possibilities that result in different basic sound classes: Sonorant, Consonantal, and Approximant (pp. 78-79).

**Universal features and characteristics** exist between the phoneme systems of different languages (p. 69).

**Cavity features** refer to the place of articulation (p. 79).

**Manner of articulation features** specify the way the articulators work together to produce sound classes, signaling production differences between plosives and fricatives, for example (p. 79).

**Source features** refer to subglottal air pressure, voicing, and stridency (pp. 79-80).

**Surface-level representation** is the actual end product of production or the concrete realization of speech (p. 83).

**Underlying form** or **deep structure** are purely theoretical concepts that are thought to represent a mental reality at the core of language use (p. 83).

**Phonological representation** refers to the underlying form in generative phonology (p. 83).

**Phonetic representation** is the surface form in generative phonology (p. 83). It refers to the surface-level representation.

**Phonological rules** govern how the phonological representation (or the underlying

representation or deep form) is transformed into the actual pronunciation (surface form) (p. 83).

**Generative Phonology** is the application of principles of generative (or transformational) grammar to phonology (pp. 84-85). In generative phonology, the concept of *underlying form* was added. This is a theoretical concept in which some sort of mental reality is implied in the way people use language (Crystal, 2010). This underlying form is exemplified by a speaker/listener's language competency. Generative phonology is not currently used for clinical purposes, however, it had a decisive influence on newer phonological constructs, primarily on Natural Phonology and the Nonlinear Phonologies.

**Naturalness** designates the relative simplicity of a sound's production and its high frequency of occurrence in many languages (p. 85). [m], for example, fulfills both requirements; it is a more "natural" sound if it is compared to speech sounds such as [tʃ] or [ð].

**Generative naturalness** designates two features: 1) the relative simplicity of a sound production and 2) its frequency of occurrence in languages (p. 85). More natural sounds are, thus, easier to produce and occur more frequently in languages of the world. The stop-plosive [p] is considered to be a natural sound.

**Generative markedness** refers to sounds that are relatively more difficult to produce and found less frequently in languages (p. 85). The affricates are considered to be marked sounds; they are relatively difficult to produce and occur seldom in languages.

**Unmarked sounds** are those that are more natural, i.e., a relatively simple production and a high frequency of occurrence in all languages (p. 85).

**Implicational universals** describe sound properties in which one property is, according to theoretical constructs, predictive of another (pp. 86-87). This predictive property could be stated as the presence of X implies Y. However, this cannot be turned around and be accurate; the existence of Y does not imply X. As an example, fricatives within a phonological system imply that there are stops (X implies Y), but the presence of stops does not mean that fricatives are within the system (Y does not imply X). See Table 4.5 on page 87).

**Natural Phonology** was designed to explain the orderly development of the phonological system in children on the basis of naturalness theories (p. 88). An innate, universal set of phonological processes is said to govern this development.

**Phonological processes** are conceptually thought to be innate and universal (p. 88). Phonological processes are easier for a child to produce and are substituted for sounds, sound classes, or sound sequences when the child's motor capacities do not yet allow their norm realization.

**Natural processes** are those phonological processes that occur regularly in the speech of most children across languages during the development period (p. 88).

**Limitation** is a mechanism within natural phonology to account for the adaptive changes in the gradual acquisition of the adult phonological system by children (p. 88). For example, children regularly substitute an unmarked sound class, stops, for example, for a member of a marked sound class, fricatives, for example, [p/f]. Later, this global substitution of stops for fricatives might be limited to [s] and [z]. Now only [s] and [z] have stop substitutions ([t/s] and [d/z]).

**Ordering** is another recognizable step in the gradual revision of the phonological system

from its innate state to the adult norm (p. 88). A child's first revisions may appear unordered, e.g., [s] as well as [z] might first be realized as [t]. Later, though, the child begins to "order" the revisions in a manner that [s] is still replaced by [t], but [z] is now replaced by [d]. Thus, "Sue" and "zoo" were first both realized as [tu]. Ordering changes this pattern later to [tu] for "Sue" and [du] for "zoo".

**Suppression** is a term used in natural phonology to refer to the abolishment of previously employed phonological processes (p. 88). Since voiced stops, for example, are more marked than voiceless ones, the child might first substitute the voiceless cognate for the voiced one, a process known as devoicing. In these cases /pɪg/ is realized as [pɪk]. Later, this substitution process becomes "suppressed". Now, /pɪg/ is realized as [pɪg].

**Syllable structure processes** are those phonological processes that affect the structure of a syllable. Weak syllable deletion ([næɪə] for "banana" or cluster reduction, realizing "spoon" as [pun]), are examples (p. 89).

**Substitution processes** refer to those processes in which specific production features are substituted for the norm features (pp. 89-90). The substitution of a voiceless alveolar plosive for a velar plosive, a [t/k] substitution, exemplifies this type of process. A [t] for [k] substitution would be labeled fronting, the production features of [k] are "fronted", the end product being [t].

**Assimilatory processes** (also called **Harmony Processes**) are those in which the articulatory properties of one sound influence the production of another (pp. 89-90). If the word "yellow" was realized as [ɛləʊ], this might be considered a liquid assimilation, i.e., the replacement of a nonliquid sound by a liquid one.

**Nonlinear phonologies** are a group of phonological theories in which single sound segments are seen as being governed by more complex linguistic dimensions, i. e., stress, intonation, metrical and rhythmical factors (pp. 93-94). According to nonlinear phonologies the linear succession of sound segments plays a subordinate role. Nonlinear phonologies demonstrate the hierarchical relationship between sound features by using various hierarchically structured diagrams.

**Feature geometry** one type of nonlinear phonology uses independent, hierarchically organized tiers to explain phenomena below the segmental level, a hierarchical arrangement of features. Features are considered autonomous units that are arranged in a hierarchy and can combine and recombine into segments. (p. 94). It also attempts to explain and depict why some features are affected by assimilation processes (spreading) while others are affected by neutralization or deletion processes (delinking) (pp. 98-99).

**Root node** is the over-riding tier of feature geometry. All other tiers are considered lower levels of representation (p. 95).

**Laryngeal node** is one of the main level nodes which, in American English, governs voicing (pp. 95-96).

**Manner features** are one of the main level nodes in feature geometry which dominate consonant, sonorant, continuant, nasal, and lateral features (pp. 95-96).

**Place features** are one of the main level nodes in feature geometry which dominate labial, coronal, and dorsal nodes (p. 95-96). See also Table 4.6 for an overview of the feature geometry consonant specifications.

**Spreading** is a term used for features affected by assimilation processes; in feature geometry spreading is also known as linking (p. 98).

**Deletion** is a technical term in feature geometry which is exemplified by neutralization or deletion processes, also known as delinking (p. 98).

**Optimality theory** is a constraint-based phonological theory which explains language universals, phonological acquisition, and phonological disorders according to specific constraints which are imposed upon the patterns (pp. 100-106). Constraints are based on the principles of markedness.

**Faithfulness** is one type of constraint which functions within the phonological system (pp. 102-103). Faithfulness constraints require that input and output forms be identical.

**Markedness** is another type of constraint which requires output forms to be unmarked or simplified in nature (pp. 102-103). Faithfulness and markedness are opposing, antagonistic properties which are mediated by the evaluator (EVAL) to determine the optimal output. The optimal output is determined by the properties of that particular language.

**Evaluator (EVAL)** is a formal mechanism within optimality theory which evaluates all possible outputs to determine the optimal output (p. 102).

**Generator (GEN)** is another formal mechanism within optimality theory which potentially can generate an infinite number of possible phonetic forms and links the input with potential outputs (p. 102).

**Phonotactic rules** of American English are outlined on page 108.

**Sonority Values** for sounds of American English are outlined on pages 109 (Figure 4.4) and Table 4.8



## LEARNING MATERIALS: ANSWERS TO QUESTIONS FROM TEXTBOOK THINK CRITICALLY (PAGE 112) : ANSWERS

Summarize Ryan's substitutions according to phonological processes:

[s] ⇒ [θ] 5X	fronting (horse, this, house, whistle, sun)
[θ] ⇒ [f] 3X	labialization (bathtub, thumb, mouth)
[tr] ⇒ [tw] 2X	cluster substitution, gliding (train, tree)
[j] ⇒ [w]	gliding of glide (yellow)
[g] ⇒ [k]	devoicing (pig)
[s] ⇒ [s̺]	fronting (swinging)



[p] ⇒ [pw}	cluster substitution, gliding of liquid (plane)
[ld] ⇒ [d]	cluster reduction (cold)
[dʒ] ⇒ [d]	stopping (jumping)
[st] ⇒ [θt]	cluster substitution, fronting (stove)
[ɹ] ⇒ [w]	gliding of liquid (ring)
[gɹ] ⇒ [gw}	cluster substitution, gliding (green)
[ð] ⇒ [d]	stopping backing ( <u>th</u> is)
[tʃ] ⇒ [ʃ] 2X	deaffrication (chair, watch)
[ʃ] ⇒ [s]	palatal fronting (shoe, fish)
[z] ⇒ [ð]	fronting (zipper)
[z] ⇒ [θ]	fronting devoicing (nose)
[ps] ⇒ [p]	cluster reduction (steps)
[st] ⇒ [t]	cluster reduction (nest)
[ks] ⇒ [kθ]	cluster substitution, fronting (books)
[ts] ⇒ [t]	cluster reduction (carrots)

The end of “jumping” [n] and the flap in “ladder” were considered acceptable pronunciations.

The following phonological processes demonstrate a large number of occurrences: fronting (11X), gliding (5X), and cluster substitution (5X) and cluster reduction (5X).

## ADDITIONAL LEARNING MATERIALS

### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

1. Using the words from Ryan (Think Critically on pages 112-113) list his errors according to distinctive features?
2. The following small sample of words is from Jenna, a 5;6 year old child with a speech sound disorder:

broom	[bwu]	flag	[flæ]
Hammer	[hæmə]	drum	[trʌm]
sandwich	[sæmɪʃ]	Rabbit	[wæbɪ]
fingers	[fɪŋgəʒ]	Feather	[fɛdə]
Vacuum	[væku]	skunk	[tʌnt]
stove	[toub]	zipper	[dɪpə]
Thumb	[tʌm]	car	[kɑə]
balloon	[bəlʉ]	swing	[fwɪŋg]
string	[twɪŋ]	music	[muzɪ]
zoo	[du]	orange	[ɔwɪntʃ]

Have the students identify the sound substitutions and deletions.

3. Using the words from Jenna (Question #2) have the students identify the phonological processes this child demonstrates.
4. Fill in the markedness and faithfulness constraints (the ones with question marks) which are based on the explanations from Table 4.7, page 103.

Constraint	Definition	Violation	Nonviolation
<b>Markedness</b>			
*Complex	No clusters	flag	[????] flag [????]
*Coda	No final consonants	moon	[????] mun [mu]
*Fricatives	No fricatives	zip	[????] zip [????]
* Liquid [l]	No liquid [l]	look	[lʊk] [lʊk] [????]
<b>Faithfulness</b>			
Max	No deletion	bat	[????] [bæt] [bæt]
Dep	No insertion	sip	[slɪp] sip [????]
Ident-Feature	Don't change features	red	[????] [ɹɛd] [ɹɛd]

## MULTIPLE CHOICE QUESTIONS

- Although each of the theories in this chapter differs, they all have one common feature. What is this?
  - they are all linear phonologies
  - they all use distinctive features
  - they all differentiate between the phonetic level and the phonemic level
  - they all use phonological processes
- The phonetic level is related to the surface level form while the phonemic level is related to
  - speech sounds
  - the underlying form
  - distinctive features
  - the phonemic inventory
- Distinctive features are
  - "atomic" constituents of sound segments which cannot be broken down any further
  - meaning differentiating units which are the same as phonemes
  - based on the phonotactics of the language in question
  - all of the above
- The binary system of distinctive features refers to
  - the two levels, surface level phonetic form and underlying functional level
  - the concept that there are two features which distinguish between phonemes
  - a system to signal the presence or absence of certain features
  - the two groups of distinctive features which differentiate vowels from consonants
- Distinctive features are
  - a means of analyzing universal similarities and differences among phoneme systems of various languages
  - not represented by one system, several different feature systems exist
  - commonly based on articulatory features but acoustic parameters have been used as

- well
- d) all of the above
6. Distinctive features can be used clinically to demonstrate
    - a) the difference between speech sound deletions and substitutions
    - b) patterns of errors
    - c) allophonic variations
    - d) where the binary system breaks down
  7. Naturalness (as opposed to markedness) relates to the relative simplicity of the sound production and
    - a) how many children use the sound by age 3
    - b) whether the sound is contained in the child's phonetic and phonemic inventories
    - c) its frequency of occurrence in General American English
    - d) its high frequency of occurrence in many languages
  8. Which one of the following concepts was introduced in natural phonology?
    - a) faithfulness and markedness
    - b) phonological processes
    - c) sonority rankings
    - d) tiered representation
  9. Which of the following phonological processes would indicate that [sk]□[t] in "skate" [teɪt]?
    - a) fronting
    - b) cluster reduction
    - c) cluster substitution
    - d) all of the above
  10. Which one of the following terms is not associated with generative phonology?
    - a) competence and performance
    - b) markedness and naturalness
    - c) limitation, ordering, and suppression
    - d) surface level and deep level representation
  11. According to Stampe, phonological processes are
    - a) only evidenced in children with disordered articulation
    - b) universal and innate
    - c) present in the adult's underlying representation
    - d) random and do not follow any patterns
  12. If a child says [bæftʌb] for "bathtub", this is an example of which phonological process?
    - a) palatal fronting
    - b) stopping
    - c) labialization
    - d) alveolarization
  13. Which one of the following is not a syllable structure process?
    - a) reduplication
    - b) weak syllable deletion
    - c) consonant cluster reduction
    - d) consonant cluster substitution
  14. Which concept in Stampe's natural phonology theory has often been criticized?
    - a) the concept that natural processes are universal
    - b) the concept that suppression occurs during the developmental process
    - c) how naturalness and markedness concepts have been applied to this theory
    - d) the concept that the child's underlying representation is the same as the adult's
  15. Unlike distinctive feature analysis, natural phonology can categorize
    - a) syllable structure changes

- b) error patterns
  - c) patterns which should be targeted in therapy
  - d) sound substitutions
16. If a child says [gʌk] for "duck", which type of assimilation process has occurred?
- a) labial assimilation
  - b) velar assimilation
  - c) nasal assimilation
  - d) liquid assimilation
17. When contrasting nonlinear to linear phonologies, what is the main difference?
- a) nonlinear phonologies do not use any type of distinctive features
  - b) nonlinear phonologies believe in a hierarchical interaction between segments and other, larger linguistic units
  - c) nonlinear phonologies do not assume that an underlying representation exists
  - d) nonlinear phonologies believe that the phonological rules generated apply only to the segmental (as opposed to the suprasegmental) level
18. Which one of the following concepts is a portion of feature geometry?
- a) constraint violation
  - b) phonological processes
  - c) place nodes
  - d) onset and rime
19. In feature geometry, feature spreading can also be labelled ?
- a) markedness
  - b) linking
  - c) surface level representation
  - d) underlying representation
20. Which one of the following constraints are not violated in American English,
- a) ONSET
  - b) PEAK
  - c) NO CODA
  - d) COMPLEX
21. Feature geometry
- a) considers the child's underlying representation
  - b) uses a feature system
  - c) uses nodes which may dominate other features and serve as a link between higher levels of representation
  - d) all of the above
22. Which one of the following approaches is a constraint-based approach?
- a) feature geometry
  - b) generative phonology
  - c) optimality theory
  - d) natural phonology
23. In optimality theory constraints are based on principles of
- a) markedness
  - b) linking and delinking
  - c) distinctive features
  - d) stress analysis
24. In optimality theory the relation between the input and the output is mediated by two formal mechanisms: the
- a) surface level and deep structure representations
  - b) ordering and suppression of processes
  - c) linking and delinking of features

- d) generator and evaluator
25. Which two types of constraints function within optimality theory as opposing, antagonistic oppositions?
- a) linking and delinking
  - b) onset and codas
  - c) faithfulness and markedness
  - d) complex and simple rankings

## TRUE/FALSE QUESTIONS

1. If two languages have the same phonemic inventory, they will be identical languages.
2. The speech sound form and the phoneme function are dependent upon one another and are often both addressed clinically.
3. Distinctive features can be used to analyze sound deletions and distortions.
4. Natural sounds are marked sounds.
5. Relative to [p], the affricate [tʃ] is a marked sound.
6. Natural phonology grew out of several concepts developed in generative phonology.
7. If a phonological process can be identified in the speech of a child, then the child has a phonological impairment.
8. Optimality theory uses the same features that were developed in feature geometry.
9. The features used in feature geometry are the same distinctive features which were used in generative phonology.
10. Optimality theory is universal, languages differ in the ranking of constraints

## SHORT ANSWER QUESTIONS

1. Why are there so many different distinctive feature systems?
2. According to generative phonology, what is the underlying form?
3. What is meant by competence and performance in generative phonology?
4. What is a phonological process?
5. Explain how suppression is a portion of the developmental process.
6. Give two examples of substitution processes.
7. Give two examples of syllable structure processes.
8. Explain the difference between linear and nonlinear phonologies.

## ESSAY QUESTIONS

1. Explain phonological rules in generative phonology relative to surface and underlying forms.
2. Discuss Stampe's concepts of limitation, ordering, and suppression. Give examples of each of these mechanisms.
3. According to Stampe, all children embark on the development of their phonological systems from the same beginnings, i.e., they all start at the same point. Explain how two children from two different languages end up with completely different phonemic systems.
5. Explain how the different nodes in feature geometry interact with one another.
6. Explain the differences between the terms faithfulness and markedness in optimality theory. Give examples of each.

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## REFERENCES

Crystal, D. (2010). *The Cambridge encyclopedia of language* (3<sup>rd</sup> ed.). Cambridge: Cambridge University Press.

Grunwell, P. (1987). *Clinical phonology* (2nd ed.). Baltimore: Williams & Wilkins.

Stampe, D. (1979). *A dissertation on natural phonology*. New York: Garland.

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# Chapter 5

## Normal Phonological Development

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### LEARNING OBJECTIVES

When you have finished this chapter, you should be able to:

- Describe early structural and functional developments that are precursors to the child's first words.
  - Identify specific early perceptual skills that infants demonstrate prior to their first words.
  - Outline the characteristics of the prelinguistic stages.
  - Discuss the characteristics of the transition between babbling and the first-50-word stage of language development.
  - Trace the consonant, vowel, and prosodic development of preschool-age children.
  - Describe the consonant, vowel, and prosodic development of school-age children.
  - Explain phonological awareness, its relationship to emerging literacy, and the impact of a phonological disorder.
- 

### CHAPTER OVERVIEW

First, this chapter provided an overview of structural and functional development in infancy and early childhood. At birth, the infant's respiratory, phonatory, resonatory, and articulatory systems are not fully developed. Many changes must occur before the systems are ready to support regular speech sound and voice production. The first portion of this chapter summarized the anatomical/physiological changes which occur as prerequisites for later speech. In addition, the child's perceptual abilities are developing. Early perceptual skills were briefly outlined, including categorical perception and phonemic awareness.

The second section of this chapter traced the segmental form and prosodic feature development of children from vocalizations prior to babbling to the time when their speech sound inventory has reached an adult-like form. The prevalence of certain sounds and syllable shapes was traced from babbling to the first words. As the number of words in children's vocabularies increases, inventory and complexity of syllables grow as well. During this early stage of expansion, the prosodic feature, intonation, begins to be used to signal different intentions.

The preschool child's development is characterized by a large growth in all aspects of language; the acquisition of new phonological features is a portion of this quickly maturing system. Although cross-sectional studies have attempted to provide so-called mastery ages for sounds, these results offer only one view of phonological development. Longitudinal data that document individual variability in sound acquisition among children as well as the influence of other language areas on phonological skills were addressed as



an additional means to view this developmental process. The suppression of many phonological processes is occurring within this time interval as well. Based on research findings, approximate ages were given for the suppression of several common phonological processes.

Both segmental form and prosodic features continue to mature during the school years. Although the sound inventory is approaching adult like form, many aspects of the phonological system are still maturing. The child needs to learn morphophonemic variations as well as metaphonological skills.

Metaphonological skills were discussed in relationship to the emerging literacy of children. During the school years, phonological development often impacts the child's abilities to learn to read and write. The close interdependencies between phonology, language development, and literacy learning point to the importance of normal phonological development in children.

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## PRESENTATION OUTLINES

1. To provide a review of the prelinguistic phase of development. Aspects of structural, functional, and perceptual development as well as the prelinguistic stages of production are covered in this overview.
2. To examine both the segmental production characteristics and the prosodic features in the child's development from the end of the babbling period to first words.
3. To delineate the segmental and prosodic characteristics of the child in the first- fifty-word stage. Both cross-sectional and longitudinal findings are presented exemplifying general developmental trends in sound production as well as information on children's individual variation. This development is linked to the overall growth in other areas of language.
4. To follow the segmental and prosodic development of the child in the preschool years. Both cross-sectional and longitudinal findings are offered to demonstrate general trends and individual idiosyncratic patterns.
5. To summarize the suppression of natural phonological processes. Syllable structure, substitution, and assimilation processes are described according to the approximate ages at which each process is normally suppressed in the speech of children.
6. To examine the speech sound and prosodic development of the school-age child. Although many aspects of phonological and prosodic development have been mastered when the child enters school, there are still specific areas which have yet to be acquired.
7. To examine the link between phonological awareness, emerging literacy, and phonological disorders. Phonological awareness, phonological processing, and phonemic awareness are defined and examples given. The relationship between these variables and speech disorders is addressed; the possible impact on emerging literacy is documented by research findings.

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## KEYWORD DEFINITIONS

**Prelinguistic behavior** refers to all vocalizations prior to the first word (pp. 115, 121-123).

**Phonological development** refers to the acquisition of speech sound form and function within a given language system (p. 115).

**Speech sound development** refers to the gradual articulatory mastery of speech sound forms within a given language (p. 115).

**Structural and functional development** of the respiratory, phonatory, resonatory, and articulatory mechanisms from birth to approximately one year of age demonstrates that dramatic modifications occur prior to the infant's first words (pp. 116-118).

**Categorical perception** pertains to the tendency of listeners to perceive speech sounds (which are varied acoustically along a continuum) according to the phonemic categories of their native language (p. 119).

**Perceptual constancy** is the ability (of infants) to identify a sound as being the same across different speakers, pitches, and other changing environmental conditions (p. 119).

**Discontinuity hypothesis** emphasizes a sharp separation between the prelinguistic and the linguistic phases of sound production, specifically between babbled sounds and the sounds of first words (p. 121). Roman Jakobson formulated this hypothesis; however, newer investigations contradict his thesis.

**Reflexive crying and vegetative sounds** mark the first stage of the prelinguistic period exemplified by cries, coughs, and burps (reflexive vocalizations) on the one hand, and grunts, sighs, clicks, and similar noises associated with activities such as feeding (vegetative sounds) on the other (p. 122). Normally, this stage covers the period between birth to approximately two months of age.

**Cooing and laughter** is the label given to the second stage of the babbling period. During this time (normally when the infant is between 2 to 4 months of age), cooing (or gooing) sounds are produced as (mostly) vowel like comfort sounds, primarily consisting of nasalized vowels and nasal consonants (Oller, 1980) (p. 122).

**Vocal play (or expansion)** refers to the third stage of the babbling period, typically occurring between 4 and 6 months of age. This stage is marked by longer strings of sound segments, prolonged vowel- and consonant-like productions often actualized with extreme variations in loudness and pitch (p. 122).

**Canonical babbling**, stage 4 of the babbling period, is a collective term for reduplicated and nonreduplicated (or variegated) babbling stages. This is a typical stage of prelinguistic development from the age of 6 months on (p. 122). During this prelinguistic stage true babbling begins.

**Reduplicated babbling** is marked by similar strings of consonant-vowel productions, especially pertaining to the consonant-like babbles (p. 120).

**Nonreduplicated or variegated babbling** demonstrates variation of both vowel-like and consonant-like realizations with typically smooth transitions between them. Reduplicated and non-reduplicated babbling stages do not necessarily follow one another sequentially. Non-reduplicated babbling does not seem to evolve out of reduplicated babbling (Mitchell and Kent, 1990) (p. 122).

**Jargon stage (a portion of advanced forms)** represents the fifth and last of the babbling stages. It is characterized by strings of babbled utterances modulated by intonation, rhythm, and pausing. This stage may overlap with the first meaningful words (p. 123).

**Vocoid** is a technical term for nonphonemic vowel-like productions, i.e., vowel productions without the linguistic function of vowels. Vocoids are vowel-like utterances which lack phonemic value as meaning establishing and meaning differentiating units. During the late prelinguistic and early linguistic periods of phonological development, mid-front and central vocoids appear to be favored over high and back vocoids (Kent and Bauer, 1985)

(p. 124).

**Contoid** is the technical term for nonphonemic consonant-like productions, i.e., consonant productions without their linguistic function as meaning establishing and differentiating phonemes. The contoids [h], [d], [b], and [m] are among the most frequently produced by infants during their late prelinguistic and early linguistic phases (Locke, 1983) (pp. 124 and 125, Table 5.2).

**Syllable shapes** refer to the various forms in which syllables can be structured in languages. Examples in American English include consonant + vowel (CV), vowel + consonant + vowel (VCV) or consonant + vowel + consonant + vowel (CVCV) structures. During the later babbling periods, open syllables (those syllables which do not have a coda) were found to be most prevalent, accounting for about 94% of all syllables produced (Kent and Bauer, 1985) (p. 125).

**Prosodic features** are larger linguistic units, elements occurring across segments which influence what we say. The most relevant features are stress, intonation, pausing, and duration leading to rhythmical effects, "imposed" upon sound segments (p. 126). This definitional concept lead to the parallel label suprasegmental features. Prosodic feature development, marked by intonation patterns, has already begun during the canonical babbling stage. The most common intonation contour is a falling pitch which begins at approximately 6 months of age; however, diversification occurs towards the end of the babbling period. At this time, the strings of babble are characteristic of General American English intonation patterns, giving the impression of sentences without words (Crystal, 1986) (p. 126).

The **transition from babbling to first words** shows many production similarities to those of the babbling stage (p. 127). Stop productions followed by nasals and fricatives in primarily monosyllabic utterances occur to a high percentage in this transition.

The **first word** is an entity of relatively stable phonetic form used consistently in a particular context and is recognizably related to the adult-word form of the language (p. 127).

**Proto-words**, also called **phonetically consistent forms**, **vocables**, or **quasiwords** are consistently used vocalizations showing no similarity to an adult model; they are "invented words" (p. 128).

The **first-50-word stage** encompasses the time from the first meaningful utterance, which is around the child's first birthday, to the time when the child begins to put two words together at approximately 18 to 24 months of age. Whereas the first word is a plausible starting point for this stage, a strict fifty-word cut-off point appears arbitrary (pp. 127-128).

**Item learning** refers to the child's acquisition of word forms as unanalyzed units rather than by contrasting phonemes to establish words (Cruttenden, 1981). Item learning occurs during the first-50-word stage. Ingram (1989) labeled a similar observation the presystematic stage (p. 128).

**System learning** occurs typically after the first-50-word stage in which children acquire the phonemic principles of the phonological system in question (p. 128)

**Holophrastic period**, an early phase of item learning, refers to the time period when the child uses one word to indicate a complete idea (p. 128)

**Phonetic variability** characterizes the unstable pronunciations noted in many children's first 50 words. However, some children do not seem to demonstrate this variability; they seem to produce stable phonetic word realizations from the beginning (p. 128).

**Limitation of syllable structures** as well as sound segments is a distinguishing mark of the first-fifty-word period (p. 129). CV, VC, and CVC syllables predominate while CVCV syllables are often syllable reduplications. In respect to early sound development. Early consonants consist of [b], [d],[n], [m] and [w]. These observed trends should not be automatically generalized. Rather, a good deal of individual variation should always be assumed. See the Clinical Application on pages 132-133.

**Phonological idioms** or **phonological regression** are terms to indicate accurate sound productions that are later replaced by inaccurate ones. This occurs possibly due to the influence of the developmental necessity to deal with complex morphosyntactic and semantic factors at the same time (p. 139).

**Syllable structure processes** are the tendency of young children to reduce words to basic CV structures (p. 139). They are evident between the ages of 1;6 and 4;0.

**Suppression of reduplication** is a common process during the first 50 word stage (p. 139). It does not extend beyond 2 years of age (p. 139).

**Suppression of final consonant deletion** is usually suppressed around age 3 (p. 139).

**Suppression of unstressed syllable deletion** is a frequent syllable structure process which can be seen in children as old as 5 years of age (pp. 139-140).

**Suppression of consonant cluster reduction** is a syllable structure process which may extend in its use until at least until school-age (p. 140).

**Epenthesis** refers to the insertion of a sound segment into a word, thereby changing its syllable structure (p. 140). The intrusive sound might be a vowel as well as a consonant; however, the sound segment most frequently inserted is a schwa between two consonants. Example: [pəlɪz] for “please”. Epenthesis within consonant clusters may extend to age 8;0.

**Substitution processes** are phonological processes marked by the replacement of one sound for another (pp. 140-141).

**Stopping**, a frequent substitution process, refers primarily to the replacement of fricatives and affricates with plosives (p. 140). Stopping is a process which can affect many different sounds. Therefore, the age of suppression is different from sound to sound. See Table 5.6 on page 141 for a summary of the age of suppression for various stopping processes.

**Fronting** refers to the tendency of young children to replace palatal and velar consonants with alveolar ones (p. 140). Fronting can occur until age 5;0 (according to Smit’s 1993 data, less than 5 percent of the children tested continued to demonstrate fronting), however, other studies (Lowe, Knutson, and Monson, 1985) found that this was a fairly rare process after the age of 3;6.

**Gliding**, the replacement of primarily [ɹ] and [l] with the glides [w] and [j] extends beyond 5;0 years of age and can be infrequently found in the speech of children as old as 7 (p. 140).

**Assimilation processes** are frequent phonological processes in very young children (p. 141). If they persist to a high degree beyond age 3;0, they may constitute a danger sign for a disordered phonological system (Grunwell; 1987).

