

logy in Children This chapter focuses on the management of articulation and phonological disorders demonstrated by children. Each phoneme in a language consists of a bundle of binary features in which the presence or absence of these features is specified (e.g., +voicing/"voicing, +nasal/"nasal, +continuancy/"continuancy; Jakobson, 1968). Some phonemes, such as /t/ and /d/, differ by only one feature contrast -- in this case, voicing. Other phonemes, such as /s/ and /g/, differ by many feature contrasts, including voicing, continuancy, placement, and stridency. Table 3–1 presents a complete list of the 11 distinctive features originally identified by Chomsky and Halle (1968). For the purposes of clinical application, however, sounds are usually analyzed according to three basic feature categories: place, manner, and voicing. This breakdown is illustrated in Table 3–2.

Table 3–1 Distinctive Feature Analysis Chart

Consonants	Features
k g t d p b f v ? ? ! s z ? ? ? t? t? d? d? m n n n l r h w j j ? ?	Vocalic
+	Consonantal
+	High
+	Back
+	Low
+	Anterior
+	Coronal
+	Voiced
+	Continuant
+	Nasal
+	Strident

Note. This "deep" approach to intervention tends to be most appropriate for clients with relatively few articulatory/phonological errors. Chapter 3 Intervention for Articulation and Phonology in Children 81 In contrast to training deeply, a horizontal strategy attacks goals broadly. It assumes that simultaneous exposure to a wide variety of targets will facilitate a client's ability to produce phonemes or sound patterns. The clinician provides less intense practice on a larger number of targets, even within the same session. This strategy focuses on efficient generalization of target behaviors across the speech sound system and tends to be most appropriate for clients with multiple errors. Clinicians may choose to combine aspects of the vertical and horizontal strategies into the cycles approach. Recall that instead of attacking therapy targets deeply or broadly, this strategy provides a client with practice on a given target for a predetermined amount of time, and then moves on to another target (Hodson & Paden, 1991; Sugden et al., 2018). This approach gives the client an opportunity to internalize the original sound or pattern while the clinician introduces the new target. Focus on the original target resumes later in the therapy program. This cycle is repeated until the target(s) emerges in spontaneous speech.

Example Profiles for Functional Articulation Disorders

This section presents three commonly seen profiles of childhood articulation problems. These examples have been designed to illustrate the selection of intervention targets as well as specific therapy activities and materials. Most of the chosen activities are easily implemented in either individual or group therapy settings. For many children, it may be necessary to teach the phonetic placement of target sounds prior to the introduction of actual activities. Appendix 3–A on the companion website provides specific instructions for establishing the correct placement for consonants that are typically considered difficult to elicit. The first profile describes a young child with multiple errors.

PROFILE 1: FUNCTIONAL ARTICULATION--3-YEAR-OLD

-/s Blends b/bl, f/fl, w/kl, t/sl, t/skw, fw/kr, b/br, d/dr, w/pr

Selection of Therapy Targets Using a Developmental Approach. Based on this child's chronological age, the errors to be targeted first are d/g, b/m, p/f, j/n, -/n, because these are the earliest emerging sounds, as can be seen in Table 3–4. The second set of target sounds Jill is 3 years old and demonstrates the following

