NINTH EDITION

Speech Sound Disorders in Children

Articulation & Phonological Disorders

John E. Bernthal
Nicholas W. Bankson
Peter Flipsen Jr.

Speech Sound Disorders in Children
Articulation & Phonological Disorders
Ninth Edition

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The individuals described in the clinical vignettes, case studies, and examples in this book are composites or real people whose situations are masked and are based on the authors' experiences. In all instances, names and identifying details have been changed to protect confidentiality.

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1

Introduction to the Study of Speech Sound Disorders

JOHN E. BERNTHAL, NICHOLAS W. BANKSON, AND PETER FLIPSEN JR.

LEARNING OBJECTIVES

This chapter introduces the reader to a major subdiscipline of the field of speech-language pathology—speech sound disorders. By the end of this chapter, the reader should be able to:

- Describe how the practice of working with individuals with speech sound disorders has evolved over time.
- Understand the basic distinction between articulation and phonological disorders, and some of the limitations of that distinction.
- Understand how common speech sound disorders are and how they arise.
- Discuss the importance of working with individuals with speech sound disorders.
- List the three main elements of evidence-based practice.

Welcome to the world of clinical intervention for individuals with speech sound disorders! You are about to learn about one of the most frequently occurring communication disorders that speech-language pathologists (SLPs) encounter. We use the term *clinical* to indicate that this book is focused on how you, as a clinician, will assess and treat disorders related to speech sound production. This is in contrast to studying production of speech sounds from the standpoint of phonetics, linguistics, or acoustics—any one of which is often a course of study in and of itself. Although knowledge from each of these areas is important background information in the study of speech sound disorders, the distinguishing characteristic of this text is that it is focused on individuals, primarily children, who have difficulty learning to produce and appropriately use the speech sounds of the language.

AN EVOLVING AREA OF PRACTICE

Concerns about speech sound production are certainly not a new area of study. An early work by Samuel Potter called *Speech and Its Defects*, for example, appeared in 1882. According to Moore and Kester (1953), formal studies of what was then called speech correction began to proliferate in the first decade of the 20th century. Organized efforts to address these problems in the public schools appear to have begun in the United States as early as 1910 in Chicago, Illinois, and 1916 in New York City. At about this same time, studies of the prevalence of speech problems in schoolchildren

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began to appear, with formal reports appearing from places such as St. Louis, Missouri (Wallin, 1916), and Madison, Wisconsin (Blanton, 1916). Growing concern for speech sound difficulties and the need for study of speech sound disorders and other communication disorders resulted in the 1925 formation of the American Academy of Speech Correction, which was the predecessor to our current professional body, the American Speech-Language-Hearing Association (ASHA) (Moore & Kester, 1953).

Moving forward in time, documenting the overall prevalence of communication disorders, beyond just speech sound disorders, continued to be of interest (e.g., Burdin, 1940; Carhart, 1939; Louttit & Halls, 1936; Mills & Streit, 1942; Morley, 1952). In addition, practitioners soon began to have a strong interest in understanding the underlying nature of these problems. This need to better understand speech sound disorders likely motivated the establishment and subsequent publication in 1936 of the *Journal of Speech Disorders*. The desire to have a scientific basis for this work in speech and communication disorders also likely led to the publication of the first edition of the classic text *Speech Correction: Principles and Methods* (Van Riper, 1939). Numerous journals and texts would follow as the breadth of the research related to these disorders expanded. The text that you are currently reading follows in that tradition.

As our knowledge base grew, so too did our focus on remediation of speech sounds. As an aside, until the 1960s, the area of language disorders in children was barely recognized as something within the province of the SLP. In fact, there were many discussions as to whether the profession should be engaged in studying and working with language disorders in children. However, interest in adult language disorders had already emerged. Brain injuries sustained by soldiers in World War II had resulted in an increasing prevalence of adult aphasia and motor speech disorders. For many years, however, SLPs were mostly concerned with speech sound production errors in school-age children and adults.