**Contrastive stress** starts to develop when children begin to talk in two-word utterances (pp. 142-143). A developmental pattern has been observed: First, it seems, a single prosodic pattern for both words is maintained with a pause between them. Next, a tone unit (or sense-group) is established between them, i.e., the pause between the words disappears and one of the two words becomes more prominent within a single intonation contour. Toward the end of this process, a unifying rhythmic relationship between the words is achieved without a pause (Crystal, 1986). Although the acquisition of stress patterns begins at an early age, clearly before the age of two, true mastery of the whole prosodic feature system is achieved only by much older children, probably not before age 12.

**Tone-unit** (or **sense-group**) is the technical term for the integration of two (or more) words into a unified prosodic event (p. 143).

**Morphophonology** is the study of the different allomorphs of the morpheme and the rules governing their use (p. 145).

**Metaphonology** involves the child's conscious awareness of the sounds of the language in question (p. 146). Metaphonological skills pertain to a child's ability to discern how many sounds a word consists of, or which sound constitutes its beginning or end, for example. Metaphonological skills appear to play a role in emerging literacy.

**Phonological processing** is the use of sounds of a language to process verbal information (in oral or written form, a form of coding) that requires working- and long-term memory (pp. 146-147). Phonological awareness is a subdivision of phonological processing. However, it is less complex than coding as it does not put demands on memory or processing of information. Several tasks are listed which can be used to measure phonological awareness (p. 147-148).

**Coding** is translating stimuli from one form to another, for example, from the auditory to the written form (p. 147).

**Phonological awareness** is an individual's awareness of the sound structure or phonological structure of a spoken word (pp. 147-148). Phonological awareness uses a single modality, the auditory one. It is the ability to hear sounds in spoken words in contrast to recognizing sounds in written words.

**Phonemic awareness** is an individual's awareness of the phoneme level and necessitates the understanding that words are composed of individual sounds (p. 148).

**Phonological memory** refers to coding information phonologically for temporary storage in working memory (p, 148).

**Retrieving phonological information from long-term memory** includes the efficiency of retrieving phonological codes associated with individual phonemes, word segments, or entire words (p. 148).

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## LEARNING MATERIALS: ANSWERS TO QUESTIONS FROM TEXTBOOK THINK CRITICALLY (PAGES 153-154):

### ANSWERS

1. Lori appears to be in Stage 4: Canonical babbling. She is producing reduplicated and non-reduplicated babbling strings. As she has just begun to imitate babbles, which occurs around 9 months of age, one could estimate that she is approximately 11 months delayed in her speech development.

2. Ryan, age 6;6

Sounds in error using the Poole (1934) data: [j] and [l]: [ʃ] and [ð] would be borderline, the age given is 6 1/2. The final consonant devoicing in "pig" is noted as a normal variation.

Sounds in error using the Templin (1957) data: [j], [l], [s], [ʃ], [θ], and [ʒ]

The problems when using these mastery ages were discussed on pages 136-138. They briefly include: defining mastery age and the various methodologies used, percentage of children producing the sound correctly, three-positions in word versus two, incomplete data sets at younger age groups.

3. Ryan, age 6;6 and phonological process suppression. Ryan's phonological processes are noted on page 50 of this Instructor's Manual:

The processes which should be suppressed by age 6;6 include: palatal fronting (possibly present until age 5), labialization (suppressed by age 6;0), devoicing (should be suppressed by age 5), stopping ([tʃ] → [d] is suppressed by age 4, stopping of [ð] appears to be a later process), and deaffrication (suppressed by age 4).

### ADDITIONAL LEARNING MATERIALS

#### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

1. Have a colleague or student bring an infant to class (or use a video recording of a child) who is demonstrating babbling behavior. First, have the students determine which babbling stage the child is in. Compare the child's age to the ages presented on pages 121-123. Next have the students attempt to transcribe the babbling. Discuss what types of problems they encounter during their transcription.

2. Investigations dealing with the sounds that are used by children in the first-50- word stage can be cross-sectional or longitudinal. Cross-sectional studies would target a group of children at a specific age, for example, children between 10 months and 16 months of age. Given the individual variation which exists between children in their acquisition of first words and the number of words they acquire in a specific time frame, discuss why cross-sectional methodology may not be an accurate way to assess this development. Stoel-Gammon (1985) groups the children of her longitudinal study into three groups (p. 130-131). Discuss how this grouping could possibly account for the individual variation noted during this time frame.

3. The following consonant clusters were noted in a child, age 7;0

Word	Production	Word	Production
slide	[slaid]	clown	[klaun]
string	[stwiŋ]	grapes	[gweipθ]
spoon	[spun]	presents	[pwezənts]
skunk	[skʌŋk]	umbrella	[əmbwɛlə]
three	[θwi]	swing	[swiŋ]
scratch	[skrætʃ]	frog	[fwaɪg]
flag	[flæɪg]	bread	[bred]
blocks	[blɒks]	brush	[brʌʃ]
truck	[trʌk]	crayons	[kreɪɒns]
drum	[drʌm]	squirrel	[skwɜːəl]

Smit and colleagues (1993) report that the following consonant clusters were still inaccurate in the speech of 5;6 to 7;0 year olds to a fairly high degree (approximately 25% of the time): [sl], [bɹ], [θɹ], [skw], [spɹ], [stɹ], and [skɹ] (p. h 144). Other consonant cluster difficulties were noted only in a very small percentage of children.

Discuss how this child's results compare to those found by Smit and colleagues (1993). Should one worry about the consonant cluster difficulties demonstrated by this child?

## MULTIPLE CHOICE QUESTIONS

- Phonological processing includes
  - working- and long-term memory
  - coding
  - phonological awareness
  - all of the above
- Which one of the following refers to the gradual articulatory mastery of speech sound forms within a language?
  - prelinguistic behavior
  - phonological development
  - speech sound development
  - categorical perception
- The respiratory, phonatory, resonatory, and articulatory mechanisms of the young infant
  - reflect exclusively primary functions
  - are adequate for both primary and secondary functions
  - mirror those found in adults
  - all of the above
- Which one of the following refers to the ability to identify the same sound across various speakers and environmental conditions?
  - categorical perception
  - perceptual constancy
  - minimal pair perception
  - phonemic contrasts perception
- At around 6 to 8 months of age, the infant's vocal tract approximates the adult shape. This coincides with

- a) the production of first words
  - b) the beginning of the prelinguistic period of development
  - c) early perceptual abilities
  - d) the beginning of canonical babbling
6. During which prelinguistic stage does the child begin to communicate to adults through imitation games with vocal productions?
- a) Stage 2: Cooing and laughter
  - b) Stage 3: Vocal Play
  - c) Stage 4: Canonical babbling
  - d) Stage 5: Jargon stage
7. During which prelinguistic stage does the child produce strings of utterances which are modulated primarily by intonation, rhythm, and pausing?
- a) Stage 2: Cooing and laughter
  - b) Stage 3: Vocal Play
  - c) Stage 4: Canonical babbling
  - d) Stage 5: Jargon stage
8. Prosodic features consist of
- a) pitch reflected in intonation
  - b) loudness reflected in stress
  - c) tempo variations, including duration
  - d) all of the above are prosodic features
9. Which one of the following refers to the type of learning in which the child acquires phonemic principles which apply to the phonology of that particular language?
- a) item learning
  - b) system learning
  - c) perceptual learning
  - d) object permanence
10. Which one of the following is not a characteristic of the first-50-word stage?
- a) phonetic variability
  - b) frequent use of consonant clusters
  - c) limited use of syllable structures
  - d) limited use of varied segmental productions
11. Both cross-sectional and longitudinal research findings examining children within the first-50-word stage found
- a) that a fairly limited number of consonants were being used by most children
  - b) that children use a larger inventory of sounds in the word-final position
  - c) that fricatives dominated the inventory of speech sounds utilized
  - d) that there was little variability between the productions of each child
12. Often the results of large cross-sectional studies of sound mastery demonstrate differing results. This is due to the
- a) different methodologies employed
  - b) type of children which were used in the research
  - c) type of articulation test which was used
  - d) age of the investigation, older investigations show later mastery ages
13. If a child at age 3;0 says [sæm] for “Sam”, but at age 3;6 [θ] and [ð] are substituted for all [s] and [z] sounds, this is known as
- a) avoidance
  - b) salience
  - c) epenthesis
  - d) regression



14. Which one of the following syllable structure processes is suppressed at a relatively later age?
- reduplication
  - final consonant deletion
  - weak syllable deletion
  - consonant cluster reduction
15. Stopping of which of the following sounds extends beyond age 5;0?
- [f]
  - [s]
  - [θ]
  - [tʃ]
16. Which one of the following is an example of epenthesis?
- [kəlin] for clean
  - [æks] for ask
  - [stwit] for street
  - [dʌm] for thumb
17. Phonological awareness uses a single modality. This is
- auditory
  - visual
  - memory
  - coding
18. Contrastive stress
- signals the difference between “You are here” as a statement versus “You are here” as a question
  - is only used at the word level, for example, 'con tract versus con 'tract
  - may not be fully acquired until age 13
  - is one of the earliest prosodic features acquired
19. Which one of the following fricatives is not among the later developing sounds?
- [f]
  - [v]
  - [s]
  - [z]
20. Which one of the following is a metaphonological task?
- the child naming pictures
  - the child pointing to pictures named
  - the child pointing to the picture which begins with the "s" sound
  - the child recalling as many animals as possible

## TRUE/FALSE QUESTIONS

- Speech sound development and phonological development are the same.
- When the child is born, the respiratory, phonatory, resonatory, and articulatory mechanisms are structurally and functionally adequate for speech sound production.
- It is not until approximately age 7 that the respiratory function of the child demonstrates adult-like patterns.
- Canonical babbling refers to both reduplicated and non-reduplicated babbling.

5. Research supports the notion that infants babble all the sounds of all the languages of the world.
6. During the late babbling period, closed syllables are the most frequent utterances of the child.
7. Quantity and diversity of babbling behavior have been correlated to later language performance.
8. The babbles uttered at the end of the babbling stage and the first words of a child are very similar.
9. In the prosodic development of the child, contrastive stress is used prior to intonation.
10. In general, one can say that vowels are mastered by age 3.
11. Mastery of the entire prosodic system of General American English is completed around age 4.
12. There is no relationship between speech sound disorders and learning to read and write.
13. Certain consonant clusters are still difficult for school-age children to produce.
14. Metaphonological skills are related to learning to read.
15. It is clear which metaphonological skills are necessary precursors for learning to read.

### **SHORT ANSWER QUESTIONS**

1. Explain what impact the relatively large arytenoid cartilages and vocal processes in the infant have on vocal fold vibration.
2. What is categorical perception?
3. What is the difference between vocoids and contoids versus vowels and consonants?
4. What is the difference between first words and proto-words?
5. Why are longitudinal findings better when looking at the individual development of a child?.
6. What are tone units?
7. Define morphophonology.
8. Define metaphonology.
9. Give an example of a metaphonological task.
10. Give an example of a sentence in which contrastive stress would change the meaning.

### **ESSAY QUESTIONS**

1. Explain why the child loses the ability to discriminate nonnative sounds which are phonetically similar around the time first words are emerging.

2. Explain the differences in how sound acquisition data are acquired and which type of data are used in cross-sectional versus longitudinal studies.
3. What are some of the problems inherent in cross-sectional sound mastery studies?
4. Explain the differences between speech sound development and phonological development. How could you structure an investigation to look at a child's phonological development?
5. Why might regression (or what is called the use of phonological idioms) occur during the development of a child's speech skills?

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## REFERENCES

- Cruttenden, A. (1981). Item-learning and system-learning. *Journal of Psycholinguistic Research*, 10, 79-88.
- Crystal, D. (1986). Prosodic development. In P. Fletcher & M. Garman (Eds.), *Language acquisition* (2nd ed.) (pp. 174-197). Cambridge: Cambridge University Press.
- Grunwell, P. (1987). *Clinical phonology* (2nd ed.). Baltimore: Williams & Wilkins.
- Ingram, D. (1989). *Phonological disability in children. Studies in the disorders of communication* (2nd ed.). London: Cole & Whurr.
- Kent, R. D., & Bauer, H. R. (1985). Vocalizations of one-year-olds. *Journal of Child Language*, 13, 491-526.
- Locke, J. (1980). Mechanisms of phonological development in children: Maintenance, learning, and loss. Papers from the Sixteenth Regional Meeting of the Chicago Linguistic Society. Chicago: Chicago Linguistic Society.
- Mitchell, P. R., & Kent, R. D. (1990). Phonetic variation in multisyllable babbling. *Journal of Child Language*, 17, 247-265.
- Oller, D. K. (1980). The emergence of the sounds of speech in infancy. In G. Yeni-Komshian, J. Kavanagh, & C. A. Ferguson (Eds.), *Child phonology: Volume I Production* (pp. 93-112). New York: Academic Press.
- Poole, I. (1934). Genetic development of articulation of consonant sounds in speech. *Elementary English Review*, 11, 159-161.
- Smit, A. B. (1993). Phonologic error distributions in the Iowa-Nebraska Articulation Norms Project: Word-initial consonant clusters. *Journal of Speech and Hearing Research*, 36, 931-947.
- Stoel-Gammon, C. (1985). Phonetic inventories, 15-24 months: A longitudinal study. *Journal of Speech and Hearing Research*, 28, 505-512.
- Templin, M. (1957). *Certain language skills in children: Their development and interrelationships*. Institute of Child Welfare, Monograph 26. Minneapolis, MN: University of Minnesota Press.
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# Chapter 6

## Appraisal

### Collection of Data

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#### LEARNING OBJECTIVES

When you have finished this chapter, you should be able to:

- Compare and contrast “screening” and a “comprehensive assessment.”
  - Identify the advantages and disadvantages of articulation tests and stimulability testing.
  - Identify specific assessment measures which can be used to supplement articulation testing.
  - Identify specific areas and procedures to follow when evaluating the speech mechanism.
  - Define and know specific ways to assess emerging phonology.
  - Identify the specific procedures that can be used to aid in the evaluation of an unintelligible child.
- 

#### CHAPTER OVERVIEW

First, this chapter summarized the various areas of data collection in the appraisal portion of the assessment process. These include (1) a standardized speech assessment, (2) spontaneous speech sampling, (3) evaluation of the oral mechanism, and (4) additional measures exemplified by a hearing screening, language screening, phonemic awareness testing, cognitive appraisal, and assessment of a child’s communicative participation. Methods and goals for each of these areas were discussed together with limitations that might be inherent in the procedures. For example, a standardized speech assessment provides a relatively time-efficient way to evaluate articulation skills; however, it does not provide the clinician with any information about the client’s abilities to use these skills in naturalistic contexts. In the second portion of this chapter, special assessment considerations were examined for the child with an emerging phonological system and the unintelligible speaker. These groups of clients present the clinician with challenges that will necessitate changes in the appraisal process and the evaluation of the results. This chapter is seen as a guide to assist the clinician in the selection of appraisal procedures that will maximize clinical decision making within the diagnostic process.

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## PRESENTATION OUTLINES

1. To delineate the elements of a comprehensive phonetic-phonemic evaluation. Emphasis will be placed upon the collection of data from the following sources: a standardized speech assessment, stimulability testing, spontaneous speech sample, hearing screening, speech mechanism examination, and the inclusion, when necessary, of additional measures such as language, phonemic awareness, cognitive testing, and assessment of a child's communicative participation.
2. To examine the advantages and disadvantages of citation form standardized speech assessments and how additional procedures can be used to supplement these results.
3. To understand the necessity of a spontaneous speech sample, how it can be effectively organized and recorded to obtain maximal results.
4. To outline the procedures necessary for the structural and functional evaluation of the speech mechanism.
5. To introduce procedures for a hearing screening which include a case history, visual inspection, pure tone screening tympanometry, otoacoustic emissions audiometry, and guidelines for referral.
6. To understand the necessity of language screening due to the high percentage of children with concurrent language disorders and phonological impairments.
7. To supply information about other special tests that might become necessary to implement such as phonemic awareness testing and cognitive appraisal.
8. To explore alternative assessment possibilities with special populations exemplified by the child with emerging phonology and the unintelligible child.

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## KEYWORD DEFINITIONS

**Assessment** pertains to the clinical evaluation of a client's disorder in two phases: *appraisal* and *diagnosis* (Darley, 1991) (p. 156).

**Appraisal** refers to the collection of relevant assessment data in at least four different areas: Case history, interviews with parents and other professionals, school and medical records, evaluation by the clinician (see page 156 and Box 6.1 on page 157).

**Diagnosis** represents the end result of studying and interpreting all collected data leading to therapeutic decision making and prognostic predictions (p. 157).

**Screening** consists of activities or tests that identify individuals who need further evaluation (p. 159).

**Comprehensive evaluation** is the core of appraising speech sound disorders (p. 159). It is phonetic-phonemic in nature and includes data from the following sources:

- A standardized speech assessment and stimulability measures
- Conversational speech in various contexts
- Hearing screening
- Speech mechanism examination
- Selection of relevant additional measures such as contextual testing, and/or cognitive assessment.

**Hearing screening** is a portion of every speech sound assessment (pp. 160-161). This screening consists of a case history as well as visual inspection of the tympanic membrane and the external ear canal for structural defects and

abnormalities. In addition, four possible protocols can be used:

1. Pure tone screening only,
2. Pure tone screening and tympanometry
3. Otoacoustic emissions screening
4. Otoacoustic emissions and tympanometry (p. 161).

**Evaluation of the speech mechanism** is a prerequisite for any comprehensive assessment. Its intent is to assess whether the system appears adequate for regular speech sound production (p. 161). Appendix 6.1 contains a sample form (Speech-Motor Assessment Screening Form, pages 192-195) to guide a clinician through this process.

**Diadochokinetic rates** can be used to test the speed of movement of the articulators. There is some controversy surrounding their use (see page 164). However, Table 6.1 (page 164) gives the average diadochokinetic rates for children from 2 years 6 months to 8 years of age.

**Standardized speech assessments** examine sound articulation in selected isolated words (pp. 165-166). However, evaluating speech sound production based on single-word responses can never render adequate information about a client's production realities in connected speech.

**Two-way scoring** consists of the judgment "right" or "wrong" with regard to a given sound production (p. 171).

**Five-way scoring** consists of the following judgment choices: correct; sound deletion; sound substitution; sound distortion; sound addition. Although clearly better than the two-way scoring system, the five-way scoring has its own limitations (p. 171).

**Phonetic transcription** represents the attempt to reflect actualities of spoken language by written symbols (p. 172). Using phonetic transcription is the best way to capture the client's speech sound realizations. Both broad and narrow transcription should be used.

**Stimulability testing** involves probing into the client's ability to produce a misarticulated sound in an appropriate manner when somehow "stimulated" by the clinician to do so (pp. 172-173). Stimulability testing begins at the isolated sound level progressing through the CV and word level.

**Contextual testing** refers to the use of specific phonetic contexts to possibly facilitate correct speech sound production (p. 173).

**Testing Multisyllabic (3-Plus Syllable) Words** can reflect many aspects of a child's production possibilities, for example the child's ability to manipulate phonotactics, prosody, language and phonological processing skills (pp. 173-174). There are some children who demonstrate difficulties with these multisyllabic words but do well with a standardized speech assessment.

**Spontaneous speech sample** pertains to obtaining examples of the client's conversational speech in a variety of talking situations (p. 174). Its transcription and analysis constitute an indispensable complement to the results of a standardized speech assessment and involve considerable planning:

- begins with a single-word citation task (standardized speech assessment) (p. 175)
- objects or pictures are used to elicit target sounds (p. 175)
- length and diversity of the sample are planned (p. 175).

**Language screening** belongs to any assessment of children with speech sound disorders and can be achieved using formal, standard assessment measures or informal

evaluations (pp. 177-178). See page 177 for a list of selected language screening measures for preschool and school-age children.

**Prosodic Screening and Testing** includes measuring systematically stress, pitch and duration or rate. (p. 178). Instruments for assessing or screening prosody in children are given in Table 6.5 (p. 178).

**Phonological and phonemic awareness screening** can be accomplished in a number of ways (pp. 179-180, also see Table 6.5 for instruments for assessing or screening phonological awareness). Some children with speech sound disorders have difficulties with phonological awareness.

**Cognitive appraisal** often provides useful and necessary information (pp. 180-181). Caution should be exercised when interpreting IQ measures of children demonstrating phonetic-phonemic disorders and children from linguistically and culturally different backgrounds.

**Assessment of a child's communicative participation** is part of the general framework of the diagnostic process (p. 181). Table 6.7 on page 181 gives a sample of measures to assess participation.

**Emerging phonology** covers the period during which conventional words begin to appear as a means of communication (p. 177). Children who are late talkers or who demonstrate a delayed emerging phonological system typically show small expressive vocabularies, a reduced repertoire of consonants and syllable shapes. Often, the words they use are unintelligible. Children with emerging phonological systems necessitate different assessment procedures. For example, formal standardized speech assessments, spontaneous speech sampling, and evaluating the speech mechanism may be difficult with these children. Assessment strategies are given for these children on pages 182-187.

An **independent analysis** is used to evaluate children with emerging phonological systems (pp. 184-185). This type of analysis takes only the client's productions into account; the articulated speech sounds are not compared to the adult norm model. Three kinds of data are collected for the independent analysis: the inventory of speech sounds, the syllable shapes the child uses, and any constraints noted on sounds or sound sequences. Examples and clinical applications are given for an independent analysis on pages 184-185.

**Unintelligibility** occurs when speech is so disordered that a speaker's message cannot be understood (p. 187). Although unintelligibility is often typical for young children, it is by no means limited to any specific age group. Difficulties with the production of liquids, stridents, and consonant clusters are especially prevalent. In addition, the phonological processes cluster reduction, stridency deletion, stopping, gliding and vocalization of liquids as well as nasal and labial assimilations have been noted in their speech (Hodson, 1984). Procedural difficulties when assessing unintelligible children and possible solutions to overcome them are discussed on pages 187-189.

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## LEARNING MATERIALS: ANSWERS TO QUESTIONS FROM TEXTBOOK

### THINK CRITICALLY (PAGE 191): ANSWERS

Three words are presented which test [ʃ] (toothbrush, shoe, fish) while one tests [ʒ] (television). The [tʃ] is tested in the words “watch” and “chair” while [dʒ] is represented by “jumping” and “page”. This appears to be an under-representation of these sounds and the clinician should find some additional words with these sounds specifically inter-vocally

Seventeen words are presented which test [ɪ], central vowels with r-coloring, and rhotic diphthongs. Eight of these are consonant clusters with [ɪ] (green, toothbrush, three, screwdriver, truck, string, crayons) while the central vowels with r-coloring appear four times (feather, screwdriver, hanger, flower). Centering diphthongs are represented by “fork”, “star”, “chair”, “horse”, “airplane” and “square”. The [ɪ] appears only one time word-initially in “rock”.

[ʃ] : she, ship, shed, shelf, shake, shell, sheep, shop, show  
wish, push, ash, bush, cash, dish, hush, sash, blush, hash  
ashes, fishing, dishes, cautious, lotion, motion, mission, ocean, pushing, cushion

[tʃ]: chain, chalk, champ, chance, cheap, check, chip, chin, chime, child  
beach, bench, bleach, catch, coach, ditch, each, much, witch, touch  
beachball, bleacher, bunches, coaches, crunchy, kitchen, hatchet, ditches,  
ketchup, inches

[dʒ]: jaw, gem, gym, jack, jam, June, jay, jeans, Jim, join  
age, badge, cage, huge, lodge, edge, hedge, gauge, siege, stooge  
budget, agent, adjust, cages, hedgehog, edges, magic, pages, legion, Egypt

[ɪ] initially: red, ring, run, roof, row, rope, rest, raft, rack, rain, rat, rib

The central vowels with r-coloring seem to be adequate, however, a couple more common words include: bird, shirt, burn, worm, purr, turn, mugger, caller, hitter, glitter, ladder, winter

The centering diphthongs seem to be adequate, however, a couple more common words include: hair, bear, ear, deer, car, bar, more, door

### ADDITIONAL LEARNING MATERIALS

### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

1. Have the students observe (or demonstrate via a video recording) a child with a speech sound disorder prior to a diagnostic session, for example, talking to the caregiver, sibling, or the clinician. Have the students fill out Figure 6.2, Sample Form for the Initial Impression (p. 160). Discuss how this information could be helpful in structuring the collection of necessary data for this particular child.



2. The following results are from Brandon, age 5;6

house	[haʊθ]	matches	[mætʃəθ]	thumb	[tʌm]
telephone	[tɛdɛfoun]	lamp	[wæmp]	finger	[fɪŋgə]
cup	[tʌp]	shovel	[tʌvou]	ring	[wɪŋ]
gum	[gʌm]	car	[tɑ]	jumping	[dʌmpən]
knife	[naɪf]	rabbit	[wæbət]	pajamas	[dæməθ]
window	[wɪndou]	fishing	[fɪtən]	plane	[pweɪn]
wagon	[wægən]	church	[tʃɜtʃ]	blue	[bwu]
wheel	[wiə]	feather	[fɛdə]	brush	[bwʌt]
chicken	[tʃɪtən]	pencils	[pɛntəθ]	drum	[dʌm]
scissors	[θɪtə]	carrot	[tɛwət]	Santa	[θænə]
duck	[dʌt]	orange	[ouwɪntʃ]	tree	[twi]
yellow	[jɛwou]	bathub	[bæftəb]	squirrel	[twɜwou]
vacuum	[vætum]	bath	[bæf]	sleeping	[θwɪpən]
bed	[bɛd]	stove	[θtuʊf]		

Based on these results from Brandon, discuss the following: a) the sounds in error which are not age appropriate (use one of the studies on page 134 as the basis for age appropriate articulation skills), b) what additional word material might be useful to give supplemental information concerning Brandon's problems (pp. 163-164), and c) how the conversational speech sample could be organized based on the sound difficulties (pp. 167-168).

3. Discuss the procedure for assessing the structure and function of the speech mechanism (pp. 169-172). Using the form in the text (Figure 6.4, Speech-Motor Assessment Screening Form, pages 189-193), have the students perform an examination of the speech mechanism on each other or, if possible, on a child. Discuss the results.

4. The following is a transcription of a 10-minute spontaneous speech sample of a 24 month-old child. This child is in the period of emerging phonology, however, he does have some words. Intended words are noted, other verbalizations which appear to have no meaning are supplied

Word	Production	Other Verbalizations	
Mom	[mamə]	[ɑ]	[ʌb]
Daddy	[dædæ]	[ɛ.ɛ]	[æ]
ball	[bɑ]	[ʌdə]	[ʌbə]
bubbles	[bʌbə]	[aʊbə]	[ɛ]
out	[aʊ]	[ʌdəb]	[nɑ]
dog	[dɑ]	[nɑbə]	[ʌ .ʌ]
no	[no]	[nʌ]	[o]

Determine the consonant, vowel, syllable shape inventories and note any sequential or positional constraints (pp. 184-185). Based on the information given, apply the Mean Babbling Level on page 186 to this child. Discuss your results.

5. Discuss how routine and scripted events could be specifically used to obtain a spontaneous speech sample from an unintelligible child. Consider tasks or objects which could be used for this purpose.

### MULTIPLE CHOICE QUESTIONS

- The term appraisal refers to the
  - end result of studying and interpreting data
  - collection of data
  - questions which are asked in the history information
  - using standardized tests
- A comprehensive phonetic-phonemic evaluation includes which of the following?
  - a standardized speech assessment
  - a conversational speech sample
  - hearing screening
  - all of the above
- A standardized speech assessment
  - always provides a standardized score
  - examines all sounds and sound combinations in General American English
  - is relatively time consuming, the time expenditure is high
  - provides all the information necessary for a comprehensive evaluation
- There are many reasons why a spontaneous speech sample should be analyzed during a comprehensive phonetic-phonemic evaluation. Which one of the following is not one of those reasons?
  - a spontaneous speech sample demonstrates the differences which exist between citing and talking

- b) a spontaneous speech sample provides a typical measure of speech performance
  - c) a spontaneous speech sample aids in determining the stimulability of the error sounds
  - d) a spontaneous speech sample might be useful in determining language, voice, and/or prosodic capabilities of the client
5. This type of scoring could be used to give feedback to the client but is not accurate enough for recording the results of a standardized speech assessment
- a) two-way scoring
  - b) five-way scoring
  - c) phonetic transcription
6. This type of scoring is the one which is typically suggested in the manuals of standardized speech assessments.
- a) two-way scoring
  - b) five-way scoring
  - c) phonetic transcription
7. Why is stimulability testing important?
- a) because it can absolutely predict which error sounds will improve in therapy
  - b) because it can tell you at which level to start in therapy (isolated sound, syllable, word level, for example)
  - c) because it can predict which children do not need therapy
  - d) because it provides the clinician with a measure of the child's consistency on two different tasks
8. The term glossing means
- a) the client quickly says something
  - b) repeating what the client says with the same pattern of misarticulations
  - c) repeating what the client says with normal pronunciation so that the word can later be identified
  - d) having the client read a text during the spontaneous speech sample
9. Functional assessment of the speech mechanism includes not only whether the client can adequately perform the task on command but also
- a) whether the range of movement is adequate
  - b) whether the movements are integrated and smooth
  - c) whether the speed of the movements appears adequate
  - d) all of the above
10. Phonological awareness testing is
- a) suggested for all children with speech sound disorders
  - b) necessary as all children with speech sound problems have phonological awareness difficulties
  - c) suggested only for children who demonstrate a collapse of two or more phonemic contrasts
  - d) not necessary
11. Which one of the following is not a characteristic of children with delayed development during the emerging phonological period?
- a) small expressive vocabularies
  - b) limited sound capabilities but very intelligible
  - c) reduced number of syllable shapes
  - d) reduced repertoire of consonants

12. It is often difficult to examine the structure and function of the speech mechanism of a young child with an emerging phonological system. What type of information should be used to supplement the speech mechanism examination?
- birth history information
  - feeding and babbling behavior
  - information from the pediatrician
  - none of the above should be used as supplemental information
13. What is an independent analysis?
- the child's productions are evaluated, however, not compared to the adult norm model
  - the clinician does an independent assessment without the aid or intervention of the caregivers
  - the child's speech sound productions are considered but independent from other language areas
  - the clinician utilizes informal assessment procedures, independent from standardized assessment tools
14. What type of information is collected for an independent analysis?
- the inventory of syllable shapes
  - the inventory of speech sounds
  - the use of any constraints on sound sequences
  - all of the above
15. Constraints on sound sequences refers to
- a reduced inventory of consonants
  - a reduced inventory of vowels
  - the use of any sounds or patterns which are used exclusively in certain words or context positions
  - the exclusive use of a certain type of syllable structure
16. Why use scripted and routine events when attempting to obtain a spontaneous speech sample from an unintelligible child?
- because these type of events utilize phonetically less complex sounds
  - because of the predictability of these events
  - because the child can articulate somewhat better during these types of tasks
  - because these tasks slow the rate of speech down which increases intelligibility

## TRUE/FALSE QUESTIONS

- Screening measures collect enough data for a comprehensive assessment.
- Standardized speech assessment results state whether the child has a phonological disorder or not.
- For later reference it is always a good idea to transcribe the entire word of a standardized speech assessment if any sounds are in error.
- Stimulability testing follows a general procedure of asking the client to "watch and listen to what I am going to say, and then you say it".
- A spontaneous speech sample is an optional portion of a comprehensive phonetic-phonemic evaluation.
- Both the appearance and the function of the oral-motor structures should be examined when evaluating the speech mechanism.