articulation errors (error sound/intended target): Initial Medial Final d/g d/g ?/t? j/l w/r -/s b/v f/? -/k -/s j/l -/d p/f ?/t s/f b/m j/n -/n 82 Providing Treatment for Communication Disorders Part Two consists of -/k, -/d, and ?/t. The remaining errors would not be considered appropriate targets for intervention, because they emerge well beyond 3 years of age. Selection of Therapy Targets Using a Nondevelopmental Approach. The errors to be targeted are /?/, /v/, /m/, /f/, /g/, and /s/. The /?/ and /v/ sounds were chosen despite developmental considerations, because Jill was highly stimulable for these sounds in isolation during the diagnostic session. The /m/ and /f/ sounds were selected because they are visible when produced, which facilitates learning of correct articulatory placement. The /f/ and /g/ sounds were included as beginning targets, because their status as initial-position errors make them significant contributors to Jill's overall unintelligibility. Sample Activities 1. Modify a board game, such as Hasbro's Candy Land by requiring a child to produce a target sound in isolation, following the clinician's model, in order to move a game piece. Close approximations, rather than accurate productions, of the target phoneme may be acceptable in the very early stages of therapy. Once the child improves her performance by 30% to 50% over baseline measures, clinician models should be faded. Three consecutive spontaneous productions can then be required for the child to take a turn in the game. 2. Create a game with colored paper fish. Each fish has a picture on it designed to elicit a target sound in the desired position. Attach paper clips to the back of each fish, and give the child a "fishing pole" with a magnet on the end of its string. (See Appendix B on the companion website for International Phonetic Alphabet symbols.) It is imperative that clinicians take a child's cultural and linguistic background into account in determining whether the production of a given speech sound represents an error or a dialectal difference. Selected examples of classic and more recent remediation approaches are described in the following sections. - Absence of feature. + Presence of feature. Vocalic: Oral cavity constriction is less than required for the high vowels /i/ and /u/. Consonantal: Marked constriction in the midline region of the vocal tract. High: Body of the tongue is raised above the neutral or resting position. Back: Body of the tongue is retracted from the neutral or resting position. Low: Body of the tongue is lowered below the neutral or resting position. Anterior: Point of constriction is farther forward than required for /?/. Coronal: Tongue blade is elevated toward alveolar ridge/palate from the neutral position. Voiced: Vocal folds vibrate during sound production. Continuant: Partial constriction of oral cavity; sound can be sustained in a steady state. Nasal: Velum is lowered to allow sound stream to escape through the nose. Strident: Turbulent noise is created by rapid airflow released through a small opening. Chapter 3 Intervention for Articulation and Phonology in Children 74 Providing Treatment for Communication Disorders Part Two Table 3-2 Place, Manner, and Voicing Chart for English Consonants Manner Place Voiced Voiceless Stop Bilabial b p Alveolar d t Velar g k Glottal -- ? Fricative Labiodental v f Linguadental # ? Alveolar z s Palatal ? ? Glottal -- h Affricate Palatal d? t? After establishing the feature contrast in auditory discrimination activities, the clinician moves therapy through the traditional speech production hierarchy from isolation/syllables through conversation. No explicit instruction on articulatory placement or sound production is given. Instead, this approach emphasizes the use of the child's communication success or breakdown to teach target sound productions. Children who persist in using these processes beyond the age of 4 years are frequently referred for speech-language services because their speech is

now perceived as difficult to understand. Some children exhibit phonological processes that are not typical of normally developing children. le/ bottle, chi? en/chicken, mi? ey/ mickey). For this reason, clinicians often adopt a "what works" approach (Stanovich, 2000) to intervention that utilizes the best features of multiple approaches. For more information on SLPs' use of evidence-based practices, see Baker and McLeod (2011) and Hoffman et al. (2013). Target Selection for Intervention Programming Two primary approaches are used for choosing initial therapy targets for children with articulation/ phonological disorders: developmental and nondevelopmental. Developmental In this approach, therapy targets are identified based on the order of acquisition in normally developing children. Table 3-4 provides a list of English consonants in the order of their emergence. Table 3-3, earlier in the chapter, outlines the most common phonological processes exhibited by young children. Chapter 3 Table 3-4 Age of Acquisition of English Consonants Intervention for Articulation and Phonology in Children 79

Consonant	Age of Acquisition (Years)
n	3
m	3
h	3
k	3
g	3
f	3
v	3
t	3
d	3
s	3
z	3
ʃ	3
ʒ	3
l	3
r	3
ʍ	3
ŋ	3
θ	3
ð	3
ʔ	3
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sounds. The typical sequence for training in the traditional approach involves (a) speech sound discrimination training, including identification, isolation, and bombardment of specific target sounds; (b) achieving phonetic placement of the articulators for the sound; (c) producing the sound in isolation; (d) producing the sound in nonsense syllables; (e) producing the sound in the initial, medial, and final positions of words; (f) producing the sound in phrases and sentences; and (g) producing the sound in conversational speech. It incorporates several teaching strategies, such as imitation, multisensory cues for phonetic placement and production, and successive approximation. For more detailed information on this approach, see Bauman-Waengler (2016) and Rvachew et al. (2004).