As time went by, the desire for better treatment outcomes led to many developments, including a focus on younger children. The idea was to work with children at younger ages to avoid the development of strongly ingrained incorrect speech production habits. This focus was also driven by the passage of several pieces of federal legislation (e.g., Education of all Handicapped Children Act in 1975, Education of the Handicapped Amendments in 1986), which mandated the services first to preschoolers (those aged 3 to 5 years) and then to infants and toddlers (birth to 3 years of age). No longer was it sufficient for SLPs to focus on individual sounds such as incorrect productions of /s/ or /r/. SLPs now had to look more carefully at children who produced errors on many sounds and thus were often very difficult to understand, not to mention the possibility of having accompanying language impairments. As part of the interest in child language disorders, the field then started to look more closely at the relationship between spoken and written language, as we saw that children with speech sound disorders may be at increased risk for reading difficulties and other significant challenges with classroom learning. Practitioners also began to publish reports and talked about children with coexisting (or comorbid) difficulties with other aspects of communication. For example, children might have a speech sound disorder and a voice disorder, a speech sound disorder and an expressive language disorder, or a speech sound disorder and a fluency (stuttering) disorder.

The field of speech-language pathology also had to deal with a changing perspective on what constitutes "normal" speech. Publications like sociolinguist William Labov's 1969 paper entitled "The Logic of Non-standard English" forced SLPs to think very differently about notions of difference and disorder. If dialects are rule-governed

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variations of a language that are accepted as normal by a community of speakers, who are we to label them as speech disorders that need to be fixed? On the other hand, each dialect community likely includes similar percentages of individuals who struggle to learn to communicate effectively. Sorting out whether a particular speaker is demonstrating the normal features of a dialect other than our own or has a disorder that must be attended to is often a challenge.

Dialects evolve within cultural contexts. Related to discussions of such contexts are considerations of second-language learners. As immigration patterns and population demographics continue to change, SLPs increasingly find themselves working with non-native speakers of the language. Although we are not usually qualified as English as a second language teachers, we may have a role to play in such cases. As with speakers of unfamiliar dialects, it would be reasonable to expect that some small percentage of second-language learners may also have speech or language-learning challenges, and we may be asked to help determine whether there is a disorder present. In addition, some of the clinical skills we have for working with speech sound disorders can be helpful in modifying foreign accents, for individuals who seek such elective services.

A WORKING FRAMEWORK

The term presently recommended by ASHA to identify people who have disorders related to producing the sounds of the language is *speech sound disorders*. Historically, these disorders were referred to as *articulation disorders*—a term still in widespread use. From the time the profession of speech-language pathology came into existence in the 1920s until the 1970s, the prevailing viewpoint relative to speech sound disorders was that they reflected a client's inability to either auditorally perceive or discriminate a particular sound or sounds, and/or to motorically produce these sounds. The role of the SLP was first to teach a client to discriminate a sound auditorally and then teach them to say it correctly by having them practice it until the new (correct) motor behavior became habitual.

When the first edition of this text was published in 1981, *Articulation Disorders* was used as the title of the book because that was still the prevailing term used to identify speech sound disorders. Beginning in the 1970s, as the first edition of this book was being written, and federal mandates began to emerge, the field of linguistics began to influence how our profession viewed speech sound disorders. Linguists, who study how speech sounds are used in various languages, pointed out that speech sound disorders should not be viewed only from a motor production and perception perspective, but also from the perspective that such difficulties may reflect a child's lack of knowledge regarding where to appropriately use sounds that they can produce. Said another way, the child might be having difficulty acquiring the phonological rules of the language. For example, they may have difficulty learning to use sounds contrastively (e.g., /p/ and /f/ are contrasted in *pine* vs. *fine*) or in learning that certain sounds need to be placed at the beginning or ends of words to communicate effectively (e.g., *at* vs. *hat*; *go* vs. *goat*). Disorders related to learning the phonological rules of the language then began to be referred to as *phonological disorders*; thus, the term *phonology* was the second term (in addition to *articulation*) that moved into our vocabulary to identify speech sound disorders.