7. There appears to be a high percentage of children with "delayed speech" who also have concurrent hearing problems.
8. Unintelligible children are limited to a group of children of a fairly young age, usually between 3 and 4 years old.
9. Measuring diadochokinetic rates can be done with children as young as age five.
10. A standardized speech assessment is the only necessary tool needed for a comprehensive phonological evaluation.

## SHORT ANSWER QUESTIONS

1. What are the differences between the appraisal and the diagnosis portion of an assessment?
2. What kind of information can an initial impression provide for the clinician?
3. What are the disadvantages of using a five-way scoring system?
4. Why is it important that clinicians attempt to assess the client's spontaneous speech in a variety of talking situations?
5. Why is it important to assess a child's communicative participation?
6. Explain why it is important to assess or screen phonological awareness.
7. Define what is meant by emerging phonology.
8. Why is an independent analysis important when assessing a child with an emerging phonological system?
9. What are routine and scripted events?
10. Why do you think that diadochokinetic rates use the repetition of [pʌ], [tʌ], and [kʌ] as opposed to other sounds or sound combinations?

## ESSAY QUESTIONS

1. Explain what is meant by two-way, five-way, and phonetic transcription scoring systems. What are the advantages and disadvantages of each?
2. Explain why a spontaneous speech sample is a necessary portion of a comprehensive phonetic-phonemic evaluation.
3. Outline how you would assess both the structure and the function of the speech mechanism.
4. What are some of the problems noted when assessing the cognition of a child with articulatory and/or phonological impairments? Why are nonverbal tests of cognition not a good answer?
5. Discuss briefly the interrelationship between learning to read, phonological/phonemic awareness and speech sound disorders.

## REFERENCES

- Darley, F. (1991). A philosophy of appraisal and diagnosis. In F. Darley & D. Spriestersbach (Eds.), *Diagnostic methods in speech pathology* (2nd ed.) (pp 1-23). New York: Harper & Row.
- Hodson, B. W. (1984). Facilitating phonological development in children with severe speech disorders. In H. Winitz (Ed.), *Treating articulation disorders. For clinicians by clinicians* (pp. 75-89). Baltimore: University Park Press.
- Smit, A. B. (1993). Phonologic error distributions in the Iowa-Nebraska Articulation Norms Project: Consonant singletons. *Journal of Speech and Hearing Research*, 36, 533–547.
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# Chapter 7

## Diagnosis

### Summarizing Data and Classifying Speech Sound Disorders

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#### LEARNING OBJECTIVES

When you have finished this chapter, you should be able to:

- Summarize data for the inventory, distribution, and stimulability of speech sounds.
  - Evaluate phonemic contrasts and how to establish a phonemic inventory.
  - Establish phonemic pattern analysis using phonological processes.
  - Classify speech sound disorders according to the following categories: articulation, phonological delay, consistent phonological disorder, and inconsistent phonological disorder.
  - Distinguish factors that affect intelligibility and measurements of intelligibility.
  - Demonstrate measures of severity, whole-word accuracy, and variability.
- 

#### CHAPTER OVERVIEW

The goal of this chapter was to show how the data gathered in the appraisal section of our assessment could be utilized for several different types of analyses. The first portion of this chapter demonstrated how to organize the data collected from the appraisal portion outlined in Chapter 6. A preliminary analysis included forms and procedures to determine the inventory, distribution, and stimulability of speech sounds. The next step in the diagnostic process examined the data to determine whether a neutralization of phonemic contrasts existed.

A method of analyzing error patterns was illustrated by an analysis of phonological processes. A sample form and analysis using our case study, Jonah, age 7 years 4 months were provided. Next, we returned to the classification system for speech sound disorders discussed in Chapter 1, the Differential Diagnostic System (Dodd, 2013). This system classifies speech sound disorders according to five subgroups: articulation disorder, delayed phonological disorder, consistent phonological disorder, inconsistent phonological disorder, and childhood apraxia of speech. Characteristics of each of the first four subgroups were discussed, as were specific diagnostic parameters.

Finally, measures of intelligibility and severity were described. Several metrics were illustrated along with their calculations. A practical application is included in the Case Study at the end of this chapter. These measures can be used to document the need for, and progress in, therapy as well as to serve as a basis for clinical research.

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## PRESENTATION OUTLINES

1. To provide a means of organizing the data which have been collected from the standardized speech measure, a spontaneous speech sample and other supplemental word material.
2. To examine how the inventory and distribution of speech sounds can be organized according to specific parameters. The inventory, consisting of all sounds produced by the client, is delineated according to prevocalic, nucleus, intervocalic, and postvocalic sounds. This organization provides the distribution of speech sounds. In addition, stimulability measures were demonstrated as a further means to organize data.
3. To offer suggestions on initial questions which will guide us in analyzing a child's error patterns.
4. To offer guidelines for establishing the analysis of phonemic contrasts which are a portion of establishing a child's phonemic inventory. Guidelines and forms are provided to establish whether a child is using phonemes contrastively to differentiate meaning. The neutralization of phonemic contrasts will be addressed as a means to differentiate between children with articulation-based speech sound disorders and those with phonological disorders.
5. To provide additional assessment procedures for a child who may evidence phonological impairment. In addition to the aforementioned inventory, distribution, and stimulability of speech sounds, phonological error patterns using phonological processes will be addressed.
6. To classify speech sound disorders according to the classification system provided by Dodd (2013). This system delineates 1) an articulation disorder, 2) phonological delay, 3) consistent phonological disorder, 4) inconsistent phonological disorder, and 5) childhood apraxia of speech. The fifth category, childhood apraxia of speech, is discussed in some detail in Chapter 11. For the other four categories case studies are given to demonstrate their applications and symptoms.
7. To examine factors affecting intelligibility and measurements of intelligibility. Several assessment protocols are given including the Percentage of Consonants Correct, the Proportion of Whole-Word Correctness, and the Proportion of Whole-Word Variability. A case study is provided at the end of the chapter to demonstrate these measures. .

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## KEYWORD DEFINITIONS

**Inventory of speech sounds** typically denotes a listing of sounds that the client can articulate within normal limits (p. 197). However, some clients might demonstrate a regular production of a speech sound in one context but not in another. For example, a child might substitute t/s at the end of a word but realize [s] in a normal manner at the beginning of a word or syllable. In addition, children may realize a sound correctly but in the wrong context, i.e., as a substitution for another sound. This is exemplified by the child who substitutes [t] for all sh-sounds but uses [ʃ] as a substitution for [tʃ]. Such inconsistencies provide important information and must be noted.

**Distribution of speech sounds** refers to where the norm and aberrant productions occurred within the word (p. 198). Most standardized speech measures categorize this distribution according to three positions: initial, medial, and final. However, word-medial is an imprecise term. The categorization used in this text classifies distribution according to where the consonants occur in relation to the vowel nuclei, i.e., pre-, post-, or intervocalic. In contrast to written syllables, syllabication of *spoken* syllables remains problematic and is not precisely rule-governed.



**Loss of phonemic contrasts or the neutralization of specific phonemic contrasts** can occur on one or many phones (pp. 204-205). This is represented by a child producing the same phoneme for one or more other phonemes, for example, a child who substitutes /t/ for /s/, /z/, /ʃ/ and /θ/. The use of minimal pairs was suggested as way to further determine phonemic function.

A **phonological process analysis** is a means of identifying substitutions, syllable structure, and assimilatory changes that occur in the speech of clients (pp. 208-210). Each error is identified and classified as one or more of the phonological processes. Patterns of errors are described according to the most frequent phonological processes present and/or those that affect a class of sounds or sound sequences. Certain idiosyncratic processes occur in the speech of children with phonological disorders. A list of a few of these processes is contained in Table 7.3 (p. 208). Although substitution processes typically affect consonants, in some children vowel errors may occur. A list of phonological processes for vowel errors is included in Table 7.4 (p. 209). Results of a clinical application with this type of analysis system can be found on pages 215 and 216.

**Articulation disorder** is the first of Dodd's (2013) classification category (pp. 211-213). This group of children is characterized by an inability to pronounce certain phones, typically s- and r-sounds. The child uses a consistent substitution or distortion for the target sound in both imitated and spontaneous productions.

**Phonological delay**, the second category of Dodd's (2013) classification is characterized by phonological patterns that one would use to describe a normally developing child at a younger chronological age (pp. 213-214).

**Consistent phonological Disorder**, the third category, is applied to children who demonstrate consistent use of some non-developmental error patterns. In addition, there may be evidence of some delayed developmental patterns. The consistent nature of unusual, non-developmental error patterns marks this child's phonological system (pp. 214-216).

**Inconsistent phonological disorder** (or inconsistent speech disorder) is the fourth category used for children who demonstrate a high degree of inconsistent productions of the same lexical item (pp. 216-218). Based on a specific measure, inconsistencies of 40 or more percent are considered to be an inconsistent speech disorder.

**Intelligibility** refers to a judgment made by a clinician based on how much of an utterance can be understood (p. 218). Although measurements of the degree of intelligibility remain subjective, they are generally related to the percentage of words that are understood by the listener. The perception of intelligibility can be influenced by many factors. Measures of intelligibility are referenced on pages 219-221.

**Measures of severity** are attempts to quantify the degree of involvement (pp.221-222). The Percentage of Consonants Correct developed by Shriberg and Kwiatkowski (1982) gives the clinician an objective measure which can be translated into severity divisions. The procedure for determining the percentage of consonants correct is outlined in Box 7.1 on page 221.

**Measures of whole words** include the Proportion of Whole Word Correctness and the Proportion of Whole-Word Variability (p. 222). A case study is given at the end of the chapter to illustrate these measures.



## LEARNING MATERIALS: ANSWERS TO QUESTIONS FROM

### TEXTBOOK THINK CRITICALLY (PAGE 225): ANSWERS

This is a transcription of Brandon, who was encountered in Chapter 6, with narrow transcription. Several variations exist in this example. Notes for the transcription. The [w] and [ɹ] are allophonic variations, typically [w] is used in Standard English dialect. There is also an unstressed syllable deletion in “telephone” so the sounds that remain are accurate. There is also an unstressed syllable deletion in “pajamas”. The /f/ for /v/ in “stove” was not counted as an error but rather postvocalic devoicing.

1. Phonetic inventory: [h], [ɹ̥], [z̥], [t], [d], [f], [v], [m], [n], [ŋ], [p], [b], [ɹ], [w], [ɻ], [tsʰ], [sʰ], [j], [dj] Note: the [tsʰ] is being considered an affricate /ts/  
Phonemic inventory: /h/, /s/, /z/, /t/, /d/, /f/, /v/, /p/, /b/, /m/, /n/, /ŋ/, /w/, /j/, /ɹ/ /ts/

2. Neutralization of phonemic contrasts

:

Target Substitution	Target Substitution
k → t	ŋ → n
g → ɣ	tʃ → ts (s is palatalized)
tʃ → tsʰ	ʃ → ts (s is palatalized)
l → w	ɔ̃ → dj
k → ɣ	θ → f
tʃ → t	
ʃ → t	
ɹ → w	
ð → d	
s → t	
z → t	
θ → t	

List all sounds that have the same substitution.

Targets	Substitution
k, ʃ, tʃ, s, z, θ	t
g, k	ɣ
ɹ, l	w
ð	d
θ	f
tʃ, ʃ	ts

There does seem to be a collapse of phonemic contrasts. Sound preference would be /t/ which is used as a substitution for /k, ʃ, tʃ, s, z, θ/.

3. Brandon is 5 years 6 months old. As noted earlier in Chapter 6, most of his errors (except for /k/ and /g/) would be considered developmentally appropriate according to the Smit (1993) data. Therefore, Brandon could probably be labelled as delayed phonological development. He has quite a few errors, which would impact his intelligibility, however, most seem to be developmental in nature and not idiosyncratic.

4. Idiosyncratic processes: 1) Frication of [g] and occasional [k] to [ɣ], 2) affrication of [ʃ] to [tʃ] as in “fishing”. The production of /dʒ/as /dj/ could possibly be idiosyncratic although it is fairly common as a substitution of /dʒ/.

## ADDITIONAL LEARNING MATERIALS

### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

1. Compare the results of the Goldman-Fristoe articulation test (Appendix 7.1 p. 226) to those of the spontaneous speech sample on page 223 for Jonah, the case study who is used throughout this chapter.
2. Jonah has been noted as being in the category consistent phonological disorder. Given the discussion and characteristics (pp. 214-215) what further testing would be warranted for Jonah?
3. Jonah appears to have very limited consonant cluster production. Given the results on pages 20-203, could you suggest some consonant clusters that might be within Jonah's production skills? For example, two phones which Jonah can produce and has in his inventory would be a good starting point. Also examine consonant clusters at the end of a word, postvocalically.

### MULTIPLE CHOICE QUESTIONS

1. Which one of the following terms refers to analyzing where the norm and aberrant productions occur within a word?
  - a) inventory of speech sounds
  - b) distribution of speech sounds
  - c) sound constraints
  - d) syllable constraints
2. Which one of the following would be necessary to analyze in multisyllabic but not in one-syllable words?
  - a) prevocalic
  - b) postvocalic
  - c) intervocalic
  - d) none of the above, all would need to be analyzed in one and more syllable words

3. A child says [tʌfbwʌʃ] for “toothbrush”. Which sound(s) are considered intervocalic in this production?
- [t]
  - [ʃ]
  - [fbw]
  - none of the above, there are no intervocalic consonant productions
4. Which one of the following is central to the differentiation of articulatory versus phonological impairments?
- the neutralization of phonemic contrasts
  - the presence of fricatives in the inventory
  - the inventory demonstrates later developing sounds
  - the presence of syllable constraints
5. Which one of the following signals an articulation disorder?
- preservation of phonemic contrasts
  - some type of articulatory change is used to mark minimal pair contrasts
  - peripheral, motor-based problems
  - all of the above
6. The regular pronunciation of the word “window” has which type of syllable shape?
- CVCV
  - CVCVC
  - CVCCV
  - CVCCVC
7. A child produces “hop” as [hɑp] and “Mom” as [mɑm] but “hopping” as [hɑ. iŋ] and “coming” as [kʌ.iŋ]. This child is probably evidencing
- a reduced consonant inventory
  - syllable constraints
  - a limited consonant distribution
  - a collapse of phonemic contrasts
8. Substitution processes within a phonological process analysis are based on
- the distribution of speech sounds
  - distinctive features
  - the collapse of phonemic contrasts
  - a broad phonetic feature classification system
9. The child says [tʌm] for “thumb”. According to a phonological process analysis which one of the following would be correct?
- the child has produced a consonant cluster substitution
  - stopping has occurred and the place of articulation has moved from dental to alveolar
  - fronting has occurred
  - fronting and stopping have occurred
10. Based on the characteristics of a consistent phonological disorder, which one of the following is true?
- these children do not need a speech-motor assessment, none of them displayed difficulties in this area
  - additional problems in this group included expressive language delay, vocabulary, and phonological awareness difficulties
  - these children were diagnosed before age 3

- d) these children were considered to have only mild speech difficulties
11. A phonological process analysis attempts to capture
- those phonetic features that distinguish between phonemes of a language, similar to distinctive features
  - syllable structure constraints
  - the degree of inventory constraint
  - the distributional problems which are noted for the individual sound substitutions
12. Using a phonological feature analysis, an error pattern is constituted by
- the number of different phonological processes the child utilizes
  - whether the sound errors represent normal or idiosyncratic processes
  - frequent use of one or more phonological process when the target and substitution are compared
  - how many syllable processes are used
13. Which one of the following analysis procedures can assess the contrastive use of phonemes within the child's phonological system?
- collapse of phonemic contrasts
  - inventory of phones
  - phonological process
  - all of the above
14. Which type of error can be assessed using a phonological process analysis?
- sound substitutions
  - sound deletions
  - assimilation processes
  - all of the above
15. A child says [dʊk] for "duck". Using phonological process analysis, this would be classified as
- vowel decentralization
  - vowel raising
  - vowel centralization
  - vowel fronting
16. The child says [tɛɪ. tɔʊ] for "potato". Which phonological process would this represent?
- stopping
  - weak syllable deletion
  - reduplication
  - fronting
17. The child says [tʌŋk] for skunk. Which phonological processes would this demonstrate?
- consonant cluster reduction + fronting
  - consonant cluster reduction
  - consonant cluster substitution + fronting
  - stopping + fronting
18. What does the term "inconsistent speech disorder" represent?
- a child who previously had a speech sound disorder but no longer does
  - a child who produces different productions from instance to instance of the same lexical item
  - a child who, only in very specific situations, demonstrates a speech sound disorder

- d) all of the above
19. Which one of the following does not influence intelligibility of an utterance?
- the degree of loss of phonemic contrasts
  - the consistency of the target realization
  - the extent to which the listener is familiar with the client's speech
  - the age, older children and adolescents are more difficult to understand
20. Measures of intelligibility are
- subjective, perceptual judgements
  - generally based on the percentage of words that are understood by the listener
  - influenced by the number, type and consistency of speech sound errors
  - all of the above

## TRUE/FALSE QUESTIONS

- The inventory of speech sounds could include those sounds which the child pronounces correctly but in a context where it does not normally belong.
- Differentiating primarily an articulation-based from a phonemic-based disorder is an either/or dichotomy.
- The following substitutions are consistently noted in all word positions: [f] [p], [v] and → [b] are produced as [p]. This is a loss of phonemic contrast.
- When analyzing syllable shape, only consonants are counted.
- The Proportion of Whole-Word Accuracy can be used instead of a standardized speech assessment measure.
- The Percentage of Consonants Correct can be calculated and applied to a metric of severity.
- Dodd's (2013) classification system is designed for primarily older school-age children.
- A phonological process analysis can only be used to assess errors resulting in a neutralization of phonemic contrasts.
- Phonological process analysis can only be used for consonant changes; vowels cannot be assessed with this method.
- According to Dodd's (2013) classification system, the group Articulation Disorder contains children with primarily s- and r-sound disorders.

## SHORT ANSWER QUESTIONS

- Why is it important to determine the inventory and distribution of speech sounds in the assessment process?
- Define what is meant by the neutralization of phonemic contrasts. Give an example of phonemic neutralization.
- When analyzing the neutralization of phonemic contrasts, what is meant by sound

preferences?

4. Pick one factor that impacts intelligibility. Briefly discuss this factor.
5. When assessing a child's error patterns, we are attempting to understand the child's phonological system. What is meant by system in this context?
6. What is the main disadvantage of scales that measure intelligibility?
7. Which types of errors can be assessed using phonological processes?
8. What are idiosyncratic processes?
9. Why is it difficult to measure intelligibility?
10. What are severity measures trying to quantify?

## ESSAY QUESTIONS

1. Give examples of the procedures you would follow to determine a child's inventory, distribution, and stimulability of phones within the child's system.
2. Why is it difficult to determine with certainty that a child has either an articulation-based or a phonemic based disorder?
3. Discuss the advantages and disadvantages of phonological process analyses.
4. Discuss which factors may have an impact on the perceived intelligibility of an utterance.
5. Discuss how measures of intelligibility and severity can be useful in the assessment and treatment process. Include how these results could be used to prioritize for therapy and document therapy progress.

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## REFERENCES

- Dodd, B. (2013). *Differential diagnosis and treatment of children with speech disorder* (2nd ed. ebook). London, UK: Whurr.
- Elbert, M. (1992). Clinical forum: Phonological assessment and treatment. Consideration of error types: A response to Fey. *Language, Speech, and Hearing Services in Schools, 23*, 241-246.
- Elbert, M., & Gierut, J. (1986). *Handbook of clinical phonology: Approaches to assessment and treatment*. San Diego: College-Hill Press.
- Howell, J., & Dean, E. (1994). *Treating phonological disorders in children: Metaphon-theory to practice* (2nd ed.). London: Whurr.
- Kamhi, A. G. (1992). Clinical forum: Phonological assessment and treatment. The need for a broad-based model of phonological disorders. *Language, Speech, and Hearing Services in Schools, 23*, 261-268.

Shriberg, L. D., & Kwiatkowski, J. (1982). Phonological disorders III: A procedure for assessing severity of involvement. *Journal of Speech and Hearing Disorders*, 47, 256-270.

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# Chapter 8

## Dialects and English as a Second Language

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### LEARNING OBJECTIVES

When you have finished this chapter, you should be able to:

- Define dialects including formal, informal and regional dialects.
  - Describe the characteristics of Appalachian English, Ozark English, and African-American Vernacular English.
  - Identify the English as a Second Language Learner noting developmental factors and defining Limited English Proficient students.
  - Describe the speech sound and specific prosodic characteristics of Spanish, Vietnamese, Cantonese, Korean, Filipino, Hmong, and Arabic American English.
  - Identify cultural competence and recognize general guidelines that could be used when evaluating an English language learner.
- 

### CHAPTER OVERVIEW

This chapter examined issues concerning dialect and English as a second language. The first section defined dialects and delineated Standard English and vernacular dialects. Regional, social, and cultural dialects were summarized. This included the vowel and consonant variations noted in North, South, Midland, and West regional dialects as well as definitions of race, culture, and ethnicity. A summary of sound features of Appalachian, Ozark, and African American Vernacular English were integrated with specific features that are also noted in regional dialects. A more thorough overview of phonological variations noted in African American Vernacular English was provided.

The second portion of the chapter looked in detail at the speaker of English as a second language. A growing number of individuals speak English as a second language including the growing number of immigrant children within the United States. Spanish, Vietnamese, Hmong, Cantonese, Korean, Filipino, and Arabic were presented as the most prevalent languages, other than English, which are spoken within the United States. For each of these languages the phonemic inventories were presented as well as specific pronunciation problems which might occur for English second language learners.

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### PRESENTATION OUTLINES

1. To define and discuss the label dialect as a language variation that typifies a group of speakers within a language. Standard English was noted as a dialect within American English. Formal Standard English, Informal Standard English and vernacular dialects were discussed as means to examine the variations of American English.
2. To define regional dialects noting the North, South, Midland, and West divisions that

have been labeled. Specific vowel variations were given for each of these areas as a means to demonstrate their similarities and differences.

3. To supply specific phonological features for selected regional and cultural dialects. Some of the changes note differences between various cultural dialects while others demonstrate comparability across regional and cultural dialects.

4. To examine the ethnic dialect known as African American Vernacular English (sometimes referred to as Black English or African American English). The understanding of the phonological variations is important for speech/language therapists. Information was provided delineating features which co-occur in other dialects as well as those which are unique to African American Vernacular English.

5. To supply general information about speakers of English as a second language. This includes the definition of limited English proficiency as well as state-by-state statistics on the top three languages spoken by limited English proficient students within the United States.

6. To outline the phonemic inventories (vowels and consonants) of the five languages spoken by limited English proficient students: Spanish, Vietnamese, Hmong, Cantonese, Korean, Filipino and Arabic. Differences between these seven languages and American English are summarized according to phonemic inventories, prosodic variations and noted pronunciation difficulties.

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## KEYWORD DEFINITIONS

**Dialect** is a neutral label that refers to any variety of a language that is shared by a group of speakers (p. 231). The technical use of dialect as a neutral term implies no particular social or attitudinal evaluations of the term. There are no “good” and “bad” dialects.

**Standard English** is noted as a dialect of American English (p. 231). It may be divided into formal and informal versions.

**Formal Standard English** is applied primarily to written language and the most formal language situations. It tends to be based on written language and is exemplified by grammar texts (pp. 231-232).

**Informal Standard English** takes into account the assessment of members of the speaking community as they judge the “standardness” of other speakers (p. 232). This judgment relies far more heavily on grammatical structure than pronunciation patterns.

**Vernacular dialects** refer to those varieties of spoken American English that are considered outside the continuum of Informal Standard English (p. 232).

**Regional dialects** correspond to various geographical locations (p. 232). The four major dialect regions include North (pp. 233-234), South (p. 234), Midland (p. 234), and West (p. 234). Characteristics of each are included within the noted pages and Figure 8.1 (p. 233) notes the geographical areas.

The speech characteristics of **Appalachian English** and **Ozark English** are summarized on pages 235 through 237. Table 8.1 (pp. 235-236) summarizes several features and these two dialects are also contained in Table 8.2 (p. 236) and Table 8.3 (pp. 236-237).

**Social dialects** are those dialects which are generally related to socioeconomic status (p. 232).

**Ethnic dialects** may be defined according to race, culture, or ethnicity (p. 232).

**Race** is a biological label that is defined in terms of observable physical features and biological characteristics (p. 237).

**Culture** is a way of life developed by a group of individuals to meet psychosocial needs. It consists of values, norms, beliefs, attitudes, behavioral styles and tradition (p. 237).

**Ethnicity** refers to commonalities such as religion, nationality, and region (pp. 237-238).

**African American Vernacular English** is a systematic, rule-governed dialect that is spoken by many but not all African American people within the United States (pp. 238-240). It is sometimes referred to as Black English or African American English. See also Table 8.3 on pages 236-237 and Table 8.4 on pages 239-240 for a summary of certain characteristics.

**ASHA's position on dialects** (ASHA, 2003) states that no dialectal variety of American English is a disorder or a pathological form of speech or language. Each dialect is acceptable as a functional and effective variety of American English. Each serves a communicative as well as a social solidarity function. Each dialect maintains the communication network and the social construct of the community of speakers who use it. Furthermore, each is a symbolic language representation of the geographic, historical, social, and cultural background of its speakers (pp. 241-242).

**Interference or transfer** indicates the incorporation of language features into a nonnative language based on the occurrence of similar features in the native language (p. 243).

**Silent period** refers to a period of time when a child may be very quiet, speaking very little as she/he focuses on understanding the new language (p. 244).

**Code switching or code mixing** is a developmental process in which English language learners alternate between L1 and L2. This may occur within a phrase of between sentences (p. 244). It also refers to the changing back and forth between dialects, specifically between African American Vernacular English and Standard American English.

**Limited English proficient students** are those who were not born in the United States or whose native language is a language other than English. The difficulties in speaking, writing, or understanding the English language compromise the individual's ability to successfully achieve in classrooms where the language of instruction is English (p. 245).

**English as a second language** may create many speech sound problems for the speaker trying to learn American English. A primary reason is the impact of the speaker's native language on the sound system of General American English. An overview of some major differences between several foreign languages and General American English is provided in Tables 8.6 for Spanish (p. 249), Table 8.7 for Vietnamese (p. 253), Table 8.8 for Korean (p. 255), Table 8.9 for Cantonese (Hong Kong) dialect (pp. 257-258), Table 8.10 for Filipino (Tagalog), (p. 260), Table 8.11 for Mong Leng Hmong (pp. 261-262), and Table 8.12 for Arabic (pp. 263-264).