Motor Kinesthetic (Stinchfield-Hawk & Young, 1938) This phonetic approach emphasizes development of correct movement patterns and requires the clinician to manipulate the articulators to facilitate sound production. This method is based on the assumption that it is possible to establish positive kinesthetic and tactile feedback patterns through direct manipulation of the client's articulators. As a result of the feedback, the client is helped to recognize and then to produce the movements of speech. In this approach, the basic unit of therapy is the isolated sound; only later are words and sentence patterns introduced and established. A more recent iteration of the motor-kinesthetic philosophy concept is PROMPT, which stands for Prompts for Restructuring Oral Muscular Phonetic Targets (Chumpelik, 1984). Originally developed for children with severe speech motor production difficulties, PROMPT is a multidimensional approach that incorporates three main domains: motor-sensory, cognitive-linguistic, and social-emotional. Speech production is facilitated through the use of tactile cues that focus on jaw height, labial/facial positioning, and mylohyoid posture for each sound/word (Grigos et al., 2010; Hayden et al., 2010). The program is highly structured, and therapists must be trained/certified through the PROMPT Institute (<https://www.promptinstitute.com>) in order to utilize this therapy approach. In summary, the motor-kinesthetic method also advocates for the use of tactile, kinesthetic, and proprioceptive cues to facilitate "motor maps" for production of individual speech sounds.

Tell the child that she is going to pretend to be a detective who has to find the "magic square" in the dark. Hand the child a penlight, turn out the lights, and instruct her to aim the beam at the square that she thinks is the magic one. As each square is lit up, ask the child to produce the target item at the appropriate level of complexity.

4. Assemble the following materials to make two puppets: two glue sticks, two brown paper bags, yarn, two sets of paper cutouts of facial features, and other accessories such as earrings, mustaches, and eyeglasses. Collect 25 pictures containing the targeted therapy sounds and place them in a pile on the table. Explain that the clinician and child will construct puppets using the paper bags and other materials. The clinician selects one picture from the pile, models the correct production of the word, and then glues one feature/accessory to one of the bags. Instruct the child to select the next picture from the pile, produce the word correctly three times, and glue a feature/accessory on the other bag. Alternate turns until both puppets are completed.

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The second profile describes a school-age child with multiple articulation errors. Initial Medial Final j/l j/l j/l s/? s/? ?/t? ?/t? ?/t? -/d ?/f ?/f s/f b/v b/v w/r w/r

PROFILE 2: FUNCTIONAL ARTICULATION--6-YEAR-OLD Joe is 6 years old and demonstrates the following errors: Blends: s/sl, b/bl, k/kl, fw/fl, fw/fr, tw/tr, k/skw, fw/kr, t/st

Selection of Therapy Targets Using a Developmental Approach. Based on this child's chronological age, the errors to

be targeted first are -/d, ?/f, b/v, and j/l, because these are the earliest emerging sounds as shown in Table 3–4. The second set of targets consists of the remaining sound and blend errors, because all of these are typically acquired by 6 years of age. Selection of Therapy Targets Using a Nondevelopmental Approach. The errors to be targeted are /r/, /fr/, /fl/, and /?/. The /r/ was chosen because it is one of the most frequently occurring sounds in English (Table 3–5). The /fr/ and /fl/ blends were selected because these are the only phonetic contexts in which Joe can correctly produce his otherwise misarticulated /f/ sound. The blends can provide a starting point for facilitating the correct production of /f/ as a singleton. Finally, the /?/ was chosen because its articulatory placement is highly visible and is therefore relatively easy to approximate.

Sample Activities

1. Draw 10 pictures on a dry-erase board, each containing one instance of a target sound. Give the child a beanbag and tell him to hit one of the pictures. Instruct the child to produce the stimulus item at the appropriate level of complexity (e.g., single word, carrier phrase, sentence, narrative).
2. For a group activity, gather at least 20 pictures/objects that contain the target sound(s) and place them around the room. Give each child a "suitcase" (box) and tell them that the group is going on a trip.