From the second edition of this book (1988) through the eighth edition, the terms articulation and phonological have been used in the title of the book (i.e., *Articulation*

and Phonological Disorders). Some SLPs have differentiated these two terms for purposes of assessment and treatment of speech sound disorders. *Articulation disorders* refer to production-based (or motor-based) speech sound errors, and *phonological disorders* denote speech sound errors that are rule based (or linguistically based). However, in reality, it may be difficult to determine which of these concepts is most appropriate to describe a particular client's error(s) productions. We must also recognize that there may be variables beyond motor production and rule acquisition that we need to attend to when we try to understand speech sound disorders. The revised title of this latest edition of the book reflects our attempt to better encapsulate the relationships among all of these terms.

ASHA, in its clinical portal (a website designed to assist clinicians), has defined *speech sound disorders* as "an umbrella term referring to any difficulty or combination of difficulties with perception, motor production, or phonological representation of speech sounds and speech segments—including phonotactic rules governing permissible speech sound sequences in a language" (ASHA, n.d.-c). In this book we use the terms *articulation, phonology,* and *speech sound disorders* somewhat interchangeably, but will hold to the traditional differentiation we have referred to between *articulation* and *phonology* when we talk about assessment and treatment.

THE SCOPE OF THE PROBLEM

Speech sound disorders may be described as ranging from something as mild as a lisp (interdentalizing the /s/ sounds; sometimes identified as substituting /θ/ for an /s/) to a disorder as significant as that found in an individual who is completely unintelligible. The terms *delay* and *deviant* are concepts that are often used to describe the nature of the sound errors produced by children. *Delay* refers to speech sound errors that are often noted as normal errors found in young children as they learn the proper use of sounds (e.g., lisps, misarticulations of /r/ or the affricates, sound substitutions and omission of sounds) but which persist in some children. *Deviant* refers to errors not typically observed in young children's development (e.g., lateralization of sibilants, backing of alveolars, vowel errors). It should be noted that some scholars argue that the labels *delay* and *deviance* are not particularly useful because, in terms of overall language development (including speech sounds), delay often leads to deviance. This progression occurs because of the high degree of coordination involved in the development of all aspects of language (e.g., speech sounds, vocabulary, syntax). If one area is slow to develop (i.e., delayed), it may lead to difficulties across several areas of development, which results in errors that we might then describe as deviant.

Typically, speech sound disorders are seen in children, and the pediatric population is the focus of this text. As discussed earlier, there have been many estimates and studies of how common these disorders are (i.e., their prevalence). In 2003, Campbell and colleagues presented data suggesting that speech sound disorders occur in approximately 15.6% of 3-year-old children. A prevalence of 11% was reported by Dodd and colleagues (2018) in a group of 1,494 Australian 4 year olds. Findings reported by Shriberg et al. (1999) indicated that by age 6 years, up to 3.8% of that age group continues to have difficulty with speech sound production. The differences in prevalence between these three percentages indicates that many of these problems are resolved during the preschool period. Although a positive trend, it does not remove the need for intervention for some children in order to learn accurate production of speech sounds. This is seen most obviously in the report of Mullen and Schooling (2010), who

reported in a national study, among prekindergarten children referred for possible communication difficulties, that approximately 75% were identified as having articulation/intelligibility difficulties (the most frequently identified disorders category). In addition, in that same study it was reported that up to 56% of the overall caseloads of school-based clinicians may involve instruction of speech sound production problems. More recently, a 2018 survey by ASHA indicated that 90% of clinicians working in the schools regularly serve children with speech sound disorders.

The nature of SLPs' work with speech sound disorders has expanded in recent decades. As mentioned previously, many of these disorders often coexist with disorders in comprehension or production of language (something we discuss in more detail later in this text). Most speech sound disorders occur in children under the age of 8 years, but speech sound production errors may persist past that point and occur in older children and adults. Working with older children and adults may require some unique considerations, and thus a major portion of a separate chapter is devoted to that group. Information contained in this book is relevant to the treatment of any client who faces difficulties producing speech sounds; however, adult speech sound disorders are often related to organic conditions, and thus you will need to review other materials when planning treatment for most adult clients. One notable exception is that of individuals acquiring English as a second language and the question of foreign accent. Thus, we conclude this text with a chapter devoted to that topic.