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**LEARNING MATERIALS: ANSWERS TO QUESTIONS FROM  
TEXTBOOK THINK CRITICALLY (PAGE 268): ANSWERS**

Word	Possible Pronunciation	
house	[haus]	Arabic has both [h], [s] and the diphthong [au].
telephone	[tælafun]	Arabic has the consonant sounds but vowels used will vary (see page 263). The [n] is a dentalized production.
cup	[kap]	The [ʌ] does not exist in Arabic, therefore, a variation of [a], [æ] or [u] may be substituted. See page 263.
gum	[kam]	[k] exists in Arabic but not [g]. The [n] is a dentalized production
knife	[naf]	The diphthong does not exist and the [n] is a dentalized production.
window	[windu]	The short Arabic [i] resembles an [ɪ] and will probably be used as a substitution.
wagon	[wakan]	There is not a [g] in Arabic. The short Arabic [a] resembles [æ] and may be used as a substitution.
wheel	[wil]	These vowels and consonants exist in Arabic.
chicken	[tʃikan]	These consonants exist in Arabic, vowels will vary, again the short Arabic [i] will be used as a substitution for [ɪ].
zipper	[zipar]	The short Arabic [i] resembles the [ɪ] sound and will probably be used as a substitution. The Arabic r-sound has several variations which sound somewhat differently than the American English r-sounds. This Arabic r-sound will probably be used as a substitution for the [ə] (see page 263).
duck	[dak]	A variation of [a], [æ] (the short Arabic [a]) or [u] will usually be substituted for [ʌ].
vacuum	[fakum]	The [kj] may give the Arabic speaker difficulty
matches	[matʃaz]	The short [a] vowel approaches [æ], the [ə] may vary between [a], the short [a] or [u].
lamp	[lamp]	The short [a] may be substituted for [æ], the [mp] combination may prove difficult due to the absence of a substantial number of consonant clusters in Arabic.
shovel	[ʃafal]	A variation of [a], [æ] (the short Arabic [a]) or [u] will

		usually be substituted for [ʌ] or [ə].
car	[kar]	The Arabic r-sound will probably be used as a substitution for the [æ].
rabbit	[rapat]	The short [a] may be substituted for [æ], the Arabic r-sound will be substituted for “r”, there is no [b] in Arabic.
fishing	[fiʃɪŋk]	The [ŋ] is an allophone of [n] and never occurs at the end of a word. Arabic speakers have a tendency to add a [k] after [ŋ] (see page 264).
church	[tʃɪrtʃ]	The Arabic r-sound will replace central vowels with r-coloring (see page 265).
brush	[praʃ]	The Arabic r-sound will replace the American English one, [b] does not exist in Arabic, a variation of [a], [æ] (the short Arabic [a]) or [u] will usually be substituted for [ʌ].
pencils	[pensalz]	Consonant clusters may be difficult for the Arabic speaker due to the limited number in Arabic.
scissors	[sɪzrz]	The Arabic r-sound replaces central vowels with r-coloring, the short [i] of Arabic sounds similar to [ɪ].
bathtub	[pəθtʌp]	The [b] does not exist in Arabic, the short Arabic [a] replaces [æ] and [ə].
thumb	[θʌm]	A variation of [a], [æ] (the short Arabic [a]) or [u] will usually be substituted for [ʌ].
finger	[fɪŋkr]	The short [i] of Arabic sounds similar to [ɪ]. Arabic speakers have a tendency to add a [k] after [ŋ] and there is no [g] in Arabic (see page 264). The Arabic r-sound replaces central vowels with r-coloring.
ring	[rɪŋ]	The short Arabic [i] sounds similar to [ɪ].
jumping	[tʃʌmpɪŋ]	The voiced affricate does not exist in Arabic. A variation of [a], [æ] (the short Arabic [a]) or [u] will usually be substituted for [ʌ].
pajamas	[patʃamaz]	See “jumping” above.
plan	[plɛn]	There may be difficulty with [pl] due to the infrequency of consonant clusters in Arabic.
blue	[plu]	There is no [b] in Arabic. There may be difficulty with the consonant cluster due to the infrequency in Arabic.
bath	[pəθ]	There is no [b] in Arabic. The short [a] in Arabic is similar to [æ].
drum	[drʌm]	The Arabic r-sound will be substituted for the American English “r”. A variation of [a], [æ] (the short Arabic [a])

or [u] will usually be substituted for [ʌ].

Santa	[santa]	The short [a] in Arabic is similar to [æ]. A variation of [a], [æ] (the short Arabic [a]) or [u] will usually be substituted for [ə].
street	[satarit]	This three consonant cluster will probably have a short vowel between its elements.

2. Select the language and use the Phonological Inventory tables and the respective Box following the Phonological Inventory tables for that particular language.

## ADDITIONAL LEARNING MATERIALS

### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

1. According to Figure 8.1 (page 233) and the text on pages 232-234, students should determine which regional dialect they belong to. This will probably be based on where they grew up or spent the most time during their childhood (up until puberty). Based on the descriptions of each of the regional dialects, determine which characteristics they have in their speech. Can they come up with word examples which demonstrate the specific vowel variations?

2. Based on the state that you are in, what are the three non-English languages that are spoken by limited English proficient students (see Table 8.5, pages 246-247). Go onto the internet and see if you can find three interesting things about the culture of the language of individuals speaking these languages.

3. The following words are from the HAPP-3. Which changes might occur if the child was pronouncing the words according to African American Vernacular English? Use Table 8.3 (pages 236-237) and Table 8.4 (pages 239-240) to assist you.

basket	green	three	watch
glasses	feather	mouth	rock
spoon	fork	screwdriver	shoe
zip	mask	truck	string
boats	star	thumb	crayons
cowboy hats	toothbrush	music box	hanger

4. What might be the difficulties on the HAPP-3 word list if the child's L1 was Spanish? Compare the Spanish phonological inventory in Table 8.6 (page 249) and Box 8.1 (pages 249-250) to assist you.

## MULTIPLE CHOICE QUESTIONS

1. Dialects
  - a) affect only the production of vowels
  - b) affect only the phonological system, the morphosyntactic or semantic systems remain the same
  - c) are limited to certain areas of the United States
  - d) may be regional, cultural or socially based
2. Dialect speakers
  - a) should never be assessed, dialect is a difference not a disorder
  - b) can also have speech sound disorders and it may be necessary to evaluate the child's functional adequacy within the dialect as well
  - c) can be thoroughly assessed using any standardized speech assessment
  - d) can have language disorders but not speech sound disorders
3. Dialects that are related to the particular geographic area are called
  - a) regional dialects
  - b) social dialects
  - c) ethnic dialects
  - d) all of the above
4. Formal Standard English is
  - a) the dialect which should be spoken in the United States
  - b) only used in grammar texts and is not spoken
  - c) used in the most formal language situations
  - d) a dialect which has become extinct
5. Informal Standard English
  - a) relies only on speech sound (pronunciation) patterns
  - b) takes into account the assessment of members of the American English speaking community
  - c) accepts stigmatized grammatical structures
  - d) does not exist on a continuum of "standardness" but rather has a specific set of features
6. rmacular dialects
  - a) are the same as Informal Standard English
  - b) vary only in their pronunciation (speech sound) patterns
  - c) have the same features for all speakers
  - d) are considered outside the continuum of Informal Standard English
7. African American Vernacular English
  - a) is an ethnic dialect
  - b) is a systematic rule-governed dialect
  - c) shares many commonalities with Standard American English
  - d) all of the above
8. The features of African American Vernacular English are
  - a) only related to phonological patterns

- b) similar in some respects to Southern dialects
  - c) not considered to be unique but share features of several different dialects
  - d) not age, gender, or socioeconomically related in the degree of their use
9. Which of the following language is spoken by the majority of limited English proficient children?
- a) Vietnamese
  - b) Korean
  - c) Spanish
  - d) Arabic
10. The Spanish vowel inventory contains
- a) far more vowels than American English
  - b) the same vowels as American English
  - c) only diphthongs
  - d) only 5 pure vowels
11. Which one of the following language contains several prenasalized stops?
- a) Spanish
  - b) Vietnamese
  - c) Hmong
  - d) Arabic
12. Which one of the following languages has pharyngealized stops and fricatives?
- a) Spanish
  - b) Vietnamese
  - c) Hmong
  - d) Arabic
13. Compared to American English, which one of the following languages has a similar inventory of plosives?
- a) Spanish
  - b) Vietnamese
  - c) Hmong
  - d) Arabic
14. If you have a child whose native language is not English and you note
- a) irregular pronunciations in English, this could be
  - b) related to native language interference
  - c) a phonological disorder which could be evidenced in L1 and L2
  - d) attributed to the differences in phonological inventories between L1 and L2
  - e) all of the above
15. A child has been referred to you who speaks Chinese as a native language and English as a second language. You, however, do not speak Chinese. You should
- a) examine and test only the English capabilities of the child
  - b) obtain an assessment tool in Chinese to test the child
  - c) rely on family, other members of the community who do speak Chinese, and an interpreter to help you assess the capabilities of the child
  - d) note the speech sound errors in English, they will not be impacted by the child's use of Chinese



## TRUE/FALSE QUESTIONS

1. Dialectal differences should be understood as disordered pronunciation.
2. Dialect usage and learning English as a second language result in very similar patterns of pronunciation.
3. Dialect is a neutral label which implies no social or attitudinal evaluations.
4. Vernacular dialects may contain socially stigmatized grammatical forms.
5. The boundaries between geographical areas for regional dialects are often not discrete.
6. All of the seven languages which were discussed (Spanish, Vietnamese, Cantonese, Hmong, Korean, Filipino, Arabic) have diphthongs.
7. All of the seven languages which were discussed (Spanish, Vietnamese, Cantonese, Hmong, Korean, Filipino, Arabic) have consonant clusters.
8. All of the seven languages which were discussed (Spanish, Vietnamese, Cantonese, Hmong, Filipino, Korean, Arabic) are tone languages.
9. In limited English proficient students, Spanish is the first language in every state within the U.S.
10. Family members can be a valuable portion of the assessment process when evaluating students with a limited English proficiency.

## SHORT ANSWER QUESTIONS

1. Discuss the difference between Formal Standard English and Informal Standard English.
2. How are regional dialects defined?
3. What are the four regional dialects that were noted in the United States?
4. List one distinction which exists when comparing the regional dialects.
5. Summarize what is meant by limited English proficiency.
6. What are the differences between culture and ethnicity?
7. Why is it important to compare the phonological inventory of L1 to American English if the child's native language is one other than English?
8. What does it mean when it is stated that in some languages aspiration (such as [p] and [p<sup>h</sup>]) has phonemic value?
9. Besides phonological variations, what other language differences are noted in African American Vernacular English? Give one example.
10. Give two characteristics of Appalachian and Ozark English.

## ESSAY QUESTIONS

1. Discuss the degree of use of African American Vernacular English according to age, gender, and socioeconomic status.
  2. Discuss how you would determine if a child's irregular pronunciation is a result of L1 – L2 transfer or if the child does indeed have a phonological disorder.
  3. Define Formal Standard English versus Informal Standard English. In which situations might you use each?
  4. What are tone languages? If a child's native language is a tone language, hypothesize the type of difficulties the child might encounter in American English.
  5. Discuss why it is important that we understand dialect features as speech/language therapists.
- 

## REFERENCES

- American Speech-Language-Hearing Association. (2003). *American English dialects* [Technical Report]. Retrieved from <http://www.asha.org/policy>
- Penfield, J., & Ornstein-Galacia, J. (1985). *Chicano English: An ethnic dialect*. Philadelphia: John Benjamin.
- Perez, E. (1994). Phonological differences among speakers of Spanish- influenced English. In J. Bernthal & N. Bankson (Eds), *Child phonology: Characteristics, assessment, and intervention with special populations* (pp. 245-254). New York: Thieme.
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# Chapter 9

## Therapy for Articulation Errors

### Obtaining an Accurate Production of a Speech Sound

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#### LEARNING OBJECTIVES

- Define the traditional motor approach, including guidelines for beginning therapy, and recognize its applicability to both articulation and phonological disorders.
- Identify the general overview of therapy progression from sensory perceptual training to establishing sounds in isolation, nonsense syllables, words, structured phrases, and conversational speech emphasizing facilitating and coarticulatory contexts.
- Summarize principles of motor learning and how these affect intervention parameters.
- Differentiate between phonetic placement and sound modification principles and apply this knowledge directly to the most frequently misarticulated sounds: [s] and [z]; [ʃ] and [ʒ]; [k] and [g]; [l]; [r] and the central vowels with r-coloring; [θ] and [ð]; [f] and [v]; affricates; voicing problems; and consonant clusters.
- Understand the structure and dynamics when doing group therapy with the traditional motor approach.

#### CHAPTER OVERVIEW

This chapter dealt with the phonetic (traditional-motor) approach to the treatment of articulation disorders, which is based on placement of the articulators in such a manner as to achieve an acceptable articulation of the sound in question. First, a sequence for therapy was outlined, beginning at the sound level and systematically moving to more complex articulatory conditions. Dismissal criteria were also suggested in the first portion of this chapter.

An overview of principles of motor learning was also included. These principles are important to guide the clinician through any type of treatment process. They provide a framework for conditions of practice and feedback that have documented efficacy.

Misarticulations of several consonants were discussed in detail in the second portion of this chapter. The consonants chosen represented the most frequently misarticulated speech sounds: misarticulations of [s] and [z]; [ʃ] and [ʒ]; [k] and [g]; [l]; [r] and the central vowels with r-coloring. Other sound problems included misarticulations of [f] and [v], the affricates [tʃ] and [dʒ], voiced and voiceless substitutions, and consonant clusters. When applicable, both phonetic placement and sound modification techniques were described. In addition, effects of coarticulation were examined for each of the noted problems.

Therapy with a group of students is often necessary. The final section of this chapter examined some possibilities for group therapy. Suggestions of how to structure the groups were given, and examples of activities were provided.

Any successful application of this approach to articulation therapy presupposes a firm knowledge base concerning not only the phonetic characteristics of the sound's typical

realization but also the misarticulated sound. An attempt has been made to provide both within this chapter.

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## PRESENTATION OUTLINES

1. To define a phonetic approach or what has often been referred to as a traditional or motor approach.
  2. To provide an overview of the therapy sequence for a phonetic approach. This sequence includes sensory-perceptual training, production of the sound in isolation, using facilitating contexts, nonsense syllables, words, structured phrases and sentences, spontaneous speech, dismissal and reevaluation criteria.
  3. To delineate principles of motor learning and give examples of how these could be implemented into treatment. Both conditions of practice and feedback were given and applied to clinical populations with speech sound disorders.
  4. To discuss in detail the most frequent misarticulations. These include misarticulations of [s] and [z]; [ʃ] and [ʒ]; [k] and [g]; [l]; [ɹ] and the central vowels with r-coloring. Other sound problems included misarticulations of [f] and [v], the affricates [tʃ] and [dʒ], voicing and consonant cluster problems are treated. Both the phonetic description of the target sound and the phonetic features of the error production serve as the basis for this discussion.
  5. To introduce the frequency of occurrence, phonotactics (including consonant clusters), morphophonemic function, minimal pair words, and sentences for each of the noted misarticulations.
  6. To demonstrate how phonetic placement and sound modification techniques can be utilized for the various misarticulations.
  7. To discuss coarticulatory conditions impacting the production of the target sound. Word examples are used to exemplify the decision-making process.
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## KEYWORD DEFINITIONS

**Phonetic approach** (also called **traditional** or **motor approach**) is exemplified by each sound being treated individually, in a sequence with one sound following the next (p. 271). Such an approach to intervention is not only suitable for articulation errors; portions of its techniques may also prove helpful for children with phonemic-based disorders.

**Multiple-sound approach** attempts to influence several error sounds simultaneously (p. 271).

A certain **therapy sequence** is often associated with the phonetic approach (pp. 272-279). Typically, the client must achieve a relatively high accuracy level (between 80 to 90%) before proceeding on to the next stage. The sequence provided includes a) sensory-perceptual training (ear training), b) production of the sound in isolation, c) using facilitating contexts, d) production of nonsense syllables with the target sound, e) words with the target sound, f) production of structured phrases and sentences with the target sound, and g) spontaneous speech.

The goal of **sensory-perceptual training (ear training)** is the client's accurate discrimination between the target sound and other sounds, the client's error production included (pp. 273-274). Identification, isolation, stimulation, and discrimination are

stages of sensory-perceptual training which are outlined in Figure 9.1, page 274.

**Production of the sound in isolation** constitutes the second phase of a phonetic intervention program (pp. 275-276). The goal is to elicit a productionally acceptable form of the target sound alone, not in combination with other speech sounds. Three techniques can be used within this phase: 1) auditory stimulation/imitation, 2) the phonetic placement method, and 3) the sound modification method.

**Auditory stimulation/imitation** provides repeated examples of the target sound realized by the clinician and imitated by the client who has previously been instructed to "watch and do exactly the same as I do." (p. 275) If this procedure works (which, unfortunately, is not often the case), it opens up an excellent shortcut to target sound elicitation.

**Phonetic placement methods** stress detailed instruction by the clinician on how the target sound is normally produced and then positioning the articulators accordingly (p. 275). The phonetic features of the target sound are compared to those of the error sound in order to determine the necessary articulatory adjustments to be made.

**Sound modification methods** are based on deriving the target sound from a phonetically similar sound that the client can produce in a normal manner (pp. 275-276). This sound becomes the starting point for the necessary articulatory adjustments which then result in an acceptable realization of the target sound.

**Facilitating contexts** (also called **key words**) can be used to successfully treat sound production errors within a phonetic approach (pp. 276-277). First, often words can be found in the speech of the client where the target sound is correctly produced. Such a possibility offers a good starting point for remedial work. Second, the client might be able to produce the target sound in an acceptable manner under certain coarticulatory conditions. The norm realization of [g] by a client (who otherwise regularly substitutes [d] for [g]) within the context of the word "finger" is an example.

**Nonsense syllables** are used after the sound has been produced in isolation (p. 277). These syllables are used to place a newly acquired isolated target sound into varying consonant + vowel contexts. The typical sequencing is target sound + vowel (CV), vowel + target sound (VC), vowel + target sound + vowel (VCV) and finally target sound + vowel + a relatively simple sound (CVC).

**Words** incorporating the target sound are utilized in the therapy sequence after accuracy has been achieved with nonsense syllables (pp. 277-278). Words need to be carefully selected. Their syllable structures and lengths, the position of the target sound within the word, syllable stress, coarticulatory factors and the client's familiarity with the words, all play important roles in the selection of suitable materials.

**Structured phrases and sentences** belong to the next therapy phase using the target sound (pp. 278-279). A carrier phrase placing the target sound/word at the beginning of the client's response is one of the easiest ways to elicit an accurate production under controlled conditions. At the beginning, care should be taken that the target sound does not appear more than once within the response. Word/phrase and coarticulation factors should be considered.

**Spontaneous speech** constitutes the last phase of the therapy sequence (p. 279). Its goal is maintaining accuracy of production when the target sound appears spontaneously in conversation. The transfer from accurate productions in therapy to conversational speech in various natural settings is usually referred to as **carryover**. Informed parents, teachers, and friends are valuable assistants during this decisive therapy phase.

**Dismissal and reevaluation criteria** belong to the therapy process (pp. 279-280). Fifty

percent accuracy of sound production during natural spontaneous speech is professionally acceptable only under the condition of clearly established reevaluation criteria. Reevaluation is a portion of our clinical responsibility.

**Clinical application (structuring a home program):** When structuring a home program, the clinician has to be sure that the assistants understand in detail what needs to be accomplished and how (pp. 280-281). That includes answers to questions such as when and how long the session should be, how to judge the relative accuracy of the child's productions, and how to motivate and reward the client. Guidelines are given for structuring a home program and a case study are provided on page 281.

**Principles of Motor Learning** describe a set of complex processes associated with conditions of practice and feedback that lead to permanent changes in a motor skill (pp. 281-285). These conditions are helpful as they focus on the motor skills involved in producing a specific target sound.

**Misarticulations of individual sounds** are discussed utilizing both phonetic placement and sound modification techniques. Each misarticulation contains the subdivisions phonetic description, linguistic function (including frequency of occurrence, phonotactics, morphophonemic function, and minimal pairs), initial remarks, types of misarticulation, and therapeutic suggestions (pp. 272-324).

#### **Misarticulations of [s] and [z]**

- *Phonetic description* (pp. 286-287): Norm productions of [s] and [z] are typically articulated in two different ways, as apico-alveolar or predorsal-alveolar fricatives (sibilants). For production differences between apico-alveolar and predorsal-alveolar s-sounds see Table 9.1 (p. 286).
- *Linguistic function* (pp. 287-288). The frequency of occurrence of [s] and [z] as well as their morphophonemic function are outlined. Word-initiating and word-terminating consonant clusters with [s] and [z] can be found in Tables 9.2 (p. 287) and 9.3 (p. 288). Minimal pair words and sentences contrasting [s] and [z] to [ʃ], [t] and [d] are contained in Appendix 9.1 (pp. 336-337).
- *Initial remarks* (pp. 288-289).
- *Types of misarticulations* (pp. 290-291) and Figure 9.2 (p. 290).
- *Therapeutic suggestions* (pp. 291-292) include the phonetic placement method (p. 292 as well as Table 9.4, pp. 292-293) and several different sound modification methods (pp. 293-294) are outlined. Functional problems which lead to nasalized productions of [s] and [z] are discussed (pp. 294-295) as well as some advantages and disadvantages of beginning therapy with [s] versus [z] (p. 295).
- *Coarticulatory conditions* are given which might prove favorable for the production of [s] and [z] (pp. 295-297). Word examples are given which follow a specific coarticulatory sequence (p. 297).

**Tongue thrust or tongue thrust swallow** refers to excessive anterior tongue movement during swallowing a a more anterior tongue position during rest (p. 289). Tongue thrust literature is contained in Box 9.1 (p. 289).

**Oral muscle pattern disorders** is a more appropriate term to be used for tongue thrust (p. 289).

**Misarticulations of [ʃ] and [ʒ]** Tongue thrust or tongue thrust swallow **refers to excessive anterior tongue**

- *Phonetic description* (p. 298): In norm productions, [ʃ] and [ʒ] are realized as voiceless respectively voiced postalveolar fricatives with lip rounding.
- *Linguistic function* includes the frequency of occurrence of [ʃ] and [ʒ], consonant clusters and their morphophonemic function (p. 298). Appendix 9.1 (pp 337-338) contain some minimal pair words and sentences contrasting [ʃ] and [ʒ] with [s] and [z] as well as [t] and [d].
- *Initial remarks* (p. 284).
- *Types of misarticulations* (p. 298) and see Table 9.3 on page 299.
- *Therapeutic suggestions* (pp. 299-301): The phonetic placement method (p. 299 and Table 9.6, page 300) and several sound modification methods (pp. 299-301) are provided.
- *Coarticulatory conditions* are outlined which might prove favorable for the production of [ʃ] and [ʒ] (pp. 301-302). Word examples are given which follow a specific coarticulatory sequence based on whether the misarticulation is caused by tongue placement versus lack of lip rounding. Word lists are provided which demonstrate coarticulatory possibilities for both types of problems (p. 302).

#### **Misarticulations of [k] and [g]**

- *Phonetic description* (p.302): [k] and [g] are voiceless or voiced velar plosives.
- *Linguistic function* consisting of the frequency of occurrence of [k] and [g], phonotactics and morphophonemic function are outlined (pp. 302-303). Tables 9.7 (p. 303) and 9.8 (p. 303) contain consonant clusters with [k] and [g] while Appendix 9.1 (pp. 338-339) gives examples of minimal word pairs and sentences contrasting [k] and [g] to [t] and [d].
- *Initial remarks* (p. 303)
- *Types of misarticulations* (see Table 9.4 on page 304).
- *Therapeutic suggestions* (pp. 303-305): Phonetic placement method (Table 9.9 pages 304-305) and several different sound modification methods (pp. 303-305) are outlined.
- *Coarticulatory conditions* are discussed which might prove favorable for the production of [k] and [g] (pp. 305-306). Word examples are given which follow a specific coarticulatory sequence (p. 306).

#### **Misarticulations of [l]**

- *Phonetic description* (pp. 306-307): [l] sounds are phonetically described as voiced alveolar laterals. There are two varieties of [l] sounds in General American English, so-called "light" and "dark" [l].
- *Linguistic function* (pp. 307-308). Frequency of occurrence, morphophonemic function, and consonant clusters with [l] (Table 9.10, p. 307) are provided while Appendix 9.1 (pages 339-340) gives examples of minimal pair words and sentences contrasting [l] to [ɹ], [w], and [j].
- *Initial remarks* (p. 308).
- *Types of misarticulations* (p. 308 and Table 9.5, p. 308).
- *Therapeutic suggestions* (pp. 309-310): Phonetic placement method (p. 309), Sound modification methods (pp. 309-310).
- *Coarticulatory conditions* are discussed which might prove favorable for the production of light and dark [l] (pp. 310-311). Examples are given for words

which contain both light and dark [ɹ] (p. 311).

### Misarticulations of [ɹ] and central vowels with r-coloring

- *Phonetic description* (pp. 312-313): There are many different forms of [ɹ] articulations in General American English. The different types are usually placed into two broad categories, the so-called "bunched" and the "retroflexed" [ɹ] productions. Bunched [ɹ] articulations are phonetically classified as voiced alveolar central approximants, the retroflexed ones as voiced retroflexed central approximants. The General American English vowels with r-coloring, [ɚ] and [ɝ], are central vowels. Both vowels show similar articulations, although lip rounding may be lacking when producing [ɚ]. The tongue actions for the rhotic vowels are similar to those for the rhotic consonants (p. 312).
- *Linguistic function* outlines the frequency of occurrence of the consonantal [ɹ] and the central vowels with r-coloring (pp. 313-314. ). Table 9.12 (p. 313) contains consonant clusters with [ɹ] while minimal pair words and sentences contrasting [ɹ] with [l], [w], and [j] are contained in Appendix 9.1 (pp. 339-340).
- *Initial remarks* (p. 314).
- *Types of misarticulations* (p. 314).
- *Therapeutic suggestions* (pp. 314-316): Phonetic placement method (pp. 314-316), Sound modification methods (p. 316), Where to begin therapy? (p. 317).
- *Coarticulatory conditions* are discussed which might prove favorable for the production of [ɹ] and the central vowels with r-coloring (pp. 317-318). Word examples are given which contain [ɹ] and the central vowels with r-coloring (p. 318).

### Misarticulations of [θ] and [ð]

- *Phonetic description* (p. 319): [θ] and [ð], are among the latest sounds to develop in the speech of children. They are normally produced in two ways, as interdental or dental (addental) voiceless (respectively voiced) fricatives.
- *Linguistic function* (p. 319). The frequency of occurrence for [θ] and [ð], their morphophonemic function, and consonant clusters with [θ] and [ð] (Table 9.14. p. 319) are outlined. Minimal pair words and sentences contrasting [θ] and [ð] to [s], [z], [t], and [d] can be found in Appendix 9.1 (pp. 340-341).
- *Types of misarticulations* (p. 320, see Table 9.7 on page 320).
- *Therapeutic suggestions* (pp. 320-321): Phonetic placement method (pp. 320-321), Sound modification methods (p. 321).
- *Coarticulatory conditions* are discussed that might prove favorable for the production of [θ] and [ð] (pp. 321-322). Word examples are given which follow a specific



coarticulatory sequence (p. 322).

### Misarticulations of [f] and [v]

- *Phonetic description* (p. 323): [f] and [v] are voiceless and voiced labiodental fricatives.
- *Types of misarticulations* (p. 323).
- *Therapeutic suggestions* (pp. 323-324): Phonetic placement method (pp. 323-324), Sound modification methods (p. 324).
- *Coarticulatory conditions* are discussed that might prove favorable for the production of [f] and [v] (p. 324). Word examples are given that follow a specific coarticulatory sequence (p. 324).

### Affricate problems

- *Phonetic description* (p. 325): Affricates are *not* merely a stop followed by a fricative production. However, in an attempt to simplify the directions for their use with children, the treatment procedures will often be structured as if the goal is merely to fuse the stop with the fricative. See the discussion on page 325.
- *Types of misarticulations* (pp. 325-326).
- *Therapeutic suggestions* (p. 326). Phonetic placement method (p. 326), Sound modification methods (p. 326)
- *Coarticulatory conditions* are discussed that might prove favorable for the production of [tʃ] and [dʒ] (pp. 326-327). Word examples are given which follow a specific coarticulatory sequence (p. 327).

### Voicing problems

- *Initial remarks* (pp. 327-328). Voicing problems manifest themselves in the substitution of a voiced for a voiceless cognate, or a voiceless for a voiced cognate.
- *Therapeutic suggestions* (pp. 328-329): Auditory discrimination exercises, tactile feedback method, auditory enhancement method, whispering method, singing method, and developing voiced stop-plosive productions are contained in this section.

### Consonant cluster problems

- *Initial remarks* (p. 329).
- *Therapeutic suggestions* (pp. 329-330): Production of word initial clusters (p. 330), production of word final clusters (p. 330), Production of word medial clusters (p. 330).
- *Coarticulatory conditions* (pp. 330-331) include variables such as the length of the cluster, the position of the cluster in the word, and the coarticulation between the specific elements of the cluster.

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## LEARNING MATERIALS: ANSWERS TO QUESTIONS FROM

### TEXTBOOK THINK CRITICALLY (PAGE 335): ANSWERS

1. Sensory-perceptual training program: [s], [z] versus [θ] and [ð]. Throughout these activities remember that this is a discrimination task, the child should **not** be trying to

produce the differences. The only response from the child should be “same” or “different”.

**Identification:** Start with identification of [s] versus [m], two very different sounds (or [s] versus [g], for example). Any sounds which vary according to the place of articulation, manner, and voicing). Give the [s] a name such as the hissing sound. Talk about the differences between [s] and [m] productions, have the child discriminate between minimal pairs words such as “sow” and “mow” or “mail” versus “sail”. If the child can discriminate between [s] and [m] sounds and word pairs, you could move to [z] versus [k], for example.

The same procedure would be followed, giving the [z] the name of the buzzing bee sound, for example, examining the production differences, and finally contrasting word pairs such as “Z” and “key”, for example. If discrimination is good for both of these pairs, move to more similar sounds, [s] versus [l] and [z] versus [t]. The same procedure would be followed. Only after these word pairs can be adequately discriminated, would [s]

versus [θ] be attempted. One might want to point out the differences in sound quality and with the aid of a mirror, the differences in how the two sounds look when being produced (the [θ] could be produced as an interdental production, therefore, the tip of the tongue would be visible). Word pairs such as “sink” and “think” or “sick” versus “thick” could be used. After successful discrimination [z] and [ð] could be attempted.

**Isolation:** Begin with [s] in the word-initial position of simple CV words: see, so. Sue, saw, say. Have the child listen and indicate when he/she hears the s-sound. If successful, follow the same procedure with [z]. I would then contrast [θ] and [ð] and then finally [s] to [θ] and [z] to [ð]. The next phase would be simple VC words, if possible, with [s] and [z] at the end of the words: ice, ace, is, A’s.

Again the same procedure would be followed moving from [θ] to [ð] and finally to [s] versus [θ] and [z] versus [ð]. Finally these sounds should be attempted in the medial position of words: kissing, missing, raising, choosing. Be careful that no other [s] or [z] sounds (and certainly not [θ] or [ð] sounds) are contained in the words. The next phase would be carrier phrases with [s] and [θ] words: He wanted to saw, He wanted to think (minimal pairs could be used if appropriate carrier phrases could be found). The carrier phrase should not contain [s], [z], [θ] or [ð] sounds, only the final word should contain these sounds. Phrases and longer sentences could then be used for discrimination. The goal is to have only one sound ([s], [z], [θ] or [ð]) per phrase or sentence.

**Stimulation:** In this phase the child is bombarded with examples of [s], [z], [θ] or [ð] sounds. Tape recordings could be used with various speakers, saying the sound soft or loud, long or short duration, fast or slow, in a high or low pitch etc. Increase the complexity gradually starting with just single-syllable words with one of the sounds in the word, progressing to phrases and sentences. Again, the number of target sounds per phrase or sentence should be kept to one.