Process Definition Examples

Suppressed by 3 years

Assimilation (harmony) A sound becomes similar to or is influenced by another sound in the same word
 guck/duck toat/coat
 doddie/doggie

Final consonant deletion Omission of the last sound in word
 be/bed f i/fish so/soap

Syllable deletion Omission of weak or unstressed syllable(s)
 nana/banana agator/alligator zert/dessert

Suppressed after 3 years

Cluster reduction Omission of at least one consonant from a cluster
 top/stop
 mall/small net/nest

Epenthesis Addition of sounds in a word
 bulack/black sthoap/soap pulay/play

Fronting Substitutions are produced anterior to their usual place of production
 tome/come cats/catch
 dum/gum

Metathesis The order of sound segments is reversed
 aminal/animal flutterby/butterfly
 bakset/basket

Stopping Fricatives/affricates are replaced by stops
 tun/sun dat/that dump/jump

Voicing/devoicing Voiced consonants replace voiceless sounds in the initial position; in the final position
 voiced consonants become voiceless
 gup/cup doe/toe bet/bed

Chapter 3 Intervention for Articulation and Phonology in Children

77 Metaphon (Howell & Dean, 1994) This approach is more accurately labeled a "philosophy" rather than a program; it is designed to provide children with explicit information that will enable them to consciously reflect on the phonemic structure of language. Heavy emphasis is placed on the child's awareness/understanding of the detailed aspects of speech sounds (separately from word meaning) to facilitate accurate sound production. It utilizes a "word-pair" technique to highlight the salient differences between individual sounds in similar words ("deep/keep").

Cycles Approach (Hodson & Paden, 1983) One of the better known phonological process intervention programs is the "cycles" approach, which is intended for children with highly unintelligible speech. The clinician identifies phonological patterns that are targeted for a designated amount of time (i.e., cycles lasting 5–16 weeks). A typical session sequence includes (a) auditory bombardment, (b) production training, (c) stimulability probes, and (d) take-home activities for generalization. After approximately 2 to 6 hr of direct intervention, the child is given time to internalize the pattern while the clinician introduces new targets. Thus, the child's progression through the program is not based on achieving a criterion level of mastery. Focus on the original target resumes later in the therapy program. Each cycle is repeated until the target pattern emerges in spontaneous speech. For more detailed information, see Rvachew et al. (1999),

Stoel-Gammon et al. (2002), Hassink and Wendt (2010), and Hodson (2010). Core Vocabulary (Dodd et al., 2010) This approach focuses on functional outcomes in which consistency, as opposed to accuracy, is targeted. The speech-language pathologist (SLP) selects 50 to 70 "functionally powerful" words and targets up to 10 at once. Most proponents of this approach subscribe to one or more of the following basic rationales: (a) speech is founded on earlier developing nonspeech motor patterns, such as sucking and chewing (Marshall, 1985; Ruark & Moore, 1997); (b) reduced muscle tone in the oral-facial area results in limited strength of speech articulators (Robin et al., 1991); (c) normal movement and sensation significantly influence motor learning, a Piagetian construct (Piaget, 1951; Thelen & Smith, 1994); and (d) speech is a highly complex behavior that is more easily learned when broken into smaller components (Magill, 1998). For example, young children frequently omit weakly stressed syllables in multisyllabic words (e.g., ephant/elephant, jama/pajamas), reduce consonant clusters (e.g., bue/blue, dek/desk), assimilate consonants in words (e.g., goggie/doggie, chichen/chicken), and delete final consonants (e.g., ba/ball, hou/house). Glide Bilabial w -- Palatal j -- Liquid Alveolar l -- Palatal r -- Nasal Bilabial m -- Alveolar n -- Velar n -- The clinician selects a feature for training (e.g., continuancy) and presents syllable or word pairs that contrast presence with absence of the feature (e.g., /fo/ versus /po/). In 2003, Weston and Bain conducted a meta-analysis of 41 peer-reviewed articulation and phonology studies. 3.0.9 97.4 4.3...