THE CAUSE OF THE PROBLEM

As we begin our discussion of speech sound disorders, it is important to recognize that, for many children, the cause of the disorder may be unknown. Often it is assumed that many children do not say their sounds properly because of difficulty in their language development that is also reflected in learning speech sounds. In some instances, the problem may be related to difficulty with other aspects of language (e.g., vocabulary, syntax). As will be discussed in a later chapter, a number of variables have been studied as they relate to such learning problems (e.g., familial history, motor development, speech sound discrimination). Definitive research evidence regarding the causes of speech sound disorders has been difficult to establish but studies are ongoing. Certainly, efforts to categorize or classify various types of speech sound disorders (e.g., speech delay related to otitis media with effusion, motor speech involvement, genetic factors) is a step in the direction of helping us better understand children with speech sound disorders of unknown origin. For some children, the cause of their disorder may be more obvious (e.g., hearing loss, cleft palate); however, even then, the impact of an organic condition does not necessarily determine the type of speech sound disorder a client may have, nor how they will respond to treatment.

In thinking about causes and treatment, it is also important to put speech sounds into their broader communicative context. As we have already mentioned, speech sounds are but one component of language (i.e., the phonology). Other aspects of language include semantics, which refers to meaning attached to words as reflected in vocabulary; morphology, which is defined as minimum meaningful units in the language that include words, and attachments to words such as plural markers (e.g., /s/ in *hats*) and tense markers (e.g., *ed* in *walked*, indicating past tense), or parts of words (e.g., *doghouse* has two minimum meaningful units); syntax, that is, grammatical rules for putting words together in phrases and sentences; pragmatics, which refers to using language appropriately in a social context; and discourse, the ability to string

sentences together in a meaningful manner while communicating with others. Each of these areas of language is acquired gradually and simultaneously by young children. Initially, we are concerned that children learn to use meaningful utterances to express themselves, but soon thereafter, we become concerned about accurate sound usage because it is largely through correct production of speech sounds that the child is understood by the listener, or, in other words, becomes intelligible.

To recap, SLPs are initially concerned with a young child's acquisition of semantics and vocabulary, then phonology, and then grammatical rules (morphology and syntax), although these areas are being acquired all at the same time. Concern over pragmatics and discourse come later because they are based on vocabulary and syntax. Thus, it is often older children for whom pragmatics and discourse may be targeted for instruction.

THE IMPORTANCE OF THE PROBLEM

As mentioned earlier, our understanding of speech sound disorders has changed dramatically over the years. Such problems are often about more than just being able to say individual sounds. Fundamentally, the issue is about being able to connect with others through communication—to make ourselves understood. And increasingly, it is being recognized that a normal sound system is important in terms of literacy development, or, in other words, learning to read and spell. Children's phonological awareness skills (or their ability to mentally manipulate the sounds and syllables in words) have been shown to impact literacy skills, and children with speech sound disorders are at risk for inappropriate development of phonological awareness and later literacy (Tambyraja et al., 2020). For this reason, clinicians have been drawn into using their knowledge of phonology as a way to understand a child's literacy development.

Before we decide that there actually is a problem, however, we need to recall some of our earlier discussion. We must recognize that some children use different speech sounds than those found in their environment because perhaps their first language is different from English, or maybe they are a part of a regional or cultural group that uses a less common dialect of English. Certainly, the increasing cultural diversity, the number of second-language learners, and other languages spoken in the United States make us acutely aware of the fact that linguistic differences are a part of everyday communication. As SLPs, we are primarily focused on disorders that individuals may have in their speech communication. When the clinician does not speak the language or dialect of a client, it is sometimes very challenging to determine what constitutes a disorder and what is a language or dialectal difference. Although there are some guidelines to help us, the reality is that there is a growing need for clinicians who are bilingual and/or represent different language/dialect groups. All sound systems, whether they are a part of a separate language or dialect, are legitimate and deserve acceptance. In some instances, the clinician may, however, help an individual learn an alternative sound system in order to fit in with speakers of other dialects of English when a client elects to do this, often for educational, business, or social reasons.