**Discrimination:** In this phase the error productions are presented by the clinician and should be the same as the child’s error. Thus, [s] versus [θ] or [z] versus [ð]. The child now knows that the target sounds are [s] and [z]. Error productions are built into the practice. Therefore, the child is shown a picture of a “sail” and the clinician says “thail”. The child should be able to identify the error and say why it is wrong. For example, if a

“th” is used the child could say that the tongue was too far forward or that you could see the tongue and you shouldn’t be able to see it.

2. Let’s assume that we would want to try the predorsal-alveolar production, the tongue tip down behind the lower incisors. The child would be instructed that the tongue tip should be behind the lower incisors while the front portion of the tongue comes in very close contact with the alveolar ridge. I would practice putting the tongue behind the bottom teeth, point out where the alveolar ridge is and have the child look in a mirror while she tries to put her tongue in the same spot. You might start by having Maureen have the front portion of her tongue touch the alveolar ridge (the little bump in our mouth) and then slowly move the tongue away so that air is forced through a narrow opening. If the sound produced is more like a “th”-sound then try using a tongue depressor to push the tongue back slightly. It is also helpful if Maureen can spread the lips in a “little smile”.

3. The first thing that needs to be done in a [ɹ] for [ɹ] substitution is to eliminate the lip rounding. Have Molly try to produce a “new sound” without the lip rounding. Using the distinction between [u], with lip rounding, and [i] without and a visual aid, such as a mirror, could be helpful. The next step would involve trying to get the tongue positioned for a retroflexed [ɹ]. I would demonstrate how the tongue curls back slightly and is directly below the alveolar ridge. I would have Molly try this position with a relatively wide-open mouth posture in an attempt to eliminate the tongue’s high back position which is characteristic of [w]. The last step would be trying to get the tongue tensed a bit which could be done by having the child forcefully “growl” to increase tension. The words to support this [ɹ] production would depend on the child. Some children are much better at producing the central vowels with r-coloring (use the list on page 318) while others do better with [ɹ] at the beginning of the word. Keep the words simple and if you find a word or words which sound correct, use those as practice for a short time to stabilize the [ɹ] before moving on to new words.

## ADDITIONAL LEARNING MATERIALS

### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

1. A child has a [t] for [k] substitution ([k] → [t]).<sup>†</sup> Choose one of the phonetic placement techniques and describe what you would do to achieve a [k] sound.
2. child 5;0 years old, has f-problems, [f] and [v] are produced as [p] and [b] substitutions ([f] → [p], [v] → [b]). Explain what the child should do with his/her articulators for a specific phonetic placement and sound modification method. How should the clinician describe the whole procedure in a manner that a child can understand and follow?
3. Discuss the differences between light and dark [l] productions. Discuss why these two types of [l] sounds may affect the word material used in therapy. Develop word lists for the light [l] versus dark [l] productions that would be acceptable for a six year old child who is in therapy for an l-problem.
4. A child is in therapy for lateral [s] difficulties and has progressed to the word stage. The clinician would like to introduce some consonant clusters with [s]. Develop word lists

with [s] clusters in the prevocalic position which are ordered from productionally easy to more difficult. Consider what impact clusters with [l] might have given the previous lateral [s] difficulties of the child.

## MULTIPLE CHOICE QUESTIONS

1. During which portion of the sensory perceptual training (ear training) is the client bombarded with large quantities of the sound in question in varying contexts? The goal is accurate identification of the sound as the context conditions change.
  - a) identification phase
  - b) isolation phase
  - c) stimulation phase
  - d) discrimination phase
2. During which portion of the sensory perceptual training (ear training) is the client asked to identify misarticulations, similar to those that he/she produces, in various word contexts
  - a) identification phase
  - b) isolation phase
  - c) stimulation phase
  - d) discrimination phase
3. Which method is based on achieving the target sound from a phonetically similar sound that the client can produce accurately?
  - a) phonetic placement method
  - b) sound modification method
  - c) facilitating contexts method
  - d) isolation method
4. If the factors affecting the articulatory complexity of words are considered, which example would probably be the easiest to produce if the target sound was [s]?
  - a) sauce
  - b) saw
  - c) moss
  - d) spot
5. When the stress and length of the word are considered, which example would probably be the easiest to produce if the target sound was [k]?
  - a) broccoli
  - b) become
  - c) acorn
  - d) bacon
6. What percentage of accuracy during spontaneous speech was suggested as dismissal criterion?
  - a) 90%
  - b) 80%
  - c) 50%
  - d) 25%
7. The most common norm realizations of [s] and [z] are apico-alveolar fricatives. However, these sounds can be articulated as
  - a) predorsal-alveolar fricatives
  - b) palatal fricatives
  - c) labio-dental fricatives
  - d) all of the above

8. Besides adequate place of articulation, what other production feature is necessary for an adequate productions of [s] and [z]?
  - a) lateral edges of the tongue are lowered
  - b) lip rounding
  - c) tongue tip touching the back of the upper incisors
  - d) sagittal grooving of the tongue
  
9. What is another, perhaps more appropriate, name for a tongue thrust?
  - a) oral muscle pattern disorder
  - b) frontal swallowing disorder
  - c) anterior myodorsal swallow
  - d) tongue displacement disorder
  
10. Which one of the following [s] problems is produced with the tip of the tongue in direct contact with the alveolar ridge and no sagittal grooving?
  - a) interdental [s] production
  - b) strident [s] production
  - c) lateral [s] production
  - d) palatal [s] production
  
11. Which one of the following [s] problems is produced with the tongue too far back?
  - a) interdental [s] production
  - b) strident [s] production
  - c) lateral [s] production
  - d) palatal [s] production
  
12. If a child demonstrates nasality only during the production of [s] and [z] sounds, this would probably indicate
  - a) a hereditary problem
  - b) a functional problem
  - c) a more posterior tongue placement for the [s] and [z] productions
  - d) a cleft palate
  
13. The most frequent misarticulation of [k] and [g] is the substitution of
  - a) an alveolar plosive
  - b) a velar fricative
  - c) a uvular stop
  - d) a glottal stop
  
14. The dark [ɪ], has an [ʊ] or [o] quality because
  - a) the lips are rounded during the [ɪ] production
  - b) the dark [ɪ] only occurs together with [ʊ] and [o] vowels
  - c) the process of vowelization (or vocalization) has affected the production
  - d) there is an elevation of the tongue's posterior portion during its production
  
15. Which type of [l] misarticulation is characterized by too small an opening for lateral air escape?
  - a) a substitution of a labiodental approximant
  - b) a substitution of an alveolar rhotic
  - c) a substitution of a bilabial glide
  - d) a substitution of a lateral fricative
  
16. To emphasize the production features, [ɹ] together with [w], [j], and [l], are often referred to as
  - a) trills

- b) approximants
  - c) glides
  - d) liquids
17. Very often the rhotics and the central vowels with r-coloring are derhotacized. This is caused by a substitution of
- a) an alveolar fricative for the r-sounds;
  - b) not enough lip rounding
  - c) lip rounding replacing front tongue action
  - d) front vowels for these sounds
18. When a child has difficulties with [ɹ] and central vowels with r-coloring, therapy should
- a) begin with [ɹ]
  - b) begin with the central vowels with r-coloring
  - c) be delayed, a watch and wait attitude should prevail to see which sound will begin to emerge
  - d) consider stimulability and perceptual saliency
19. In principles of motor learning, which one of the following is a condition of practice?
- a) practice amount
  - b) practice accuracy
  - c) practice variability
  - d) all of the above are conditions of practice
20. In principles of motor learning, which one refers to feedback frequency?
- a) attentional focus, external versus internal
  - b) how often a child receives feedback from the clinician
  - c) feedback on why the response was correct or incorrect
  - d) all of the above

### TRUE/FALSE QUESTIONS

1. A phonetic approach can only be used with children with phonetic-articulatory impairments.
2. During the therapy sequence, accuracy is usually set at 80 to 90 percent before the child progresses to the next stage.
3. A target sound in an unstressed syllable is typically easier to produce than one in a stressed syllable.
4. [s] and [z] can be articulated as either apico-alveolar or predorsal-alveolar fricatives.
5. [s] is a relatively frequent sound in General American English.
6. Children with oral muscle pattern disorders always have difficulty with [s] and [z] productions.
7. The dark [ɹ] production is only noted in certain dialectal variations of General American English.
8. If a child has difficulties with [ɹ], very often the central vowels with r-coloring will

also demonstrate production difficulties.

9. Specific dialects of General American English demonstrate a lack of r-coloring on both consonantal [ɹ] and central vowels with r-coloring.
10. There is a rather large time span between the acquisition of [f] and [v].

## SHORT ANSWER QUESTIONS

1. Differentiate between a phonetic (or traditional-motor) approach and a multiple-sound approach.
2. Differentiate between the sound modification and the phonetic placement method.
3. What are facilitating contexts? How can they be used in a therapy situation?
4. What is carryover? During which phase of therapy is it important?
5. What is meant by the term tongue thrust? What type of misconception does the term tongue thrust promote?
6. Which articulatory features cause a strident [s] production?
7. The production characteristics of [s] and [z] are fairly similar to [θ] and [ð]. What are the specific production differences between the sounds?
8. Distinguish between the production features of the two types of [ɹ] sounds, bunched versus retroflexed productions.

## ESSAY QUESTIONS

1. Discuss how the length of the word, the position of the target sound in the word, the syllable structure, and the syllable stress can have a positive and negative impact on production accuracy.
2. Discuss the advantages and disadvantages of using the apico-alveolar versus the predorsal-alveolar phonetic placement method for achieving a norm [s] production.
3. Discuss the differences between the interdental and the apico-dental (addental) [θ] and [ð] productions.
4. Discuss the production differences between the affricate [tʃ] and the production of [t] + [ʃ] as two isolated sounds.
5. Discuss which coarticulatory variables should be considered when working with consonant clusters.

# Chapter 10

## Treatment of Phonological Disorders

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### LEARNING OBJECTIVES

When you have finished this chapter, you should be able to:

- Define minimal pair therapy exemplified by minimal opposition contrast therapy and multiple oppositions, noting target selection and intervention.
- Explain minimal pair target selection represented by maximal oppositions and the complexity approach.
- Characterize the cycles phonological remediation approach, its goals, and therapeutic progression.
- Understand evaluation procedures to determine an inconsistent speech disorder and how to implement the resulting core vocabulary approach.
- Describe metaphon therapy as a phonological awareness approach to treating phonological disorders in preschool children.
- Identify speech sound disorders with concurrent language problems, specifically the treatment of morphosyntax, vocabulary, and the child with emerging phonology.
- Analyze vowel errors and prepare an intervention program

### CHAPTER OVERVIEW

In this chapter, several different intervention approaches for the treatment of children with phonemic disorders have been described. Some of these remediation programs use minimal pair contrasts as the beginning unit of remediation – for example, minimal opposition contrasts, maximum oppositions, complexity approaches, and multiple oppositions. Other remediation techniques are unique, such as cycles training, treatment of an inconsistent speech disorder, and metaphon therapy. These therapy protocols, which have been developed and refined through actual clinical experience, forge together a combination of methods that can be effectively utilized to treat phonological disorders in children.

Discussion of the treatment approaches has been designed to answer specific questions. First: When should this therapy be chosen? Which clients could best be treated with this approach? Guidelines that broadly separate clients who might be better versus poorer candidates for each particular approach were given. Documented research on therapeutic efficacy of each model has also been provided. Second, selections of beginning targets and clinical applications have been supplied to exemplify the transition from assessment to intervention. Third, intervention methods have been outlined in some detail to indicate the utilization of each approach in a therapy setting.



The last portion of this chapter explored and suggested some special applications of phonological therapy. Phonological remediation principles with children displaying concurrent language difficulties and those with an emerging phonological system exemplified the merging of phonological intervention strategies with other language areas such as morphology and semantics. Finally, treatment principles for children with disordered vowel systems were presented to demonstrate how minimal pair contrasts can be structured within a vowel remediation program.

Throughout this chapter, assessment results and their connection to therapy goals have been emphasized. Whenever possible, a direct link has been made between the assessment results outlined in Chapter 7 and the therapy procedures in this chapter. Several clinical applications have been provided to demonstrate the assessment-treatment connection, which is essential for professional speech-language services.

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## PRESENTATION OUTLINES

1. To outline the principles underlying phonological approaches to therapy.
2. To discuss how most phonologically based therapies use minimal pairs, representing phoneme function, as the core of the intervention process.
3. To introduce several therapies which employ minimal pairs as the center of the intervention program. These include minimal opposition contrast therapy, maximal oppositions approach, complexity approaches, and multiple opposition approach. Emphasis is placed upon a description of the therapy method, which types of clients might benefit maximally from this approach, published treatment efficacy studies, and how to select target sounds for the therapy in question.
4. To introduce cycles training, core vocabulary (treatment of an inconsistent speech disorder), and metaphon therapy as phonemic approaches which use somewhat different treatment procedures. Emphasis is again placed upon a description of the therapy method, which types of clients might benefit maximally from this approach, published treatment efficacy studies, and how to select target sounds for the therapy in question.
5. To examine the interrelationship between phonological disorders and concurrent language problems. Both morphosyntactic and semantic difficulties are often portions of the overall profile of children with phonological impairments. Therapeutic suggestions are outlined which combine phonological with morphosyntactic and semantic tasks.
6. To examine the interrelationships between phonology and other language areas in the child with an emerging phonological system. Factors such as phonetic-phonemic inventory, syllable shapes and constraints will be used when structuring material for the development of an early vocabulary.
7. To provide an overview of treatment principles that could be used with children demonstrating vowel errors. Treatment principles for extremely limited vowel inventories as well as multiple vowel substitutions are discussed.

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## KEYWORD DEFINITIONS

**Treatment principles for phonemic errors** focus on the phoneme value of speech sounds as a means to establish and differentiate word units (pp. 343-344). Consequently, and in direct contrast to phonetic (or traditional-motor) approaches, intervention begins at the word level. Another difference between the treatment of phonetic and phonemic errors pertains to the emphasis on the phonological system of the child rather than on his/her sound production difficulties. This leads to the treatment of groups of sounds or sound classes rather than the treatment of individual sounds.

**Minimal opposition contrast therapy** refers to the therapeutic use of word pairs differing by one phoneme only (pp. 345-346). These words, then, serve to establish phonemic contrasts not present in the child's phonological system. A child might not differentiate between plosives and fricatives, realizing [s] as [t], and [f] as [p], for example. In one type of minimal pair therapy, word pairs such as "fin" and "pin" are used; [f], representing the fricatives, [p] the plosive. The underlying principle of minimal pair contrast therapy is that by establishing the linguistically relevant contrast between [f] and [p], generalization will occur to other stops and fricatives.

Target selection for **minimal opposition contrast therapy** consists of selecting two sounds with as many articulatory similarities as possible (pp. 345-346, see also the Case Study on page 346). "The minimal opposition procedure is most appropriate for clients who are stimulable for the target sound." (Lowe, 1994, p. 190). Again, clients who primarily display phonemic substitutions are the best choices for minimal opposition therapy.

**Therapy procedures for minimal opposition therapy** (p. 348).

**Near-minimal pairs** are pairs of words that differ by more than one phoneme, however, the vowel preceding or following the target sound remains constant in both words (pp. 347-348)

**Phonological process selection for minimal opposition contrast therapy** is typically based on the selection of a phonological process which is then used in minimal pair contrasts (pp. 345-346). Examples are given for constructing minimal pairs using phonological processes in Table 10.1, page 347.

**Multiple oppositions approach** utilizes the child's collapse of phonemic contrasts within minimal pair therapy (pp. 349-353). Thus, several sounds which are produced the same, i.e., the phonemic contrasts are lost, are targeted in therapy. The supposition is that by treating a larger number of contrasts several phonemic oppositions could be added to the child's system.

**Selecting a target for the multiple oppositions approach** (pp. 350-351, see also the Case Study with Jonah on pages 351-352).

**Therapy procedures for multiple oppositions approach** (pp. 352-353).

**Maximal oppositions approach** utilizes minimal word pairs as well (pp. 353-357). However, in direct contrast to the minimal opposition contrast therapy, target sounds are selected which are productionally quite different in respect to their distinctive features: Two sounds are selected which are not in the child's inventory and maximally different in their distinctive feature components. This intervention strategy appears to be especially effective with children who demonstrate moderate to severe phonological impairments.

**Selecting a target for the maximal oppositions approach** (pp. 354-355, see also the Case Study with Jonah on pages 356-357).

**Therapy procedures for maximal oppositions approach** (p. 357).

**Complexity Approach** is a therapy based on findings that more complex linguistic input promotes greater change on untreated related targets in a child's phonological system (pp. 357-363).

**Selecting a target for the complexity approach**, includes selecting a singleton (p. 358-359), or selecting a consonant cluster (p. 359-362). See also Appendix 10.1 for probes for initial consonant clusters (pp. 389-390).

**Therapy procedures for the complexity approach** (pp. 362-363).

**Probe words** are words not being targeted in therapy but contain the sound or sounds you are trying to achieve as well as other sounds that were not found in the child's inventory (p. 363). See also Appendix 10.2 for examples of probe words which could be used (pp. 390-392).

**Cycles phonological remediation approach** was developed by Hodson and Paden (1991). In this approach the remediation of phonological patterns is trained successively during specific time periods (cycles) (pp. 364-369). Targeted patterns within each cycle are used to stimulate the emergence of a specific sound or pattern, not their mastery. Therefore, clients do not have to reach a certain percentage of accuracy of any phoneme or pattern realization in order to move to the next cycle. The cycles approach attempts to approximate closely the way phonological development normally occurs, i.e., in a gradual manner. Also, several patterns can be targeted in one cycle. While some patterns from one cycle to the next might be "recycled", new sound patterns are introduced as well. The cycles approach was not designed for children with mild speech disorders. On the contrary, cycles training targets highly unintelligible children.

**Selecting targets for cycles training** (pp. 365-366). See also selection of targets for Jonah on pages 366-368.

**Therapy procedures for cycles training** (pp. 368-369).

The **core vocabulary approach** was originally developed as a response to a child who did not seem to improve with strategies that normally were successful in treatment (pp. 369-372). This child demonstrated what has been subsequently called an inconsistent speech disorder (pp. 369-370).

An **inconsistent speech disorder** is one characterized by the unpredictable use of a large number of different phones with multiple error types for the same word if that word is said repeatedly (p. 369-370)

**Selecting targets for the core vocabulary approach** (pp. 370-371). See also the Case Study, Lorenzo, on page 371.

**Therapy procedures for the core vocabulary approach** (pp. 371-372).

**Metaphon therapy** emphasizes training metalinguistic skills, specifically metaphonological awareness (pp. 373-377). It is assumed that phonologically impaired children fail to realize the communicative significance of the phonological rule system. The clients targeted for metaphon therapy are preschool children because at this age metaphonological knowledge is developing along with other language skills. Therefore, good candidates for metaphon therapy appear to be preschool children with very restricted phonetic inventories, children who have at least three or more processes operating in their speech.

**Selecting targets for metaphon therapy:** (pp. 374-375). See also the Case Study of Jonah on page 375.

**Therapy procedures for metaphon therapy:** (p. 375-377).

**Speech sound disorders with concurrent language problems:** Phonological disorders frequently co-occur with language disorders. The relationship between phonology and other areas of language is complex (pp. 378-381).

**Therapeutic suggestions: Connecting phonology to morphosyntax** (pp. 378-380).

**Therapeutic suggestions: Connecting phonology to semantics** (p. 380-381).

**The child with an emerging phonological system** (pp. 381-383). Children whose comprehension abilities are considered normal but who fail to achieve a fifty word vocabulary and two-word combinations by age two, are referred to as "late talkers", toddlers with slow expressive language development, or as children with specific language impairment. It appears that about 10 to 15% of the two-year-old population meets these criteria (Rescorla, 1989). General remediation strategies for these children include developing expressive language skills, specifically expanding the number of vocabulary items, the consonant inventory, the syllable shapes, and finally the use of two-word utterances. At this stage of development, therapy must represent a unified package. Therefore, therapy to promote phonological skills needs to be combined with increasing the child's lexicon.

**Therapeutic suggestions for the child with an emerging phonological system: Combining phonology with semantics: Developing a lexicon** (pp. 381-383).

**Treatment of vowel errors** may become a necessity for children with phonological impairments (pp.383-387). Some children with phonological disorders demonstrate difficulties with vowel realizations. Documented vowel errors in children seem to fall into two groups: first, children with extremely limited vowel inventories, and second, children with relatively large vowel inventories but a high incidence of vowel substitutions.

**Therapeutic suggestions: The child with a very limited vowel inventory** (pp. 384-386).

**Therapeutic suggestions: The child with a high proportion of vowel substitutions** (pp. 386-387).

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## LEARNING MATERIALS: QUESTIONS, ANSWERS, CLINICAL

### APPLICATIONS THINK CRITICALLY (P. 389): ANSWERS

1. Andrew using maximal oppositions: Major class feature differences exist between [ɹ], [l] versus all the other consonants. The two sounds which have the most distinctive feature differences are: (1) [k] versus [l] (7 distinctive feature differences) and (2) [g] versus [l] (6 distinctive feature differences).

2. Neutralization of phonemic contrasts:

[g, ɹ, ð, ʃ, s, z, ʒ, ʒ] [d]

There is also the possibility that [n]→[d] in the word "snake". It is unclear whether [s] is replaced by [d] (as in the word "soap") or whether it is a d/n substitution.

The substitution in the word "screwdriver" is unclear: [skɹ] [dw]. Probably the [s] [d] as in "soap". Another possibility would be the [k] [d]. Based on the fact that the d/s substitution does occur in another word, the author has chosen to interpret the word this way and has included [s] in the neutralization of phonemic contrasts for [d].

[k, tʃ, ʃ, s, z, f, θ] → [t]

[l, z] [j]

[v, m] [b]

[f] → [p]

[ɹ] → [w]

[θ] → [f]

[ŋ] → [n]

For the multiple oppositions approach targets would be selected that are based on one phoneme being used for several different phonemes, i.e., the neutralization of phonemic contrasts which demonstrate the use of multiple losses. The collapse to [t] seems to offer a good possibility. If consonant clusters are also analyzed which collapse to [t] we find [fl] in “flowers” and [st] in “stars”. For multiple oppositions up to four targets can be selected, however, they should be maximally distinct. Targets should also include a consonant cluster if possible. The following offer themselves as possibilities: [t] versus [tʃ], an affricate, [θ], an interdental fricative, and [fl] a consonant cluster. Theoretically a voiced sound should be selected since our substitution is voiceless. However, [z] is the only option and although it is a fricative (and not a plosive such as [t]) it is produced at the same place of articulation as the [t]. In this case, how stimulative the child might be for the various sounds could play a role in selection of the targets.

Words which could be used: tap – chap – thap (a nonsense action verb) – flap

Have the students see if they can come up with other word lists.

## **ADDITIONAL LEARNING MATERIALS**

### **DISCUSSION TOPICS AND CLINICAL APPLICATIONS**

1. Based on the results of the articulation test (p. 226) and spontaneous speech sample of Jonah. (pp. 223, also refer to the discussions in the Case Study for Jonah throughout the chapter), discuss which type of treatment (one of the minimal pair contrast therapies, cycles training, core vocabulary, metaphon therapy) might be the best solution for this child. Give reasons for and against the different approaches for this particular child.
2. Based on the results of an articulation test and a spontaneous speech sample from a child with a severe phonological disorder, discuss how you would select treatment goals for cycles training. Additional information and case studies can be found in Hodson and Paden (1991).
3. Many of the children who are being treated for phonological impairments have concurrent language problems. Based on diagnostic results, or an actual clinical case, discuss how treatment in the area of phonology could be combined with therapy targeting other language areas such as morphosyntax or semantics. Give concrete therapeutic

suggestions if possible.

4. A clinical application was provided for a 1;8 year old child with an emerging phonological system (Chapter 6, page 184). Discuss how therapy could be structured that would expand the child's entire language system, i.e., how could the phonological inventory and syllable shapes be expanded to promote the developing lexicon of the child?

## MULTIPLE CHOICE QUESTIONS

1. Phonologically based treatment approaches have which unit as the core of therapy?
  - a) sounds
  - b) syllables
  - c) words
  - d) distinctive features
2. Several of the phonologically based treatment approaches use minimal pair words in their approaches. The reasoning is
  - a) minimal pairs represent phonemic function as meaning differentiating values
  - b) minimal pairs are relatively easy for the child to produce, thus the child achieves success
  - c) there are countless minimally paired words which can be constructed for every sound pair
  - d) minimal word pairs are typically one syllable words which are easier for the child to produce
3. As described in this text, which one of the following approaches is not based on using minimal pairs?
  - a) minimal opposition contrast therapy
  - b) maximal opposition therapy
  - c) complexity approach
  - d) cycles training
4. In which type of therapy is target selection based on the identification of those sounds that neutralize phonemic contrasts and the use of these sounds in minimal paired words
  - a) minimal opposition contrast therapy
  - b) maximal opposition therapy
  - c) cycles training
  - d) multiple oppositions therapy
5. As discussed in this text, maximal opposition therapy is closely aligned with which analysis procedure?
  - a) distinctive feature analysis
  - b) place of articulation analysis
  - c) phonological process analysis
  - d) manner of articulation analysis
6. Based on the principles of minimal opposition contrast therapy, that sound substitutions chosen should reflect the least number of differences in production features, which of the following target sounds should be selected if a 7 year old child demonstrates the following substitutions: [ɪ] → [w], [θ] → [d], [ʃ] → [d], and [g] → [k]?
  - a) [ɪ] → [w]

- b) [θ] → [d]
- c) [ʃ] → [d]
- d) [g] [k]
7. The complexity approach is suited for which type of child with a speech sound disorder?
- a child who only has one or two error sounds
  - a child who demonstrates an inconsistent speech disorder
  - a child who is older, for example 8 or 9 years old
  - a child who has a delayed phonological disorder
8. Based on the children who were used in the research to document the maximal oppositions approach, which type of clients seems to benefit the most?
- children with sound deletions
  - children with the collapse of several phonemic contrasts
  - children with very mild articulation disorders
  - older children and adolescents
9. Targets selected for multiple oppositions are based on
- the number of distinctive feature differences between the error sounds
  - specific classes of sounds which the child cannot produce
  - the collapse of phonemic contrasts in the child's inventory
  - the most prevalent phonological process the child utilizes
10. When using phonological processes to determine, target sounds, selection is based on their relative frequency of occurrence, the effect this process has on the intelligibility of the child and
- the age and phonological development of the child
  - the lack of stimulability of the child for this process
  - the number of word pairs which could be generated with this process
  - whether the process is a substitution versus a syllable structure process, syllable structure processes have priority
11. The following processes are all possibilities for target selection. Which of these processes would probably have the most effect on intelligibility?
- initial consonant deletion
  - palatal fronting
  - consonant cluster substitution
  - gliding of the r-sound)
12. Which one of the following minimal pair words could be used if the target was gliding of [r]?
- right - light
  - whip - lip
  - sip - lip
  - hip - lip
13. Which one of the following minimal pair words could be used if the target was palatal fronting?
- pie - tie
  - can - tan
  - sink - think
  - shed - said
14. Which group of clients are targeted for cycles training?

- a) children with mild to moderate phonological disorders
  - b) unintelligible children
  - c) children with sibilant substitutions
  - d) all of the above
15. In therapy, cycles training uses
- a) minimal pair word cards
  - b) short carrier phrases on cards
  - c) object and action words
  - d) the same target words with every cycle
16. In cycles training therapy, auditory bombardment refers to
- a) amplified auditory stimulation while the target words are read by the clinician
  - b) amplified auditory stimulation while the child says the target words repeatedly
  - c) repeated auditory stimulation of the target sound by the clinician
  - d) repeated auditory stimulation of several different minimal pairs, the child must identify which word in the pair contains the target sound
17. Metaphon therapy begins with which type of analysis?
- a) distinctive feature analysis
  - b) place of articulation analysis
  - c) phonological process analysis
  - d) the collapse of phonemic contrasts analysis
18. If a child demonstrated a high degree of consonant cluster reduction, which of the following grammatical morphemes might be misarticulated?
- a) plural -s
  - b) regular third person -s
  - c) possessive -s
  - d) all of the above
19. The more complex the syntactical structure of the utterance, the more likely a child will
- a) talk slowly, thus, articulatory accuracy will increase
  - b) demonstrate a breakdown in articulatory accuracy
  - c) demonstrate fewer phonological processes
  - d) demonstrate fewer pauses, thus, increasing unintelligibility
20. When the child is in the emerging phonology stage, therapy to promote phonological skills needs to be combined with increasing the child's
- a) lexicon
  - b) babbling behavior
  - c) morphological skills
  - d) all of the above
21. If the vowel problems in children with phonological disorders are analyzed, two patterns emerge, those children with multiple vowel substitutions and those with
- a) no central vowels, especially central vowels with r-coloring
  - b) no diphthong productions, both phonemic and nonphonemic diphthongs are affected
  - c) very limited vowel inventories
  - d) no tense vowels in their inventories



## TRUE/FALSE QUESTIONS

1. Phonologically-based approaches target phoneme function.
2. Target selection for maximal oppositions therapy is based on distinctive feature differences.
3. When selecting target sounds for minimal opposition contrast therapy, best results will probably be obtained if the child is stimulable for the target sound.
4. Maximal oppositions refer to maximal differences in word length and complexity which are contrasted in therapy.
5. The maximal oppositions approach selects two target sounds which are not in the child's inventory.
6. In cycles training, clients must reach 75 percent accuracy before going on to the next cycle.
7. In cycles training, word-final clusters with [s] are first targeted rather than singleton [s] productions.
8. For target selection in metaphon therapy, sounds not in the inventory and those that cannot be imitated are given priority.
9. Target words in metaphon therapy are minimal pair words.
10. Preschoolers with phonological impairments always have concurrent language disorders.

## SHORT ANSWER QUESTIONS

1. Phonologically-based approaches assume that generalization will occur to other sounds or sound classes. What is meant by generalization in this context?
2. Define what is meant by minimal pair contrast therapy.
3. Contrast the difference in selecting target sounds for the complexity approach versus minimal opposition contrast therapy.
4. What is the role of communicative breakdown in minimal opposition contrast therapy?
5. List one similarity and one difference between minimal opposition contrast therapy and the maximal oppositions approach.
6. In the maximal oppositions approach, targets are selected which consider the number and type of distinctive features. In this context, what is meant by number and type of distinctive features?
7. Why are several different sounds or patterns targeted simultaneously in cycles training?
8. How does metaphon therapy specifically increase the child's metaphonological awareness? Give concrete examples.
9. Why must therapy for the child with an emerging phonological system be a unified package, i.e., why must all aspects of language be considered?

10. Which two types of vowel problems are noted in children with phonological impairments?

## ESSAY QUESTIONS

1. Discuss which principles underlie phonologically-based treatment? Which elements are at the core of this therapy framework?
2. Distinctive feature analysis is often considered out of date. Why is it important to understand distinctive features, i.e., which therapy approach uses distinctive features as the basis for target selection? How does this approach use distinctive features?
3. What is meant by targeting complexity in the complexity approach? In which way are the sounds selected “complex”?
4. Metaphon therapy is based on metalinguistic awareness. Discuss the suggested problems that children with phonological disorders have in the area of metalinguistic awareness.
5. Discuss why it is possible that a phonological impairment could directly affect morphosyntactic and semantic development. Give examples to support your answer.

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## REFERENCES

- Hodson, B. W., & Paden, E. P. (1991). *Targeting intelligible speech: A phonological approach to remediation* (2nd ed.). San Diego: College Hill Press.
- Howell, J., & Dean, E. (1994). *Treating phonological disorders in children: Metaphon-theory to practice* (2nd ed.). London: Whurr.
- Lowe, R. J. (1994). *Phonology: Assessment and intervention applications in speech pathology*. Baltimore: Williams & Wilkins.
- Rescorla, L. (1989). The Language Development Survey: A screening tool for delayed language in toddlers. *Journal of Speech and Hearing Disorders*, 54, 587-599.
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# Chapter 11

## Speech Sound Disorders in Selected Populations

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### LEARNING OBJECTIVES

When you have finished this chapter, you should be able to:

- Understand the definitions, general features, speech sound characteristics, assessment, and treatment options for childhood apraxia of speech.
  - Define cerebral palsy as a motor-speech disorder; describe its accompanying difficulties in respiration, phonation, resonance, and articulation; and understand the diagnostic and therapeutic possibilities.
  - Classify cleft palate features as well as the subsequent speech sound characteristics, assessment, and treatment guidelines.
  - Describe general features and note specific speech sound disorders of children with intellectual disabilities, including Down syndrome, as well as diagnostic and therapy options.
  - Recognize the definition, characteristics, speech sound difficulties, and assessment and treatment options for children with a hearing loss.
  - Categorize motor-speech disorders in adults—apraxia of speech and dysarthria—according to their general features, speech sound characteristics, and diagnostic and therapeutic measures.
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### CHAPTER OVERVIEW

There are several communication disorders with articulatory/phonological deficits as one of their central characteristics. This chapter provided an overview of the most prominent among them. First, the childhood disorders, developmental apraxia of speech, cerebral palsy, cleft palate, intellectual disability, and hearing impairment have been reviewed. Acquired communication disorders with articulatory deficits commonly occurring in adults were then represented by apraxia of speech and the dysarthrias. Each of these disorders has been defined and general characteristics have been listed. Such an outline served as a foundation for the subsequent discussion of specific articulatory and phonological problems that are found in these populations. Assessment principles for the respective speech problems noted have been pointed out followed by selected therapeutic measures for the treatment of individuals within the seven populations.

For each of the disorders mentioned, an impressive list of specialized literature exists. References have been given throughout the chapter to guide interested students and practitioners to more in-depth information. Each disorder represents a complex entity, including many important variables and involving several groups of professionals. This chapter briefly summarized basic considerations of articulatory and phonological

features and their clinical intervention.

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## PRESENTATION OUTLINES

1. To provide the general features of several populations: Individuals with childhood apraxia of speech, cerebral palsy, cleft palate and lip, intellectual disabilities, hearing impairments, acquired apraxia of speech, and dysarthria.
  2. To distinguish the articulatory and phonological characteristics of each of the selected populations.
  3. To discuss diagnostic and therapeutic implications, within the context of the articulatory and phonological impairments, for each of the selected populations.
- 

## KEYWORD DEFINITIONS

**Childhood apraxia of speech (CAS)** is according to ASHA (2007) a neurological childhood (pediatric) speech sound disorder in which the precision and consistency of movements underlying speech are impaired in the absence of neuromuscular deficits (e.g., abnormal reflexes, abnormal tone). The main difficulty appears to be in the planning and/or programming of spatiotemporal parameters of movement sequences, resulting in errors in speech sound production and prosody. (pp. 394-403).

**Articulatory/phonological characteristics of childhood apraxia of speech** include several characteristics which are summarized on pages 395-398. The following general behaviors have been studied: nonspeech motor, speech motor, prosody, speech perception, language difficulties, and metalinguistic/literacy variables.

**Groping behavior** refers to an ongoing series of movements of the articulators attempting to find the appropriate articulatory position (p. 396).

**Silent posturing** refers to the positioning of the articulators for a specific articulation without sound production (p. 396).

**Clinical Implications: Diagnostics and childhood apraxia of speech** (pp. 398-400) include the following assessment procedures:

- hearing screening
- language testing
- thorough speech-motor assessment
- standardized speech assessment
- language sampling
- additional testing: sequencing and consistency of sounds and syllables

**Clinical Implications: Therapeutics and childhood apraxia of speech** (pp. 400-402). Established sets of therapeutic approaches do not exist. Some general therapeutic principles are that children with suspected CAS require an extraordinarily high amount of intensive, individual therapy. Therefore,

- remediation should progress systematically through hierarchies of task difficulties,
- careful incremental increases in sequential movements and their "memory" will prove necessary,
- use many repetitions in drill-oriented sessions, auditory discrimination tasks might be beneficial, self-monitoring needs to be emphasized, multiple modalities should be employed,
- intensive work on prosodic feature realization constitutes an integral part of any remedial program,
- compensatory strategies may be necessary,
- provide successful experiences (pp. 400-401) (Hall, Jordan, and Robin, 1993).

**Clinical Application:** Additional therapeutic techniques for developmental apraxia of speech that have demonstrated treatment efficacy (pp. 402-403).

**Motor speech disorders: Cerebral palsy (CP)** is a nonprogressive disorder of motor control caused by damage to the developing brain during pre-, peri-, or postnatal periods (p. 403). The condition results in a wide variety of motor disabilities, dysarthria among them. It constitutes the most common developmental motor impairment occurring about 3 times in 1,000 births (Bigge, 1991). Speech-related dysfunctions in cerebral palsy include respiratory, phonatory, resonatory, articulatory, and prosodic abnormalities as well as velopharyngeal inadequacies. The three types of involvement commonly found in cerebral palsied individuals are spasticity, dyskinesia, and ataxia (pp. 404-406).

**Articulatory and phonological characteristics of cerebral palsy** are related to the type of cerebral palsy and the severity of the disorder (pp. 404-406). See Table 11.2 (p. 405) for a summary of the types of cerebral palsy. Also note the discussion on pages 404 and 405.

**Clinical Implications: Diagnostics and cerebral palsy** (pp. 406-407). Cerebral palsied children present a variety of clinical pictures; however, some common factors are directly related to basic functions subserving speech. Problems with respiration, phonation, resonance, and articulation should be assessed to determine the type and degree of interference each of these systems could have on speech.

Supplemental data in these areas are needed:

- cognitive skills
- sensory-perceptual abilities beginning with an audiological evaluation
- emotional behavior
- feeding/eating characteristics
- language competence.

**Clinical Implications: Therapeutics and cerebral palsy** (pp. 407-409). Based on the type and degree of involvement, only general guidelines for elementary orientation can be offered. However, some principles apply to the treatment of all cerebral palsied individuals, especially to remediation efforts with young clients:

- some prespeech prerequisites must be met, head control and the coordination of respiratory patterns with voice and articulatory efforts,
- abnormal oral reflexes, specifically the chewing reflex, need to be inhibited,
- speech-language stimulation is essential, starting with vocal play and babbling practice in infants,

- when treating older children, begin remediation efforts with reflex-inhibiting postures which are recommended by the physical therapist
- temporal coordination and motor control of speech musculature are necessary once abnormal oral reflexes are inhibited,
- increase speed, range, and accuracy of lip, tongue, and jaw movements,
- select target sounds on the basis of stimulability, consistency, and visibility.

If the treatment of groups of sounds (rather than of individual sounds) seems indicated, follow these general guidelines:

- train consonants articulated correctly first in prevocalic positions then in postvocalic positions,
- distortions should be treated before substitutions and omissions, auditory-visual stimulation is preferred over auditory stimulation alone,
- some children will not be able to achieve norm articulations. In these cases, strive for reasonable compensations (pp. 408-409) (Crary, 1993; Hardy, 1983).

**Clinical Application: Communicative augmentation** (pp. 408-409).

**Cleft palate** (pp. 409-416)

**Clefting** refers to a division of a continuous structure by a cleavage, a split prominently caused by a failure of the palate to fuse during fetal development (pp. 409-410). The categorization of the American Cleft Palate-Craniofacial Association recognizes four categories of clefts:

- clefts of the prepalate include cleft lip, cleft of alveolar process or a cleft of the prepalate
- clefts of the palate include clefts of the hard and soft palates
- clefts of the prepalate and palate
- facial clefts other than prepalate and palate.

**Articulatory and phonological characteristics of cleft palate** include compensatory errors (productions produced by a more posterior positioning of the articulators) which may be a direct result of the velopharyngeal incompetence (pp. 410-411). However, this is not always the case and they may be caused by limited movements of the velopharyngeal valve during production of specific sounds.

**Clinical Implications: Diagnostics and cleft palate** (pp. 411-414). Clefts are a matter of long-term care. Areas of diagnostic concern in respect to the assessment of children with clefts underline the necessity of a team approach. The central diagnostic issue pertains to the velopharyngeal port incompetency (VPI) these children display, resulting in hypernasal resonance, nasal air emission, sound distortions, and sound substitutions. Sound distortions and substitutions are characterized by tendencies to articulatory backing, a compensatory measure frequently employed by these children. VPI impairs the intraoral pressure build-up necessary for the norm production of many speech sounds, primarily stop-plosives, sibilants and other fricatives as well as affricates. Nasals and semivowels remain relatively intact. The primary clinical task for the speech-language pathologist is to assess the child's articulatory/ phonological status and then infer the effects of structural deviations on the observed phonological behavior. This involves at least:

- speech sampling and analysis including sound inventory and phonological pattern development,
- stimulability probes,
- intelligibility judgments,
- oral-facial examination.

**Clinical Implications: Therapeutics and cleft palate** (pp. 414-416).

Many children with cleft palates undergo palatal repair by the age of 18 months. They remain typically free of compensatory sound production errors such as glottal stops for

oral stop-plosives and pharyngeal stops for oral fricatives. Other children require therapeutic intervention. Its overall goals are to:

- improve the placement of consonant production by promoting a more forward place of articulation,
- improve velopharyngeal valve function and decrease hypernasal resonance quality,
- modify compensatory articulations,
- improve the child's phonological system, in the case of developmental phonological errors (Van Demark and Hardin, 1990).

**Clinical Application: A case study of a child with cleft palate** (pp. 414-415).

**Intellectual disability** refers to substantial limitations both in intellectual and in adaptive behavior as expressed in conceptual, social, and practical adaptive skills. Intellectual disability manifests before age 18 (pp. 417-423). Children with intellectual disabilities demonstrate a higher prevalence of speech problems; about 70% of them are said to have speech production difficulties. The phonological characteristics include:

- deletion of consonants as the most frequent error,
- inconsistency of error productions,
- some patterns similar to children who are not intellectually disabled but demonstrate a functional delay.

**Down Syndrome** refers to a condition in which a person is born with an extra copy of chromosome 21 (p. 418). The general characteristics and articulatory and phonological difficulties are contained on pages 418-419.

**Clinical Implications: Diagnostics and an intellectual disability** (pp. 419-420). The following assessment procedures could be used

- standardized speech assessment,
- spontaneous speech sampling,
- testing of motor speech capabilities,
- testing of hearing acuity and middle ear functioning,
- language testing,
- assessment of the communicative environment.

**Clinical Implications: Therapeutics and intellectual disability** (pp. 420-423).

Therapy, of course, has to be based on the specific assessment results for each individual with an intellectual disability. Listed here are some general principles that apply more or less to all articulatory/phonological intervention efforts with intellectually disabled individuals:

- use over learning and repetition,
- train in the natural environment,
- begin as early as possible,
- follow developmental guidelines,
- concentrate more on overall intelligibility than on individual sounds,
- enlist the help of the client's caregivers,
- direct all therapeutic activities to serve the daily routine,
- target short, repetitive, reinforced activities meaningful to the situation (Owens, 1997).

**Hearing Impairment (Hearing loss)** (pp. 423-427) is a generic term for any diminished ability in normal sound reception. Hearing impairment is described by type and degree of the particular auditory dysfunction (p. 423).

**Conductive hearing loss** affects the mechanical transfer of sound waves (p. 423).

**Sensorineural hearing loss** is caused by damage to the sensory end organ, the cochlear hair cells or the auditory nerve (p. 423).

**Hearing level (HL)** indicates the degree of loss according to hearing threshold findings measured in dB (p. 423).

**Articulatory/phonological characteristics** associated with **hearing impairments** indicate generally that the greater the impairment, the more likely errors will extend from consonant and vowel production errors to stress, pitch, and voicing problems (pp. 324-325). In children, consonant deletions and substitutions might occur, especially final consonant deletions. Typical substitutions are:

- confusion between voiced and voiceless cognates,
- stopping of fricatives and liquids,
- confusion between oral and nasal consonants,
- vowels tend to be neutralized,
- tense for lax and lax for tense vowel substitutions,
- prosodic feature realization might also be affected, especially in the population of profoundly hearing impaired.

**Clinical Implications: Diagnostics and hearing loss** (p. 425).

The impact of impaired hearing on the articulatory/phonological status of the client needs complete appraisal data before any diagnostic conclusion can be reached.

These include but are not limited to

- cause, age of onset, and identification of the impairment (etiology and type),
- length of previous intervention efforts,
- speech intelligibility measures,
- results of formal and informal language skills,
- evaluation of the client's caregivers' attitudes toward the disorder and the need for intervention.

**Clinical Implications: Therapeutics and hearing loss** (pp. 425-427).

With hearing impaired clients, the speech-language clinician's remedial task is mainly directed to the improvement of the client's speech intelligibility. That involves:

- improvement of the client's residual hearing by speech signal amplification,
- maximal utilization of the level of residual hearing for speech perception through systematic articulatory training.

**Speech intelligibility** may be defined generically as that aspect of oral speech-language output that allows a listener to understand what a speaker is saying (p. 425).

**Teaching phonetic and phonological skills to the hearing impaired individual** (p. 426).



**Auditory –verbal therapy** is a method of working with a child who is hearing impaired or deaf and that child’s family to develop spoken communication (p. 427-428).

**Motor speech disorders in adults: Acquired apraxia of speech** (pp. 428-432).

Apraxia of speech is a disorder of expressive communication as a result of brain damage affecting the normal realization of speech sounds, sound sequences, and prosodic features representing speech. Auditory comprehension, in principle, remains intact.

**Apraxia of speech versus dysarthria** (p. 428).

**Apraxia of speech versus aphasia** (p. 428).

**Oral (nonverbal) apraxia** is a disturbance in planning and executing volitional nonspeech movements of oral structures, i.e., those movements not representing speech production (p. 428).

**Articulatory/phonological characteristics** of apraxia of speech (p. 429) include the following:

- effortful groping for articulatory movements,
- unsuccessful attempts at self-correction,
- prosodic disturbances,
- difficulty initiating utterances,
- articulatory inconsistency on repeated productions of the same utterance, although islands of well articulated speech exist,
- sound substitution errors predominate,
- sound (or syllable) transpositions might occur,
- productions tend to occur in stressed syllables,
- error productions are recognized by the client.

**Clinical Implications: Diagnostics and apraxia of speech** (p. 430). Assessment procedures include:

- aphasia test,
- intelligence, cognitive, and memory tests,
- apraxia battery,
- speech-motor examination,
- standardized speech assessment,
- spontaneous speech sample.

**Clinical Application: Formal and informal tests for apraxia of speech in adults** (p. 429).

**Clinical Implications: Therapeutics and apraxia of speech** (pp. 430-432). Each client demonstrates a different clinical picture but these guidelines can be used when structuring therapy

- all treatment stimuli should be meaningful because they promote articulatory accuracy, avoid nonsense syllables.
- preference is given to short words because errors increase with the length of the word.
- emphasize "simple" sounds, consonants with more precise articulatory requirements (such as sibilants, affricates, and consonant clusters) increase the error rate.

**Motor speech disorders: The dysarthrias** (pp. 432-438).

Literally, dysarthria means disordered articulation but as a technical term it denotes a very specific group of articulatory impairments, i.e., neurogenic disorders which result in respiratory, phonatory, resonatory, and articulatory deficiencies. Dysarthrias are neuromuscular speech disorders caused by many different etiologies such as accidents, strokes, and congenital conditions, for example. According to the locus of the damage and its neuropathic consequences, it is customary to classify the dysarthrias into five main types (see Table 11.3, page 433-434):

- spastic dysarthria,
- ataxic dysarthria,
- hypokinetic dysarthria,
- hyperkinetic dysarthria,
- flaccid dysarthria,
- mixed dysarthria.

**Articulatory features of the various types of dysarthria** (pp. 432-435) The general clinical picture of most dysarthrias include:

- irregular, shallow breathing patterns possibly interrupted by sudden deep breaths;
- lack of respiratory support for speech purposes,
- strained voice with deviation from suitable loudness and voice quality levels,
- hypernasality distorting speech sounds,
- labored, indistinct sound articulation,
- narrow range of prosodic feature realization (monopitch, monoloudness).

**Clinical Implications: Diagnostics and the dysarthrias** (pp. 435-436).

**Protocol for Assessing respiration, phonation, resonance, and articulation of dysarthric speech** (Appendix 11.1, pages 440-441).

**Clinical Implications: Therapeutics and the dysarthrias** (pp. 436-438).

- help the person to become a productive patient,
- modify abnormalities of posture, tone, and strength, modify respiration,
- modify phonation,
- modify resonance.
- modify articulation.
- modify prosody,
- provide alternative or augmentative modes of communication if indicated (Rosenbek and LaPointe, 1985).

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**LEARNING MATERIALS: ANSWERS TO QUESTIONS FROM**

**TEXTBOOK THINK CRITICALLY (PAGE 438-439): ANSWERS**

1. Case study: Dillon

Prevocalic consonants: [b, d, t, f, j, m, w, n] also [tw, tj]

Intervocalic consonants: [n, b, d, t, m, j]

Postvocalic consonants: [t, b, m, n, p, k, d, f]

Dillon does have the same number of consonants in the prevocalic and postvocalic word-positions (8 consonants each). However, he seems to have some different consonants in the prevocalic when compared to the postvocalic word-positions. The consonants [j] and [w] are present in the prevocalic word-position for Dillon. One would not expect them in the postvocalic position as they do not appear in American English in that position. On the other hand, Dillon does have [p] and [k] only in the postvocalic position. In the prevocalic position he substitutes [b] for [p] (“page”, “plane”) and either [d] or [t] for [k] (“candle”, “cowboy”).

2. Syllable shapes: CV, VC, CVV, CVC, VCV, CCVC, CVCV, CV VC, CVCVC, CVCV V, CVCV VC, CV VCCV

Any evidence of CC structures: Yes, #20 music box (this is across syllable boundaries, #34 string [tw], #38 truck [tj])

3. Collapse of phonemic contrasts:

[k, f, θ, ʃ, s, g, dʒ, z, t, θ] [d]

[tʃ, k, f, ʃ, s, dʒ, z, d, θ] → [t]

the pronunciation of #33 “star” is interpreted as a cluster reduction of [st] → [t] and then voicing of the [t] to [d]

[f, v, p] → [b]

[ɹ, l, z] [j]

[ɹ] → [w]

[θ] → [f]

[ŋ] → [n]

Sound preferences: [d] and [t]

## ADDITIONAL LEARNING MATERIALS

### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

1. Observe a child in the clinic (or a video recording of a child, there are several good youtube videos) who has been diagnosed with childhood apraxia of speech. Compare the child’s articulatory/phonological characteristics to those noted in the text. What similarities and differences exist? Discuss specific treatment possibilities for the child with developmental apraxia of speech.

2. Observe a child in the clinic (or a video recording of a child, there are several on youtube) who is cerebral palsied. Based on the medical diagnosis, compare the articulatory/phonological characteristics of the child to those noted in the text. What similarities and differences exist? Discuss the interactions which can be observed

between respiratory, phonatory, resonatory, and articulatory functions.

3. Children with Down syndrome are often enrolled in therapy or early intervention programs. If possible, observe a child with Down syndrome who is in the early stages of speech/language development. Based on the remediation principles outlined in the text or, depending on the level of the child, those treatment procedures outlined in emerging phonology, discuss a treatment plan for the child.
4. Discuss the methodological difficulties inherent in determining general articulatory/phonological characteristics for the hearing impaired population. Factors to discuss would include the type and degree of hearing impairment, the cause, individual variation, onset of the hearing loss, age of detection, and previous intervention efforts.
5. Observe an adult in the clinic (or a video recording of an adult, or one on youtube) who has been diagnosed with adult apraxia of speech. Compare the client's articulatory/phonological characteristics to those noted in the text. What similarities and differences exist? Discuss specific treatment possibilities for the client with apraxia of speech.

## MULTIPLE CHOICE QUESTIONS

1. Those children who evidence a lack of motor control of the oral mechanism which is not attributable to other problems of muscular control are often diagnosed as individuals with
  - a) an intellectual disability
  - b) childhood apraxia of speech
  - c) cerebral palsy
  - d) cleft palate
2. Children with childhood apraxia of speech often demonstrate an ongoing series of movements of the articulators in an attempt to find the desired articulatory position. This is referred to as
  - a) silent posturing
  - b) prosodic impairment
  - c) sequential volitional movement
  - d) groping behavior
3. Which one of the following assessment procedures is, in most cases, not necessary when attempting to diagnose a child with childhood apraxia of speech?
  - a) language testing
  - b) additional tests of examine the sequencing of sounds and syllables
  - c) assessment of cognitive skills
  - d) assessment of sequential volitional movements
4. Which one of the subtypes of spasticity demonstrates equal degrees of spasticity in all four limbs?
  - a) hemiplegia
  - b) paraplegia
  - c) diplegia
  - d) quadriplegia
5. Why must compensatory articulatory efforts often be implemented with the cerebral palsied individual?
  - a) because they may not be able to achieve the normal articulation
  - b) because these will aid in coordinating respiration, phonation, and resonance
  - c) because augmentative communication is not possible with these individuals

- d) all of the above
6. Cleft palate children may demonstrate compensatory adjustments. This compensatory action results in
- articulation that is within normal limits
  - sound omissions
  - sound substitutions or distortions which are produced more posterior and inferior in the vocal tract
  - an anterior positioning of the tongue with resulting sound substitutions and distortions
7. Besides the nasal consonants, which one of the following consonant groups usually remains relatively intact in the speech of children with cleft palates?
- stop-plosive
  - affricates
  - semivowels
  - fricatives
8. Articulatory backing in children with cleft palates is
- not typical
  - possibly an attempt to capture airflow or use the back of the tongue to help seal the velopharyngeal port
  - only noted on stop-plosive productions
  - associated with bilateral and not unilateral cleft palates
9. In the intellectually disabled population, which one of the following articulatory errors is the most frequent one?
- deletion of consonants
  - metatheses
  - velar fronting
  - reduplication
10. In the intellectually disabled population, there is a high incidence of
- cleft palate
  - hearing impairments
  - articulatory backing
  - all of the above
11. Which one of the following is not characteristic of the speech demonstrated by individuals who are intellectually disabled?
- sound errors are consistent in speech
  - speech is characterized as indistinct
  - final consonant deletion is a common process
  - lack of appropriate pauses and phrasing
12. Within the hearing impaired population, speech intelligibility should be increased, especially in respect to voice, suprasegmental realization, and
- pausing between utterances
  - consonant cluster realization
  - reducing the rate of articulation
  - accuracy of vowel productions
13. The greater the hearing loss, the more likely that
- consonant productions will be affected
  - vowel productions will be affected
  - errors in stress, pitch, and voicing will occur
  - all of the above

14. A program is suggested for the hearing impaired child from Dunn and Newton (1994). One of the first steps is to
  - a) establish a suprasegmental base
  - b) teach the production of minimal pair distinctions
  - c) teach vowel distinctions
  - d) teach sequential movements of CVCV structures
  
15. When contrasting the articulatory errors of apraxia of speech and dysarthria, apraxic errors are
  - a) very similar to dysarthric errors
  - b) related to fricatives while dysarthrics have more difficulty with stop-plosives
  - c) inconsistent whereas dysarthric errors are consistent and predictable
  - d) vowel production errors, dysarthrics have more difficulties with consonants
  
16. Which one of the following is not an articulatory/phonological characteristic of apraxia of speech?
  - a) number of errors increase as the word increases in length
  - b) more errors occur on consonants that require more precise articulatory adjustments
  - c) no difficulty initiating utterances but increased difficulty as the utterance progresses
  - d) sound substitution error predominate
  
17. Which one of the following should be utilized when beginning treatment of the articulatory difficulties noted in acquired apraxia of speech?
  - a) meaningful utterances
  - b) nonsense syllables
  - c) longer words and utterances
  - d) consonant clusters
  
18. The dysarthric individual may demonstrate a very slow speech rate. This is referred to as
  - a) tachylalia
  - b) bradylalia
  - c) hyperkinesia
  - d) aphonia
  
19. There are five main types of dysarthric individuals. Most of these types demonstrate
  - a) resonance which is considered normal
  - b) slow, imprecise sound realization
  - c) lower than normal pitch and loudness levels
  - d) all of the above
  
20. When treating individuals with dysarthria, most therapy plans are based on the principle of
  - a) establishing articulatory precision of consonants
  - b) providing alternative or augmentative modes of communication
  - c) treating disordered facets of the subsystems (respiration, phonation, resonance) contributing to articulation
  - d) increasing the rate of articulation

## TRUE/FALSE QUESTIONS

1. Sequencing errors are central to the disorder of childhood apraxia of speech.
2. All of the speech characteristics noted in the text are present in all children

with childhood apraxia of speech.

3. Children with cerebral palsy may have difficulties with respiration, phonation, resonance, and articulation.
4. About half of the cerebral palsied population demonstrates some degree of intellectual disability.
5. Developmental speech-language delays occur rarely in the cleft palate population.
6. Speech sound errors are not as common in the intellectually disabled population when compared to the nondisabled population.
7. Traditional motor approaches have been of little value in treating speech sound difficulties in the intellectually disabled population.
8. Children with hearing impairments have been found to use at least partially rule-governed phonological systems.
9. Clients with apraxia of speech often suffer from oral (nonverbal) apraxia as well.
10. The speech characteristics of all individuals with dysarthrias are very similar.

### **SHORT ANSWER QUESTIONS**

1. Why is the diagnosis of childhood apraxia of speech difficult to make?
2. Define the term cerebral palsy.
3. List the three types of cerebral palsy.
4. Explain in general terms how respiratory, phonatory, and resonatory difficulties noted in children with cerebral palsy could impact the speech outcome.
5. Explain why cleft palate children have a tendency to articulatory backing.
6. What is an oronasal fistula? Explain how the location of the fistula has an impact on the production of specific consonants.
7. When assessing a child who is intellectually disabled, why is assessment of the environment important for establishing later intervention goals?
8. Explain why the articulatory/phonological characteristics noted for the hearing impaired population may not reflect the individual child's characteristics.
9. Distinguish between apraxia of speech and oral (nonverbal) apraxia.
10. Why is it important that speech-language pathologists assess the dysarthric individual even if a medical diagnosis has already been given?

## ESSAY QUESTIONS

1. Discuss why the term childhood apraxia of speech is used as a diagnostic label for specific children, i.e., what do childhood apraxia of speech and apraxia of speech in adults have in common? Why is this possibly not a good label for these children?
2. Why must the treatment of a young child with cleft palate be a team approach? Which professionals are a portion of this team and why?
3. What are the differences between general treatment guidelines for articulatory disorders for the intellectually disabled versus nondisabled children?
4. Outline briefly the general guidelines when structuring articulation therapy for an individual with acquired apraxia of speech.
5. Explain why treating the subsystems of speech (respiration, phonation, resonance) are important within the intervention process for individuals with dysarthria.

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## REFERENCES

- American Speech-Language-Hearing Association. (2007). *Childhood apraxia of speech* [Position Statement]. Retrieved from <http://www.asha.org/policy>
- Bigge, J. (1991). *Teaching individuals with physical and multiple disabilities*. (3rd ed.). New York: Merrill.
- Crary, M. A. (1993). *Developmental motor speech disorders*. San Diego: Singular Publishing Group.
- Hall, P. K., Jordan, L. S., & Robin, D. A. (1993). *Developmental apraxia of speech: Theory and clinical practice*. Austin, TX: PRO-ED.
- Hardy, J. C. (1983). *Cerebral palsy*. Englewood Cliffs, NJ: Prentice-Hall. Owens, R. E. (1997). Mental retardation: Difference and delay. In D. K. Bernstein & E. Tiegerman-Farber (Eds.), *Language and communication disorders in children* (4th ed.) (pp. 457-523). Boston: Allyn & Bacon.
- Rosenbek, J. C., & LaPointe, L. L. (1985). The dysarthrias: Description, diagnosis and treatment. In D. F. Johns (Ed.), *Clinical management of neurogenic communicative disorders* (pp. 97-152). Boston: Little, Brown.
- Shriberg, L. D., Aram, D. M., & Kwiatkowski, J. (1997). Developmental apraxia of speech: I. Descriptive and theoretical perspectives. *Journal of Speech, Language, and Hearing Research*, 40, 273-285.
- Van Demark, D. R., & Hardin, M. A. (1990). Speech therapy for the child with cleft lip and palate. In J. Bardach & H. L. Morris (Eds.), *Multidisciplinary management of cleft lip and palate*. Philadelphia: W. B. Saunders.