It is also important to place the work we do in this area into its broadest context. Regardless of whether we are discussing a speech sound disorder, use of a dialect that is different from that of our own, or an individual in the process of learning a new language, it is important to remember that the desire to communicate is fundamental to who we are as human beings. A wish to support this fundamental aspect of humanity is likely why most SLPs (including the authors of this book) entered the field. This view

is so pervasive that a recent issue of the *International Journal of Speech-Language Pathology* (vol. 20, no. 1, 2018) was dedicated to discussing it as a basic human right. In their foreword to that issue, McEwin and Santow (2018) remind us that communication is actually a right that was enshrined in Article 19 of the United Nations Universal Declaration of Human Rights.

> *"Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to* **seek, receive and impart information and ideas** *through any media and regardless of frontiers."*
>
> *United Nations, 1948 (emphasis added)*

As the primary vehicle for human communication, our ability to use language (of which speech sounds are an integral part) is extremely important to our ability to function in modern society. And as we have transitioned to a more knowledge-based economy and society, Ruben (2000) has argued that individuals with communication disabilities may end up even more disadvantaged than those with other types of disabilities. Those individual disadvantages end up having a cumulative impact on our entire society. In his now 20-year-old analysis, Ruben estimated that failure to address communication disabilities costs the U.S. economy between $154 and $186 billion. Given the pace of technological advancement since then, one can only imagine how much larger that impact must be today. Thus, our work with individuals with speech sound disorders is by no means a trivial endeavor.

AN EVIDENCE-BASED APPROACH

A final note in laying the groundwork for our study of speech sound disorders is to acknowledge that we are now in an era of accountability. Those who pay for our services, whether taxpayers, school or hospital administrators, insurance executives, or our clients and their families, can reasonably ask that we as a profession demonstrate that the services we provide are both effective (i.e., they actually work) and efficient (i.e., they do so in the most cost-effective way). No longer is it sufficient for us to simply say, "Trust us; we know what we're doing." We need to provide scientific evidence; put another way, we need to demonstrate that we are engaging in evidence-based practice (EBP). In her 2007 book on EBP, Christine Dollaghan suggests that EBP requires the conscientious, explicit, and judicious integration of 1) best available *external* evidence from systematic research, 2) best available evidence *internal* to clinical practice, and 3) best available evidence concerning the preferences of a fully informed patient (p. 2, italics in original).

Relative to external evidence, this book has, since its first edition, been about presenting the best of the available scientific studies related to working with children who have speech sound disorders. This edition continues and expands that effort. In addition to discussing published external evidence, we will also discuss how the conscientious clinician can and should generate their own internal evidence about whether what they are doing with each client is in fact resulting in meaningful change.

Finally, relative to patient preferences, the past 30 years have yielded a long and varied menu of treatment approaches, which we will highlight. It is no longer a matter of clinicians simply telling parents that we will "do artic therapy." Rather, parents of children with speech sound disorders may well come to us forearmed with information obtained online and/or from family and friends about various treatment options.

When they do (or even if they don't), EBP mandates that they be partners in determining which approach or instructional format may be best prescribed for their child. So, we need to be able to discuss the various options intelligently and objectively. Taken a step further, to the extent that they are able to do so, children themselves should be given a say in the goals and approaches to be used in working with them. Such a person-centered approach also means that our goals may not always be for a 100% perfect match to the adult normal model; in some cases, we may want to work primarily on improving functional communication (the ability to effectively accomplish the intended communication objectives in everyday activities).

Each of the chapters that follow was developed with the thought of providing the latest information and research relative to speech sound disorders. The breadth and depth of information presented is designed to provide a broad-based perspective of how SLPs can go about helping children who face difficulties producing the sounds of the language.