# Test Bank

## Answers to Questions in Instructor's Resource Manual

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# Chapter 1

## Clinical Framework

### Basic Terms And Concepts

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#### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

1. Discuss why the child's production of minimal pairs could be used in determining a phonological disorder? See pages 7 minimal pairs and pages 9-10 phonological disorder.
2. What information could be a portion of the phonemic inventory? Discuss how you would gather information about the inventory of phonemes and phonotactic constraints. See page 9, phonemic inventory and phonemic constraints.
3. What type of material could you use to examine the phonotactics of a child's who has difficulties with the production of "s" in consonant clusters? Which words would test the possible phonotactics of s-clusters in American English occurring at the beginning and end of syllables? See pages 287, Table 9.2 and 288, Table 9.3, Chapter 9 for a list of consonant clusters.
4. Based on the results of a standardized speech assessment and/or a spontaneous speech sample have the students determine the phonetic inventory, the phonemic inventory, and the phonotactics of a child with an articulatory or phonological impairment. Note any patterns or constraints which are demonstrated. See page 9 for phonetic and phonemic inventory as well as phonological constraints.
5. Give one example of what could be assessed within each of the five areas of language (phonology, morphology, syntax, semantics, and pragmatics). See page 2, Figure 1.1 for the subdivisions of language with specific examples. Have the students generate new examples.

The following is a portion of a language sample from Jeannette,  
age 4;6.

Vowels: [i, ɪ, ε, ə, u, ʊ, ʌ, ɑ, æ, aɪ, ou]

Consonants: [w, l, ɹ, m, n, ŋ, b, t, d, k, h, f, v, s, ʃ, ʒ]

Vowels Not in inventory: [ə, ɜ, aʊ/aʊ, eɪ, aʊ/aʊ, ɔɪ ]

Consonants: [p, g, j, z, tʃ, dʒ, ð, θ]

Make a list of the words that Jeanette pronounces differently than would be expected when compared to the adult model of pronunciation.

jelly, chocolate, turtles, the, then, that, Shredder, just, these, other, things.  
In addition, there is final consonant deletion on "want", "and", "don't" as well as devoicing of the final [z] on "beans", "is", "Ninjas", "comes", "things". Devoicing of [v] occurs on "of".

Note any consistent patterns of substitution of one sound for another:

[t/θ], [v, d/ ð], [ʒ/dʒ], [s/]

### MULTIPLE CHOICE QUESTIONS

- 1) c                    2) c                    3) d                    4) b                    5) c  
6) d                    7) d                    8) c                    9) d                    10) c

### TRUE/FALSE QUESTIONS

1. FALSE      2. FALSE      3. FALSE      4. FALSE      5. TRUE  
6. TRUE      7. TRUE      8. FALSE      9. TRUE      10. FALSE

### SHORT ANSWER QUESTIONS

1. Define communication disorder. See page 3.
2. Explain why a child with "s" difficulties, might have problems in the area of morphology. See pages 2-3 for the definition of morphology. Refer to plural -s, third person singular "s", for example.
3. Contrast the terms speech sound and phoneme. See pages 5-6.
4. Contrast the terms articulation disorder versus phonological disorder. See pages 7-9.
5. Write a brief definition and give an example of each of the following terms: phonology, morphology, syntax, semantics, and pragmatics. See pages 2-3.

### ESSAY QUESTIONS

1. Discuss how articulation disorders represent difficulties with the physical production aspects of speech sounds. Utilize the terms "articulation", "physical sound realities", and "speech sounds" when developing your discussion. Refer to pages 8 and 9.

2. Discuss how phonological disorders represent difficulties with the linguistic function of phonemes. Utilize the terms "phoneme" and "phonology" when developing your discussion. Refer to Figure 1.3, page 8 and page 9.
  3. Discuss the differences between a language and a speech disorder. Give specific examples for each type. Refer to page 4 and Figure 1.2.
  4. Articulation errors are referenced by a child's age. Referring to the definition and characteristics of the term "articulation" state why this is a meaningful reference point. Refer to pages 4 and 5.
  5. Briefly discuss the differences between the Speech Disorders Classification System (Shriberg et al., 2010) and the Differential Diagnosis System (Dodd, 1995, 2005). See pages 10-13.
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# Chapter 2

## Articulatory Phonetics

### Speech Sound Form

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#### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

1. Difficulties with vowel productions may occur in children with phonological disorders. The following examples of vowel substitutions have been slightly modified from those presented in the article by Pollock and Keiser (1990). Students should compare the typical vowel production to the noted changes according to the parameters 1) the portion of the tongue which is involved in the articulation, i.e., front, central, back vowels; and 2) the tongue's position relative to the palate, i.e., high, mid, low vowels.

##### Vowel Changes

1. High-front vowel is changed to a low-back vowel.
  2. Onglide portion of diphthong is changed; mid-front vowel is changed to a low-front vowel.
  3. Mid-front vowel is changed to a low-back vowel.
  4. Monophthong is changed to a diphthong; low-front monophthong is changed to a diphthong with a low-front onglide and a high-front offglide.
  5. Monophthong is changed to a diphthong; low-front monophthong is changed to a diphthong with a mid-back onglide and a high-front offglide.
  6. High-back vowel is changed to a mid-back vowel.
  7. Central vowel is changed to a low-back vowel.
  8. Diphthong is changed to a monophthong; low-front onglide is changed to a low-back vowel.
  9. Diphthong is changed to a monophthong; mid-back onglide is changed to a central vowel.
  10. Monophthong is changed to a diphthong; low-back monophthong is changed to a diphthong with a low-back onglide and a high-front offglide.
2. Students should compare the typical consonant productions to the noted misarticulations according to voicing, place of articulation, and manner, changes.

##### Consonant Changes

1. Voiceless alveolar fricative is changed to a voiceless dental (or interdental) fricative.
2. Voiced labiodental fricative is changed to a voiced bilabial plosive.
3. Voiced alveolar (or retroflexed) rhotic (or liquid or central approximant) is changed to a voiced labio-velar glide (or approximant).
4. Voiceless dental (or interdental) fricative is changed to a voiceless labiodental

- fricative.
5. Voiced alveolar nasal is changed to a voiced alveolar plosive.
  6. Voiceless velar plosive is changed to a voiceless alveolar plosive.
  7. Voiceless postalveolar fricative with lip rounding is changed to a voiceless alveolar plosive.
  8. Voiced alveolar lateral (liquid or lateral approximant) is changed to a voiced labio-velar glide (or approximant).
  9. Voiced alveolar fricative is changed to a voiced alveolar plosive.
  10. Voiceless dental (or interdental) fricative is changed to a voiceless alveolar plosive.

3. Based on the results from question #2, discuss which production parameters have been altered for each of the misarticulations.

1. swing [sw] → [θw]

Change in place of articulation: the articulators have moved forward from the alveolar ridge to the upper teeth.

2. shovel [v] → [b]

Change in place of articulation and manner of articulation: the articulatory constriction has moved forward, manner of articulation has changed from a narrow opening (fricative) to a complete closure (plosive)

3. frog [fɹ] → [fw]

Change in place of articulation and manner of articulation: there is lip rounding, the tongue has moved back to include a high-back tongue placement for [w], manner of articulation has changed from a liquid to a glide or from an approximant to a central approximant.

4. thumb [θ] → [f]

Change in place of articulation: articulators have moved from the tip of the tongue to the bottom lip.

5. knot [n] → [d]

Change in manner of articulation: manner has changed from a nasal to a plosive, the velum has moved from an open to a closed position.

6. coat [k] → [t]

Change in place of articulation: articulators have been moved to a more forward position.

7. fishing [ʃ] → [t]

Change in place and manner of articulation: articulator has moved forward, manner of articulation has changed from a narrow opening (fricative) to a complete closure (plosive).

8. lamp [l] → [w]

Change in place of articulation: articulator have moved from the tip of the tongue touching the alveolar ridge to a labial position for [w] (lip rounding), the tongue has moved back to a high-back elevation.

9. zoo [z] → [d]

Change in place and manner of articulation: articulators have moved somewhat back from the tip of the tongue to the edges of the tongue, manner of articulation has changed from a narrow opening (fricative) to a complete closure (plosive).

10. three [θɹ] → [tɹ]

Change in place and manner of articulation; the articulators have moved somewhat back from the tip of the tongue to the edges of the tongue and upper teeth to the alveolar ridge, manner of articulation has changed from a narrow opening (fricative) to a complete closure (plosive).

4. Ingram (1974) and Smith (1973) offer case studies of children with assimilation processes. A few examples are offered here for discussion. What types of assimilation processes (progressive, regressive, contact, remote) are being seen in these examples?

#### Assimilation Processes

1. Regressive (anticipatory), remote (noncontiguous) assimilation. This is called back assimilation in Ingram (1974) and velar harmony in Smith (1973).
2. Regressive (anticipatory), remote (noncontiguous) assimilation. This is similar to the first example.
3. Progressive (perseverative), remote (noncontiguous) assimilation. Note: The reduction of [bl] to [b] would be a normal production for a young child.
4. Regressive (anticipatory), remote (noncontiguous) assimilation. The changes in voicing from two voiceless sounds [st] to a voiced sound [b] could be discussed. This might be a case of prevocalic voicing (in addition to the assimilation process) which is often seen in young children.
5. Regressive (anticipatory), remote (noncontiguous) assimilation.

5. For example, the following words from the Weiss Comprehensive Articulation Test (1980) are used to test [t] and [d].

	Words used to test [t]	Words used to test [d]
Initial position	table	door
Medial position	Santa Claus	ladder
Final position	coat	bed

The number of syllables varies from one to three for testing [t] and [d]. In the medial position [t] is tested as the onset of an unstressed syllable but may frequently be assimilated to [sænə]. The medial [d] in *ladder* is often produced not as [d] but as a flap (tap, or one-tap trill) (see page 55). Although this is an acceptable allophonic variation of [d], it does not really test [d] per se.

#### MULTIPLE CHOICE QUESTIONS

- |       |       |       |       |       |
|-------|-------|-------|-------|-------|
| 1) a  | 2) c  | 3) d  | 4) b  | 5) c  |
| 6) d  | 7) c  | 8) c  | 9) a  | 10) b |
| 11) a | 12) c | 13) d | 14) b | 15) b |
| 16) c | 17) d | 18) a | 19) c | 20) b |
| 21) b | 22) a | 23) d |       |       |

## TRUE/FALSE QUESTIONS

- 1) FALSE    2) FALSE    3) TRUE    4) TRUE    5) FALSE  
6) TRUE    7) FALSE    8) FALSE    9) TRUE    10) FALSE

## SHORT ANSWER QUESTIONS

1. Give the definition of vowels. See page 27 and Table 2.3 page 28.
2. Which vowels are considered rounded vowels? See page 30.
3. Define monophthong. See page 29.
4. Which phonetic categories are used to describe consonants? See page 33.
5. Briefly describe pleural linkage and its impact on respiration. See page 21.
6. What is the difference between extrinsic and intrinsic muscles of the larynx? See pages 22-23.
7. How does resonance modify the signal from the vocal folds? See page 25.
8. Define coarticulation. See page 38.
9. Define assimilation. See page 38.
10. List the peak, onset, and coda for the word "stretch". Refer to page 40.

## ESSAY QUESTIONS

1. List the production and linguistic function differences between vowels and consonants. Refer to Table 2.3 (page 28) and the text on pages 27-28.
  2. The vowel quadrilateral reflects the production features of the various vowels. Discuss how the quadrilateral reflects the oral dimensions of vowel production. Refer to page 29.
  3. Distinguish between nonphonemic and phonemic diphthongs. Give word examples for both phonemic and nonphonemic diphthongs. Refer to page 32.
  4. A child says [sɪp] for "ship". Explain the difference phonetically between the child's production and the typical pronunciation. Refer to Table 2.5 on page 36.
  5. How might syllable structure be helpful when structuring word materials for therapy? Refer to pages 41 and 42.
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## Chapter 3

# Phonetic Transcription and Diacritics

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### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

### ADDITIONAL LEARNING MATERIALS

4. Answer: Based on the broad transcription the child demonstrates difficulty with [s], substituting [ʃ] for the [s] at the beginning of a word or syllable and at the end of a word.

5. Answer: Based on the narrow transcription it seems clear that the child differentiates between [ʃ] and [s]. The child uses a palatalized “s” [sʲ] for [s] in all word positions. This would have a bearing on the diagnosis of this child as one could assume that it is an articulation and not a phonological disorder. The child uses production differences to distinguish meaning, thus, “ship” and “sip” would be two distinct words.

6. This morning I snuck up on my cat.

[ðɪŋ mɔənən aɪ ʃnʌk ʌp ɔn maɪ kæt]

[ʃ]: a voiced alveolar lateral fricative. Would be considered a misarticulation of [s].

[oə]: a centering diphthong with no r-coloring on the central vowel. Could be possibly considered a misarticulation for [oɜ] or could be dialect related.

[ən] at the end of “morning”: Would be considered a normal variation of the pronunciation “ing”

[ʃ̚]: a dentalized s-production. Would be considered a misarticulation of [s].

[ɱ]: an unreleased stop-plosive. Would be considered a normal variation at the end of a word or utterance.

I like my cat, Tigger.

[? aɪ laɪ k maɪ : k = æt tɪg ə]

[ʔ]: a glottal stop. Could be considered a normal variation at the beginning of an utterance preceding a vowel..

[:]: the two dots indicate lengthening of the vowel. Could be considered a normal variation.

[k̄]: aspiration of [k]. Does indicate lack of aspiration but probably would not be considered a “misarticulation”.

[ɣ]: a voiced velar fricative. This sound is used as a substitution for [g] and would be considered aberrant, the child is not demonstrating the normal closure for the plosive [g].

[ə]: (at the end of Tigger) demonstrates a central vowel without r-coloring. Would be considered a misarticulation.

He"s a big fur ball.

[hiz̄ ɔ bɪg fɜ p ɔl]

[z̄]: a palatalized [z]. Would be considered an aberrant production.

[ɜ]: the central vowel [ɜ] without r-coloring. Could be considered an aberrant or possibly a dialectal variation.

[p̄]: a devoiced [p]. Would possibly be considered a normal variation.

He"s brown and his tummy he has white all over him

[hɪz̄ buaʊn ænd hɪz̄ tʌ mɪ hi hæʃ waɪ t ɔl ovə hɪm]

[z̄]: a dentalized [z]. Would be considered a misarticulation. be considered an aberrant production.

[æ̃]: a nasalized [æ]. Given the context of this vowel preceding a nasal

[v]: a labiodental approximant. This sound could be used as a substitution for [ɹ] and would consonant, this would be considered a normal production.

[ɪ]: shortening of the [i] vowel. Probably would be considered a normal variation.

[s̄]: partial voicing of [s]. Would be considered a normal variation.

[ə]: loss of r-coloring on a central vowel that typically has r-coloring. Could be considered an aberrant or possibly a dialectal variation.

## MULTIPLE CHOICE QUESTIONS

- 1) b            2) d            3) d            4) b            5) a  
6) c            7) c            8) d            9) b            10) d  
11) b           12) a           13) b           14) a           15) a  
16) a           17) d           18) a           19) b           20) d

## TRUE/FALSE QUESTIONS

- 1) FALSE      2) TRUE      3) FALSE      4) TRUE      5) TRUE  
6) FALSE      7) FALSE      8) FALSE      9) TRUE      10) FALSE

## SHORT ANSWER QUESTIONS

1. What are diacritics? See page 51.
2. Why are diacritics important when transcribing disordered speech? See page 51, Clinical Comments on page 54 and pages 65-67.
3. Explain what is meant by the statement that phonetic transcription is not a prescriptive system. See page 50.
4. Contrast the productions of a dentalized versus a palatalized [s] sound. See page 53 and Clinical Comments, page 54.
5. Explain how a lateralized [s] sound is produced. See pages 53 and 54.
6. Discuss why it is important to note an unreleased plosive as you transcribe rather than relying on the audio recording. See pages 56-57.
7. Explain how diacritics are used with vowel deviations. See pages 59-61.
8. Explain the differences in production between a light [l] sound, an alveolar lateral, and a dark [l] sound, a velarized production. See page 53.
9. Explain how the voiced and voiceless velar fricatives are produced. Why might the velar fricatives be used as a substitution for [k] and [g]? See page 64.
10. Explain how the voiced and voiceless bilabial fricatives are produced. See page 64.

## ESSAY QUESTIONS

1. Explain why clinicians should use phonetic transcription in the assessment and treatment process? Refer to page 51.
2. There are also several problems which must be considered when using phonetic transcription. What are some of the factors which may affect our transcription? Refer to page 51.

3. A distinction is made between a labiodental approximant production and a [w] for [ɹ] substitution. Why would this distinction be important when assessing a child? Refer to page 58.
  4. Using the vowel quadrilateral as a reference point, discuss the production and perception of [o] if it is raised, lowered, and produced with a more forward tongue articulation. Refer to pages 59 and 60.
  5. Give examples of words which might result in a labialized [s] due to coarticulation factors. Refer to page 58.
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# Chapter 4

## Theoretical Considerations and Practical Applications

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### ADDITIONAL LEARNING MATERIALS

### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

1. Using the words from Ryan (Think Critically on pages 112-113) list his errors according to distinctive features?

[s] ⇒ [θ] 7X	+ strident ⇒- strident
[θ] ⇒ [f] 3X	+ coronal ⇒- coronal -strident ⇒+ strident
[ɹ] ⇒ [w] 4X	+consonantal ⇒- consonantal +approximant ⇒-approximant +coronal ⇒-coronal -high ⇒+ high -back ⇒+ back -round ⇒+ round -round ⇒+round
[j] ⇒ [w]	-back ⇒+back -round ⇒+round
[g] ⇒ [k]	+voicing ⇒-voicing
[l] ⇒ [w]	+consonantal ⇒- consonantal +approximant ⇒-approximant +coronal ⇒-coronal +anterior ⇒-anterior +lateral ⇒-lateral -high ⇒+ high -back ⇒+ back -round ⇒+round

[dʒ] ⇨ [d]                      -anterior ⇨ +anterior  
    +high ⇨ -high  
    +delayed release ⇨ -delayed release  
    + strident ⇨ -strident

[ð] ⇨ [d]                      +continuant ⇨ -continuant

[tʃ] ⇨ [ʃ] 2X                      -anterior ⇨ +anterior  
    +high ⇨ -high  
    +delayed release ⇨ -delayed release  
    + strident ⇨ -strident

[ʃ] ⇨ [s] 2X                      -anterior ⇨ +anterior  
    +high ⇨ -high [z] ⇨ [ ]  
    + strident ⇨ - strident

[z] ⇨ [ð]                      + strident ⇨ - strident

[z] ⇨ [θ]                      + strident ⇨ -strident  
    +voicing ⇨ -voicing

A large number of changes in the following distinctive features are noted: strident (15X), high (9X), coronal (8X), and anterior (6X).

1. Jenna

Have the students identify the sound substitutions and deletions. This is done in Question #2

2. Using the words from Jenna (Question #2) have the students identify the phonological processes this child demonstrates. See above.

broom                      [bɹu] [bɹ] → [bɹ] consonant cluster substitution + gliding  
    [m] → ∅ final consonant deletion

flag                      [flæ] [g] → ∅ final consonant deletion

hammer                      [hæmə] [ə] → [ə] derhotacization

drum                      [tɹʌm] [dɹ] → [tɹ] consonant cluster substitution + devoicing

sandwich                      [sæmɪʃ] [s] → [ʃ] fronting

	[tʃ] → [ʃ] deaffrication
rabbit	[wæbɪ] [ɪ] → [w] gliding [t] → ∅ final consonant deletion
fingers	[fɪŋgəz] [ə] → [ə] derhotacization [s] → [ʒ] fronting
feather	[fɛdə] [ð] → [d] stopping (if you want detail then+ backing) [ə] → [ə] derhotacization
vacuum	[vækʊ] [kj] → [k] consonant cluster reduction [m] → ∅ final consonant deletion
skunk	[tʌnt] [sk] → [t] consonant cluster reduction + fronting [nk] → [nt] consonant cluster substitution + fronting
stove	[toub] [st] → [t] consonant cluster reduction [v] → [b] stopping
zipper	[dɪpə] [z] → [d] stopping [ə] → [ə] derhotacization
thumb	[tʌm] [θ] → [t] stopping
car	[kɑə] [ɑə] → [ɑə] derhotacization
balloon	[bəlʊ] [n] → ∅ final consonant deletion
swing	[fwɪŋg] [sw] → [fw] labialization
string	[twɪŋ] [stɪ] → [tw] consonant cluster reduction + gliding
music	[muzɪ] [mj] → [m] consonant cluster reduction [k] → ∅ final consonant deletion

zoo [du] [z] → [d] stopping

orange [ɔwɪntʃ] [ɹ] → [w] gliding

[tʃ] would probably be noted as an acceptable pronunciation

Jenna has several (6X) instances of final consonant deletion. She uses derhotacization or gliding on every r-production. Fronting is noted on [s] and [k, g]. There are five instances of consonant cluster reduction and four of stopping.

1. Constraint	Definition	Violation	Nonviolation
<b>Markedness</b>			
*Complex	No clusters	flag [fæɡ]	flag [????]
*Coda	No final consonants	moon [mun]	mun [mu]
*Fricatives	No fricatives	zip → [zɪp]	zip [dɪp]
* Liquid [l]	No liquid [l]	look [lʊk]	[lʊk] → [wʊk]
<b>Faithfulness</b>			
Max	No deletion	bat → [bæ]	[bæt] [bæt]
Dep	No insertion	sip [slɪp]	sip → [sɪp]
Ident-Feature	Don't change features	red → [wɛd]	[ɹɛd] [ɹɛd]

### MULTIPLE CHOICE QUESTIONS

- 1) c      2) b      3) a      4) c      5) d
- 6) b      7) d      8) b      9) d      10) c
- 11) b      12) c      13) d      14) d      15) a
- 16) b      17) b      18) c      19) b      20) b
- 21) d      22) c      23) a      24) d      25) c



## TRUE/FALSE QUESTIONS

- 1) FALSE    2) TRUE    3) FALSE    4) FALSE    5) TRUE  
6) TRUE    7) FALSE    8) FALSE    9) FALSE    10) FALSE

## SHORT ANSWER QUESTIONS

1. What are implicational universals? See pages 86-87.
2. According to generative phonology, discuss the difference between surface-level and underlying form? See page 83.
3. What is meant by competence and performance in generative phonology? Equate these terms to surface-level and deep level forms. See page 85.
4. What is a phonological process? See page 88.
5. Explain how suppression is a portion of the developmental process. See pages 88-89.
6. Give two examples of substitution processes. See pages 89-90.
7. Give two examples of syllable structure processes. See page 89.
8. Explain the difference between linear and nonlinear phonologies. See page 93.

## ESSAY QUESTIONS

1. Explain phonological rules in generative phonology relative to surface and underlying forms. Refer to pages 83 and 84.
  2. Discuss Stampe's concepts of limitation, ordering, and suppression. Give examples of each of these mechanisms. Refer to pages 88 and 89.
  3. According to Stampe, all children embark on the development of their phonological systems from the same beginnings, i.e., they all start at the same point. Explain how two children from two different languages end up with completely different phonemic systems. Refer to pages 88 and 89.
  4. Explain how the different nodes in feature geometry interact with one another. Refer to pages 94 -96.
  5. Explain the differences between the terms faithfulness and markedness in optimality theory. Give examples of each. Refer to page 102.
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# Chapter 5

## Normal Phonological Development

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### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

3. ANSWER: This child appears to be having difficulties with certain consonant clusters with [ɹ]. Although certain r-clusters were noted as still being inaccurate in 5;6 to 7;0 year olds, the following r-clusters are usually produced correctly at age 7;0: [fɹ], [tɹ], [dɹ], [gɹ], and [pɹ].

### MULTIPLE CHOICE QUESTIONS

- |       |       |       |       |       |
|-------|-------|-------|-------|-------|
| 1) d  | 2) c  | 3) a  | 4) b  | 5) d  |
| 6) c  | 7) d  | 8) d  | 9) b  | 10) b |
| 11) a | 12) a | 13) d | 14) d | 15) c |
| 16) a | 17) a | 18) c | 19) a | 20) c |

### TRUE/FALSE QUESTIONS

- |           |           |          |          |           |
|-----------|-----------|----------|----------|-----------|
| 1) FALSE  | 2) FALSE  | 3) TRUE  | 4) TRUE  | 5) FALSE  |
| 6) FALSE  | 7) TRUE   | 8) TRUE  | 9) FALSE | 10) TRUE  |
| 11) FALSE | 12) FALSE | 13) TRUE | 14) TRUE | 15) FALSE |

### SHORT ANSWER QUESTIONS

1. Explain what impact the relatively large arytenoid cartilages and vocal processes in the infant have on vocal fold vibration. See page 117.
2. What is categorical perception? See page 119.
3. What is the difference between vocoids and contoids versus vowels and consonants? See page 124.
4. What is the difference between first words and proto-words? See pages 127-128.

5. Why are longitudinal findings better when looking at the individual development of a child? See pages 129- 130.
6. What are tone units? See page 143.
7. Define morphophonology. See page 145.
8. Define metaphonology. See page 146.
9. Give an example of a metaphonological task. See pages 147-148.
10. Give an example of a sentence in which contrastive stress would change the meaning. See page 146.

### **ESSAY QUESTIONS**

1. Explain why the child loses the ability to discriminate nonnative sounds which are phonetically similar around the time first words are emerging. Refer to page 120.
  2. Explain the differences in how sound acquisition data are acquired and which type of data are used in cross-sectional versus longitudinal studies. Refer to pages 136 through 139.
  3. What are some of the problems inherent in cross-sectional sound mastery studies? Refer to pages 136-138.
  4. Explain the differences between speech sound development and phonological development. How could you structure an investigation to look at a child's phonological development? Refer to page 136.
  5. Why might regression (or what is called the use of phonological idioms) occur during the development of a child? Refer to page 139.
-

# Chapter 6

## Appraisal

### Collection of Data

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Number 2: The following results are from Brandon, age 5;6

house	[hauθ]	matches	[mætfəθ]	thumb	[tʌm]
telephone	[tɛdəfoun]	lamp	[wæmp]	finger	[fɪŋgə]
cup	[tʌp]	shovel	[tʌvou]	ring	[wɪŋ]
gum	[gʌm]	car	[tə]	jumping	[dʌmpən]
knife	[naɪf]	rabbit	[wæbət]	pajamas	[dæməθ]
window	[wɪndou]	fishing	[fɪtən]	plane	[pweɪn]
wagon	[wægən]	church	[tʃɜtʃ]	blue	[bwu]
wheel	[wiə]	feather	[fɛdə]	brush	[bwʌt]
chicken	[tʃɪtən]	pencils	[pɛntoθ]	drum	[dwʌm]
zipper	[dɪpə]	this	[dɪθ]	flag	[fwæ]
scissors	[θɪtə]	carrot	[tɛwət]	Santa	[θænə]
duck	[dʌt]	orange	[ouwɪntʃ]	tree	[twi]
yellow	[jɛwou]	bathtub	[bæftəb]	squirrel	[twɜwou]
vacuum	[vætum]	bath	[bæf]	sleeping	[θwɪpən]
bed	[bɛd]	stove	[θtoʊf]		

Based on these results from Brandon, discuss the following:

- a) the sounds in error which are not age appropriate (use one of the studies on page 137 as the basis for age appropriate articulation skills)

Sounds consistently in error include: [s], [z], [l], [ɹ], [θ], [ð], [ʃ], [ʒ], [k]. Brandon occasionally substitutes [d/g] but can produce the [g] in “wagon” and “gum”. Using the Smit (1993) data the following sounds would be age-appropriate: [s, z, l, ɹ, θ]. The following sounds would be of concern: [k, g, ð, ʃ, ʒ].

- b) what additional word material might be useful to give supplemental information concerning Brandon's problems (p. 170).

Have the students come up with lists of one- and two-syllable words (for medial sound production) with the sounds that are listed under those that would be of concern. Possibly try to avoid those sounds which the child has known difficulties with such as [ɹ] and [l].

- c) how would the conversational speech sample be organized based on the sound difficulties (see pages 174-176)

4. The following is a transcription of a 10-minute spontaneous speech sample of a 24-month-old child. This child is in the period of emerging phonology as he does have some words. Intended words are noted, other verbalizations which appear to have no meaning are supplied

Word	Production	Other Verbalizations	
Mom	[mɑmə] 2	[ɑ] 1	[ʌb] 2
Daddy	[dædæ] 2	[ɛ.ɛ] 1	[æ] 1
ball	[bɑ] 2	[ʌdə] 2	[ʌbə] 2
bubbles	[bʌbə] 2	[aʊbə] 2	[ɛ] 1
out	[aʊ] 1	[ʌdəb] 3	[nɑ] 2
dog	[dɑ] 2	[nɑbə] 3	[ʌ .ʌ] 1
no	[no] 2	[nʌ] 2	[o] 1

Determine the consonant, vowel, syllable shape inventories and note any sequential or positional constraints (pp. 184-185). Based on the information given, apply the Mean Babbling Level on page 186 to this child. Discuss your results.

Vowels: [æ, ɑ, ɛ, o, aʊ, ʌ, ə]

Consonants: [d, b, n,]

Constraints: No syllables with codas, all open syllables. Very few consonants.

The total number of consonants is below the children with small expressive vocabulary (page 185)

Mean Babbling Level: The syllable levels are noted above after the transcriptions. Total = 37 divided by 21 = 1.76. This is approximately the level of children with small expressive vocabularies at 24 months of age (p. 186).

### MULTIPLE CHOICE QUESTIONS

- 1) b            2) d            3) a            4) c            5) a
- 6) c            7) d            8) c            9) d            10) a
- 11) b           12) b           13) a           14) d           15) c
- 16) b

## TRUE/FALSE QUESTIONS

- 1) FALSE    2) FALSE    3) TRUE    4) TRUE    5) FALSE  
6) TRUE    7) FALSE    8) FALSE    9) TRUE    10) FALSE

## SHORT ANSWER QUESTIONS

1. What are the differences between the appraisal and the diagnosis portion of an assessment? See page 156.
2. What kind of information can an initial impression provide for the clinician? See pages 159-160.
3. What are the disadvantages of using a five-way scoring system? See page 171.
4. Why is it important that clinicians attempt to assess the client's spontaneous speech in a variety of talking situations? See page 174.
5. Why is it important to assess a child's communicative participation? See page 181.
6. Explain why it is important to assess or screen phonological awareness. See pages 178-179.
7. Define what is meant by emerging phonology. See page 182.
8. Why is an independent analysis important when assessing a child with an emerging phonological system? See pages 184-185.
9. What are routine and scripted events? See page 188.
10. Why do you think that diadochokinetic rates use the repetition of [pʌ], [tʌ], and [kʌ] as opposed to other sounds or sound combinations? See pages 164-165.

## ESSAY QUESTIONS

1. Explain what is meant by two-way, five-way, and phonetic transcription scoring systems. What are the advantages and disadvantages of each? Refer to pages 170 through 172.
2. Explain why a spontaneous speech sample is a necessary portion of a comprehensive phonetic-phonemic evaluation. Refer to page 174.
3. Outline how you would assess both the structure and the function of the speech mechanism. Refer to pages 162-164 and Appendix 6.1 on pages 192-195.
4. What are some of the problems noted when assessing the cognition of a child with a speech sound disorder? Why are nonverbal tests of cognition not a good answer? Refer to pages 180-181.
5. Discuss briefly the interrelationship between learning to read, phonological/phonemic awareness and speech sound disorders. See pages 178-179.

# Chapter 7

## Diagnosis

### Summarizing Data and Classifying Speech Sound Disorders

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1. Compare the results of the Goldman-Fristoe articulation test (Appendix 7.1 p. 226) to those of the spontaneous speech sample on page 223.

Both the Goldman-Fristoe Test of Articulation and the spontaneous speech sample show overlap and very many similarities. See pages 200 and 203 for detail on phones and consonant clusters. Certain phones which were stimulable on the articulation test are present in the spontaneous speech sample. These include [j, v, f] and the intervocalic consonant cluster [nf].

2. Jonah has been noted as being in the category consistent phonological disorder. Given the discussion and characteristics (pp. 214-215) what further testing would be warranted for Jonah?

Children within the group of consistent phonological disorder had a fairly high percentage of occurrence of difficulties with expressive language, vocabulary, and phonological awareness (pp. 214-215). In addition, oro-motor deviations were noted in approximately 25% of these children. These areas should be tested for a child with a consistent phonological disorder.

3. Jonah appears to have very limited consonant cluster production. Given the results on pages 20-203, could you suggest some consonant clusters that might be within Jonah's production skills? For example, two phones which Jonah can produce and has in his inventory would be a good starting point. Also examine consonant clusters at the end of a word, postvocally.

There were no initial clusters noted in Jonah's speech. In addition, he does not have a larger number of phones which could be used to build correct initial consonant clusters. For example, there are no k- or r-sounds. Jonah does show evidence of differentiating [l] in minimal pairs (see page 207) so this might be used to establish initial consonant clusters such as [pl] or [bl], both of which contain early sounds paired with the [l]. Jonah does show evidence of one intervocalic consonant cluster in his spontaneous speech sample [nf] in "french fries", although the [tʃ] is deleted in this example. One could build on this consonant cluster with short phrases such as "I have one fan", One fight, one foot, one farm. Another possibility might be some developmentally early final consonant clusters with phones Jonah can produce such as [nt] or [nd] in words such as "and", "hand", "pond" or "ant", "don't", and "want". Have the students expand with other "simple" consonant clusters which contain phones that Jonah can produce.

## MULTIPLE CHOICE QUESTIONS

- 1) b   2) c   3) c   4) a   5) d  
6) c   7) b   8) d   9) b   10) b  
11) d   12) c   13) a   14) d   15) a  
16) b   17) a   18) b   19) d   20) d

## TRUE/FALSE QUESTIONS

- 1) TRUE   2) FALSE   3) TRUE   4) FALSE   5) FALSE  
6) TRUE   7) FALSE   8) FALSE   9) FALSE   10) TRUE

## SHORT ANSWER QUESTIONS

1. Why is it important to determine the inventory and distribution of speech sounds in the assessment process? See pages 200 and Error Patterns: Can We Formulate Preliminary Error Analyses? on pages 203 and 204.
2. Define what is meant by the neutralization of phonemic contrasts. Give an example of phonemic neutralization. See pages 204-207.
3. When analyzing the neutralization of phonemic contrasts, what is meant by sound preferences? See Table 7.2 on page 206
4. Pick one factor that impacts intelligibility. Briefly discuss this factor. See pages 218 and 219.
5. When assessing a child's error patterns, we are attempting to understand the child's phonological system. What is meant by system in this context? See page 199.
6. What is the main disadvantage of scales that measure intelligibility? See page 220.
7. Which types of errors can be assessed using phonological processes? See pages 208-210.
8. What are idiosyncratic processes? See Table 7.3 and 7.4 (pages 208-209) and page 215.
9. Why is it difficult to measure intelligibility? See pages 219 and 220.
10. What are severity measures trying to quantify? See pages 221 and 222.

## ESSAY QUESTIONS

1. Give examples of the procedures you would follow to determine a child's inventory, distribution, and stimulability of phones within the child's system. See pages 200-203.
2. Why is it difficult to determine with certainty that a child has either an



articulation-based or a phonemic based disorder? See pages 212 and 213.

3. Discuss the advantages and disadvantages of phonological process analyses. See pages 208-210.
  4. Discuss which factors may have an impact on the perceived intelligibility of an utterance. See pages 219 and 220.
  5. Discuss how measures of intelligibility and severity can be useful in the assessment and treatment process. Include how these results could be used to prioritize for therapy and document therapy progress. See pages 219-222.
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# Chapter 8

## Dialects and English as a Second Language

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### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

3. The following are possible differences in productions of words when African American English is considered. Answers are only related to consonant productions. Note: Several of these features appear both in Table 8.3 and 8.4. Only one table has been given. Æ

basket	[bæsktʔ]	Table 8.4, page 240, #22 – Coarticulated glottal stop with devoiced final stop
glasses		The same pronunciation
spoon	[spũ]	Table 8.4, page 240, #19 - Deletion of word-final consonants with nasalization of preceding vowel
zip	[dɪp] or [dɪpʔ]	Table 8.4, pages 239-240, #7 and 22, - Syllable-initial fricatives replaced by stops, especially voiced stops, coarticulated glottal stop with devoiced final stop
boats	[bout]	Table 8.4, page 239, #1 – final consonant cluster reduction
cowboy hat	[kaʊ bɔɪ hætʔ]	Table 8.4, page 240, #22 – Coarticulated glottal stop with devoiced final stop
green	[gɹĩ]	Table 8.4, page 240, #19 - deletion of word-final consonants with nasalization of preceding vowel
feather	[fɛvəː] or [fɛvə]	Table 8.3, page 237, - Substitution of [f/θ] and [v/ð] in the intervocalic word-position Table 8.3, page 236, Loss of r-coloring of unstressed central vowel [ə]
fork	[foæk] or [foækʔ]	Table 8.4, page 239, #11 – Loss of r-coloring of centering diphthongs with [ə], page 240, #22, coarticulated glottal stop with devoiced final stop

mask	[mæks]	Table 8.3, page 237 – Metathesis of final [s] + stop
star	[stɑə]	Table 8.4, page 239, #11– Loss of r-coloring of centering diphthongs with [ə]
toothbrush	[tuʃbrʊʃ]	Table 8.3, page 237 - Substitution of [f/θ] and [v/ð] (labialization) in the intervocalic word-position
three	[θi]	Table 8.4, page 239, #5 – Loss of “r” after consonants, after [θ] and in unstressed syllables
mouth	[maʊf]	Table 8.4, page 239, #6 – Labialization of interdental fricatives
screwdriver	[skruːdɪvə]	Table 8.4, page 239, #12 - Loss of r-coloring of unstressed central vowel [ə]
truck	[tɹʌkʔ]	Table 8.4, page 240, #22 – Coarticulated glottal stop
thumb	[tʌm] or	Table 8.3, page 237 – Substitution of [t/θ] and [[t̃] consonants with nasalization of preceding vowel
music box	[muzək bɒk]	Table 8.4, page 240, #23 – loss of [j] (palatalization) after specific consonants – page 239, #1, final consonant cluster reduction (possibly [ks] becomes [k])
watch		Should be the same
rock	[ɹɒk]	Table 8.4, page 240, #22 – Coarticulated glottal stop with devoiced final stop
shoe		Should be the same
string	[stɹɪŋ] [skɹɪŋ]	Table 8.3, page 237 - Deletion of word-final consonants with nasalization of preceding vowel, page 240, #24 substitution of [k] for [t] in [str] clusters
crayons	[kɹeɪɒn]	Table 8.4, page 239, #1 – final consonant cluster reduction
hanger	[hæŋə]	Table 8.3, page 237 - Neutralization of r-coloring of unstressed central vowel after a consonant

4. What might be the difficulties on the HAPP-3 word list if the child's L1 was Spanish? Compare the Spanish phonological inventory in Table 7.5 and the Clinical Application –

phonological changes – Hispanic Spanish on pages 208 and 209.

1. basket: The vowels might be distorted [æ] and [ə] sounding probably more like [a]. The [sk] combination should sound correct, the final [t] will probably be dentalized but recognizable as a [t].
2. glasses: The vowels will have similar distortions as noted in #1. The final [z] will be produced as an [s] but that is a common pronunciation in American English.
3. spoon: The vowel [u] exists in Spanish as do the consonants [s] and [p]. The final [n] might be dentalized but probably will not be noticeable as a variation in pronunciation.
4. zip: The vowel [ɪ] will probably sound more like [i]. The [z] does not exist in Spanish so the word might sound more like [sɪp].
5. boats: The vowel may not be diphthongized but that is a non-phonemic variation. The consonants exist in Spanish so the word should be the same. Penfield and Ornstein-Galacia (1985) and Perez (1994) note reduction of consonant clusters in word-final position, thus “boat” for “boats” could be a possibility.
6. cowboy hat: The diphthongs do not exist in Spanish, the [o] and [a] vowels will probably be used as substitutions. Although [h] does not exist in Spanish, an intrusive [h] can be noted between vowels.
7. green: Although the r-sound is a trilled sound in Spanish and may sound somewhat different, the other sounds do exist in Spanish. The pronunciation should be approximately the same.
8. feather: The [ɛ] will probably be produced as [e] and the trilled Spanish “r” may replace the final vowel with r-coloring. Although [f] exists in Spanish, [θ] does not. According to Penfield and Ornstein-Galacia (1985) and Perez (1994), the prominent substitution will be [d] for [θ].
9. fork: The Spanish trilled “r” may replace the central vowel with r-coloring. The word should sound approximately the same.
10. mask: The Spanish vowel [a] will probably be pronounced instead of [æ]. Penfield and Ornstein-Galacia (1985) and Perez (1994) note reduction of consonant clusters in word-final position, thus “mas” for “mask” could be a possibility.
11. star: The trilled Spanish “r” might be used for the centering diphthong.
12. toothbrush: The [ʌ] vowel will probably be pronounced as [a]. According to Penfield and Ornstein-Galacia (1985) and Perez (1994) [t] will probably be used instead of [θ]. The trilled “r” could be used in the consonant cluster [bɹ]. There is variable production of [ʃ], therefore, a [tʃ] could be used.
13. three: A [t] for [θ] variation might be implemented.
14. mouth: There are no diphthongs in Spanish, therefore, [aʊ] might be reduced to [a]. A [t] for [θ] variation might be implemented.
15. screwdriver: The Spanish trilled “r” might be used as a replacement for [ɹ] in the consonant clusters and for the final central vowel with r-coloring. The diphthong [aɪ] might be reduced to [a].
16. truck: The Spanish trilled “r” might be used as a replacement for [ɹ] in the

consonant cluster and the [ʌ] might be replaced by [a].

17. thumb: According to Penfield and Ornstein-Galacia (1985) and Perez (1994) [t] will probably be a variation for [θ] and the [ʌ] might be replaced by [a].
18. music box: Although [m] and [j] exist in Spanish, the [m<sup>j</sup>] palatalization might pose a problem. The medial [z] in “music” might be realized as [s] and the final [ks] cluster could be reduced to [k].
19. watch: According to Penfield and Ornstein-Galacia (1985) and Perez (1994) there is variable production of [ʃ] and [tʃ]. Therefore “watch” might be pronounced as [wɑʃ].
20. rock: The Spanish trilled “r” might replace [ɹ].
21. shoe: According to Penfield and Ornstein-Galacia (1985) and Perez (1994) there is variable production of [ʃ] and [tʃ]. Therefore “shoe” might be pronounced as [tʃu I].
22. string: The vowel [ɪ] might be replaced by [i]. The [ŋ] is palatalized in Spanish so it might sound somewhat differently.
23. crayons: The Spanish trilled “r” might be used in the initial consonant cluster. The diphthong [eɪ] might be reduced to [e]. The final consonant cluster [nz] might be reduced to [n], however, if pronounced the final [z] might be realized as a voiceless [s].
24. hanger: According to Penfield and Ornstein-Galacia (1985) and Perez (1994) the [h] is often velarized to [x]. The trilled Spanish “r” might be used instead of the central vowel with r-coloring which is at the end of “hanger”. The [æ] vowel may be pronounced [a].

## MULTIPLE CHOICE QUESTIONS

- |       |       |       |       |       |
|-------|-------|-------|-------|-------|
| 1) d  | 2) b  | 3) a  | 4) c  | 5) b  |
| 6) d  | 7) d  | 8) b  | 9) c  | 10) d |
| 11) c | 12) d | 13) a | 14) d | 15) c |

## TRUE/FALSE QUESTIONS

- |          |          |          |          |          |
|----------|----------|----------|----------|----------|
| 1) FALSE | 2) FALSE | 3) TRUE  | 4) TRUE  | 5) TRUE  |
| 6) FALSE | 7) FALSE | 8) FALSE | 9) FALSE | 10) TRUE |

## SHORT ANSWER QUESTIONS

1. Discuss the difference between Formal Standard English and Informal Standard English. See pages 231-232.
2. How are regional dialects defined? See pages 232 and 233.
3. What are the four regional dialects that were noted in the United States? See pages 233-234.

4. List one distinction which exists when comparing the regional dialects. See page 233 for three variations.
5. Summarize what is meant by limited English proficiency. See page 245.
6. What are the differences between culture and ethnicity? See pages 237-238.
7. Why is it important to compare the phonological inventory of L1 to American English if the child's native language is one other than English? See page 243-244.
8. What does it mean when it is stated that in some languages aspiration (such as [p] and [p<sup>h</sup>]) has phonemic value? See page 257, for example the explanation under Consonant Differences: Cantonese and GAE.
9. Besides phonological variations, what other language differences are noted in African American Vernacular English? Give one example. See pages 240-241.
10. Give two characteristics of Appalachian and Ozark English. See Table 8.1 on pages 235-236.

### ESSAY QUESTIONS

1. Discuss the degree of use of African American Vernacular English according to age, gender, and socioeconomic status. Refer to page 238.
  2. Discuss how you would determine if a child's irregular pronunciation is a result of L1 – L2 transfer or if the child does indeed have a phonological disorder. Refer to pages 265 and 266.
  3. Define Formal Standard English versus Informal Standard English. In which situations might you use each? Refer to page 231-232.
  4. What are tone languages? If a child's native language is a tone language, hypothesize the type of difficulties the child might encounter in American English. Refer to pages 252 and 254.
  5. Discuss why it is important that we understand dialect features as speech/language therapists. Refer to pages 241-242.
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# Chapter 9

## Therapy for Articulation Errors

### Obtaining an Accurate Production of a Speech Sound

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#### ADDITIONAL LEARNING MATERIALS

#### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

1. A child has a [t] for [k] substitution ( $[k] \rightarrow [t]$ ). Choose one of the phonetic placement techniques and one of the sound modification techniques and describe what you would do to achieve a [k] sound.

The phonetic placement techniques are outlined in Table 9.9 (page 304) while the sound modification techniques are on pages 303 and 305. Have the students pick one of each and describe how [k] could be achieved with a fairly young child.

2. A child 5;0 years old, has f-problems, [f] and [v] are produced as [p] and [b] substitutions ( $[f] \rightarrow [p]$ ,  $[v] \rightarrow [b]$ ). Explain what the child should do with his/her articulators for a specific phonetic placement and sound modification method. How should the clinician describe the whole procedure in a manner that a child can understand and follow?

The phonetic placement techniques are described on page 323 while the sound modification method is on page 324. There is really only one that applies to the p/f substitution. Have the students describe how they would demonstrate with a child how to achieve the [f] and [v] sounds.

3. Discuss the differences between light and dark [l] productions. Discuss why these two types of [l] sounds may affect the word material used in therapy. Develop word lists for the light [l] versus dark [l] productions that would be acceptable for a six year old child who is in therapy for an l-problem.

The differences between light and dark [l]-sounds are described on pages 306-307. Also the contexts in which both [l]-sounds occur are noted on page 307. Using these

contexts have the students come up with an additional word list (do not just use the one page 311) which would have 10 words, for example, that would be age-appropriate for the light [l] and 10 for the dark [ɫ]-sound.

4. A child is in therapy for lateral [s] difficulties and has progressed to the word stage. The clinician would like to introduce some consonant clusters with [s]. Develop word lists with [s] clusters in the prevocalic position which are ordered from productionally easy to more difficult. Consider what impact clusters with [l] might have given the previous lateral [s] difficulties of the child.

The following word-initial consonant clusters with [s] (Table 9.2, page 287) could be considered (infrequent clusters such as [sf] and [skw] have not been included and the three-element clusters have also been eliminated): sk, sl, sm, sn, sp, st, sw. Since the child had a lateral s-problem the [sl] cluster should probably wait until later. Consonant clusters with little tongue movement from the initial to the second consonant include [sm] and [sp]. In addition, [sn] and [st] might be easy clusters as the place of articulation is similar for both [s] and [n], [t]. The [sk] might be problematic as the child has to go from a forward tongue placement to a velar one. The [sw] would also be a more difficult consonant cluster due to the lip spreading on [s] versus lip rounding on [w] and the posterior positioning of the back of the tongue. This might be an acceptable ordering from easy to more difficult:

sm, sp, sn, st, sk, sw, sl

## MULTIPLE CHOICE QUESTIONS

- |       |       |       |       |       |
|-------|-------|-------|-------|-------|
| 1) c  | 2) d  | 3) b  | 4) b  | 5) b  |
| 6) c  | 7) a  | 8) d  | 9) a  | 10) c |
| 11) d | 12) b | 13) a | 14) d | 15) d |
| 16) b | 17) c | 18) d | 19) d | 20) b |

## TRUE/FALSE QUESTIONS

- |          |          |          |          |          |
|----------|----------|----------|----------|----------|
| 1) FALSE | 2) TRUE  | 3) FALSE | 4) TRUE  | 5) TRUE  |
| 6) FALSE | 7) FALSE | 8) TRUE  | 9) FALSE | 10) TRUE |

## SHORT ANSWER QUESTIONS

1. Differentiate between a phonetic (or traditional-motor) approach and a multiple-sound approach. See page 271.
2. Differentiate between the sound modification and the phonetic placement method. See pages 275-276.
3. What are facilitating contexts? How can they be used in a therapy situation? See pages 276-277.
4. What is carryover? During which phase of therapy is it important? See page 279..



5. What is meant by the term tongue thrust? What type of misconception does the term tongue thrust promote? See page 289.
6. Which articulatory features cause a strident [s] production? See Figure 9.2 (page 290) and the Clinical Application on pages 291-292.
7. The production characteristics of [s] and [z] are fairly similar to [θ] and [ð]. What are the specific production differences between the sounds? See Figure 9.2 (page 290).
8. Distinguish between the production features of the two types of r-sounds, bunched versus retroflexed. See page 312.

## ESSAY QUESTIONS

1. Discuss how the length of the word, the position of the target sound in the word, the syllable structure, and the syllable stress can have a positive and negative impact on production accuracy. Refer to pages 296-297.
  2. Discuss the advantages and disadvantages of using the apico-alveolar versus the predorsal-alveolar phonetic placement method for achieving a norm [s] production. Refer to page 292.
  3. Discuss the differences between the interdental and the apico-dental (addental) [θ] and [ð.] productions. Refer to pages 320-321.
  4. Discuss the production differences between the affricate [tʃ] and the production of [t] + [ʃ] as two isolated sounds. Refer to page 325.
  5. Discuss which coarticulatory variables should be considered when working with consonant clusters. Refer to pages 330-331.
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# Chapter 10

## Treatment of Phonological Disorders

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### ADDITIONAL LEARNING MATERIALS

### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

1. Based on the results of the articulation test (p. 226) and spontaneous speech sample of Jonah. (pp. 223, also refer to the discussions in the Case Study for Jonah throughout the chapter), discuss which type of treatment (one of the minimal pair contrast therapies, cycles training, core vocabulary, metaphon therapy) might be the best solution for this child. Give reasons for and against the different approaches for this particular child.

Minimal pair contrast therapy: typically for children who have only a few speech sound errors. Jonah has a large number of errors especially for his age.

Multiple oppositions: this could be a possibility for Jonah. He collapses several phonemes to [t] and [d].

Maximal opposition therapy: another good option for Jonah. Any type of restructuring and expanding of his phonological system would be helpful.

Complexity approach: This is an option for Jonah especially in light of the fact that he has relatively no consonant clusters. Targeting a cluster would be a good idea.

Cycles approach: This might be the best option as (based on Jonah's Percentage of Consonants Correct he is below what is considered severe. It could be assumed that he is relatively unintelligible.

Metaphon therapy: This is directed towards preschool children. Jonah is 7;6. This would not be a good option.

Core Vocabulary: Jonah's productions are very consistent (see his Whole Word Variability at the end of Chapter 7).

2. Based on the results of an articulation test and a spontaneous speech sample from a child with a severe phonological disorder, discuss how you would select treatment goals for cycles training. Additional information and case studies can be found in Hodson and Paden (1991).

You could have the students use Andrew on page 388 to select targets for the cycles approach.

3. Many of the children who are being treated for phonological impairments have concurrent language problems. Based on diagnostic results, or an actual clinical case, discuss how treatment in the area of phonology could be combined with therapy targeting other language areas such as morphosyntax or semantics. Give concrete therapeutic suggestions if possible.

Try to see if the students can combine the work on speech sounds with Morphosyntax. Possibly using plural -s or third person singular if the s-sound is being worked on.

4. A clinical application was provided for a 1;8 year old child with an emerging phonological system (Chapter 6, page 184). Discuss how therapy could be structured that would expand the child's entire language system, i.e., how could the phonological inventory and syllable shapes be expanded to promote the developing lexicon of the child?

Ted is age 1 year 8 months and has Down syndrome; he is being followed in the early intervention program. His mother and the speech-language pathologist have recorded these 12 words:

“yes”	[jɛ]	“pig”	[pɪ]
“mom”	[mʌm]	“hug”	[hʌk]
“daddy”	[dædi]	“bike”	[baɪ]
“hello”	[hou]	“duck”	[dʌk]
“grandpa”	[dapa]	“truck”	[tʌk]
“bye”	[bɪ]	“cow”	[daʊ]

Vowel inventory: [i, ɪ, ɛ, æ, a, ou, aɪ, aʊ, ʌ]

Consonant inventory: [m, p, b, t, d, k, j, h]

Syllable shapes: CV, CVC, CVCV

Constraints: [k] seems to be used only in a postvocalic position after the central vowel [ʌ].

Based on Ted's inventory of vowels and consonants, have the students develop additional words that would expand specifically on his nouns and verbs. For example, up, my, toe, come, comb (come and comb would only be successful if Ted can expand his [k] constraint). Also expand on two-syllable words with potty, patty (as in patty cake), teddy, happy.

### MULTIPLE CHOICE QUESTIONS

- 1) c            2) a            3) d            4) d            5) a
- 6) d            7) b            8) b            9) c            10) a
- 11) a           12) b           13) d           14) b           15) c
- 16) a           17) c           18) d           19) b           20) a
- 21) c

### TRUE/FALSE QUESTIONS

- 1) TRUE        2) TRUE        3) TRUE        4) FALSE       5) TRUE
- 6) FALSE       7) TRUE        8) FALSE       9) TRUE        10) FALSE

## SHORT ANSWER QUESTIONS

1. Phonologically-based approaches assume that generalization will occur to other sounds or sound classes. What is meant by generalization in this context? See page 343.
2. Define what is meant by minimal pair contrast therapy. See page 344.
3. Contrast the difference in selecting target sounds for the complexity approach versus minimal opposition contrast therapy. See pages 345-346 for minimal pairs and pages 358-360 for the complexity approach.
4. What is the role of communicative breakdown in minimal opposition contrast therapy? See page 348.
5. List one similarity and one difference between minimal opposition contrast therapy and the maximal oppositions approach. See pages 344 and 353.
6. In the maximal oppositions approach, targets are selected which consider the number and type of distinctive features. In this context, what is meant by number and type of distinctive features? See pages 354-355.
7. Why are several different sounds or patterns targeted simultaneously in cycles training? See pages 364-366.
8. How does metaphon therapy specifically increase the child's metaphonological awareness? Give concrete examples. See page 373-374.
9. Why must therapy for the child with an emerging phonological system be a unified package, i.e., why must all aspects of language be considered? See page 381.
10. What is meant by an inconsistent speech disorder? How is this "inconsistency" assessed? See pages 369-370.

## ESSAY QUESTIONS

1. Discuss which principles underlie phonologically-based treatment? Which elements are at the core of this therapy framework? Refer to pages 343-344.
2. Distinctive feature analysis is often considered out of date. Why is it important to understand distinctive features, i.e., which therapy approaches use distinctive features as the basis for target selection? How do they use distinctive features? Refer to pages 354-355.
3. What is meant by targeting complexity in the complexity approach? In which way are the sounds selected "complex"? Refer to pages 357-360.
4. Metaphon therapy is based on metalinguistic awareness. Discuss the suggested problems that children with phonological disorders have in the area of metalinguistic awareness. Refer to pages 373-374.
5. Discuss why it is possible that a phonological impairment could directly affect morphosyntactic and semantic development. Give examples to support your answer. Refer to pages 378-379.

# Chapter 11

## Speech Sound Disorders in Selected Populations

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### ADDITIONAL LEARNING MATERIALS

#### DISCUSSION TOPICS AND CLINICAL APPLICATIONS

Number 1: Observe a child in the clinic (or a video recording of a child, there are several good youtube videos) who has been diagnosed with childhood apraxia of speech. Compare the child's articulatory/phonological characteristics to those noted in the text. What similarities and differences exist? Discuss specific treatment possibilities for the child with developmental apraxia of speech.

On page 398 there is a link for Jewel, Video Example 11.1, who has been diagnosed with childhood apraxia of speech. Compare her speech characteristics to those noted in the text on pages 396 and 397.

Number 5: Observe an adult in the clinic (or a video recording of an adult, or one on youtube) who has been diagnosed with adult apraxia of speech. Compare the client's articulatory/phonological characteristics to those noted in the text. What similarities and differences exist? Discuss specific treatment possibilities for the client with apraxia of speech.

On page 429 is a video link, video example 11.4, of an adult with acquired apraxia of speech. It is a lengthy video and can be analyzed for several different features.

#### MULTIPLE CHOICE QUESTIONS

- |       |       |       |       |       |
|-------|-------|-------|-------|-------|
| 1) b  | 2) d  | 3) c  | 4) d  | 5) a  |
| 6) c  | 7) c  | 8) b  | 9) a  | 10) b |
| 11) a | 12) d | 13) d | 14) a | 15) c |
| 16) c | 17) a | 18) b | 19) b | 20) c |

## TRUE/FALSE QUESTIONS

- 1) TRUE      2) FALSE      3) TRUE      4) TRUE      5) FALSE  
6) FALSE      7) TRUE      8) TRUE      9) TRUE      10) FALSE

## SHORT ANSWER QUESTIONS

1. Why is the diagnosis of childhood apraxia of speech difficult to make? See pages 394-395.
2. Define the term cerebral palsy. See page 403.
3. List the three types of cerebral palsy. See page 404 and also Table 11.2 on page 405.
4. Explain in general terms how respiratory, phonatory, and resonatory difficulties noted in children with cerebral palsy could impact the speech outcome. See page 406.
5. Explain why cleft palate children have a tendency to articulatory backing. See page 411.
6. What is an oronasal fistula? Explain how the location of the fistula has an impact on the production of specific consonants. See pages 412 and 413.
7. When assessing a child who is intellectually disabled, why is assessment of the environment important for establishing later intervention goals? See page 420.
8. Explain why the articulatory/phonological characteristics noted for the hearing impaired population may not reflect the individual child's characteristics. See page 423-424.
9. Distinguish between apraxia of speech and oral (nonverbal) apraxia. See page 428.
10. Why is it important that speech-language pathologists assess the dysarthric individual even if a medical diagnosis has already been given? See pages 434-435.

## ESSAY QUESTIONS

1. Discuss why the term childhood apraxia of speech is used as a diagnostic label for specific children, i.e., what do childhood apraxia of speech and apraxia of speech in adults have in common? Why is this possibly not a good label for these children? Refer to the characteristics on page 396 and those on pages 428-429.
2. Why must the treatment of a young child with cleft palate be a team approach? Which professionals are a portion of this team and why? Refer to pages 410-411.
3. What are the differences between general treatment guidelines for articulatory disorders for the intellectually disabled versus nondisabled children? Refer to

pages 420-421.

4. Outline briefly the general guidelines when structuring articulation therapy for an individual with acquired apraxia of speech. Refer to pages 431-432.
  5. Explain why treating the subsystems of speech (respiration, phonation, resonance) are important within the intervention process for individuals with dysarthria. Refer to pages 436-438.
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