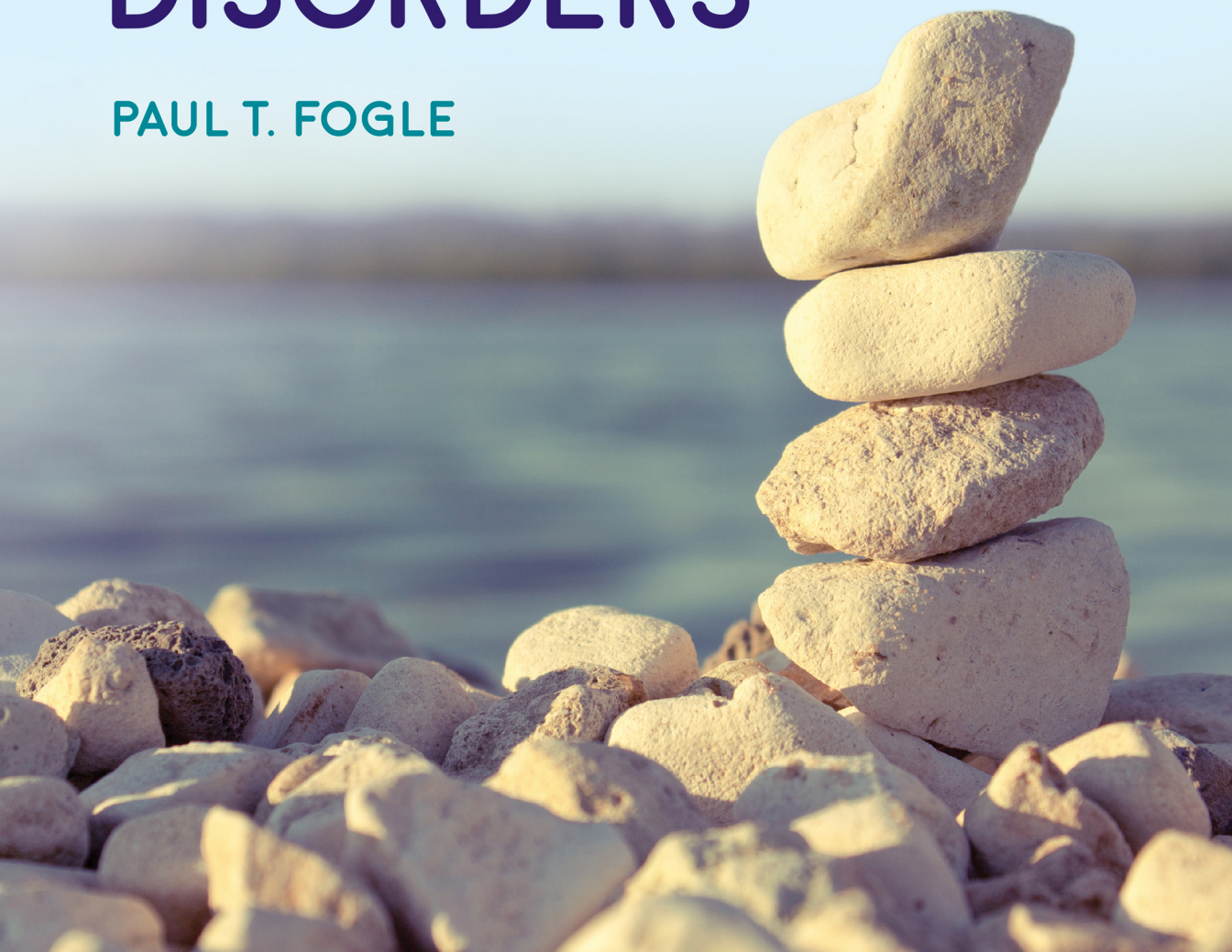
SECOND EDITION

ESSENTIALS OF COMMUNICATION SCIENCES & DISORDERS

PAUL T. FOGLE



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This book is dedicated to the professors and students who use this textbook. May it be helpful in your work and your dedication to helping others.


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Brief Contents


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Contents


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Preface

Introduction

Essentials of Communication Sciences and Disorders, Second Edition was written for students just beginning their education in speech-language pathology and audiology (communication sciences and disorders). The *Essentials* text focuses on what is considered to be the essential information that beginning students need, and is based on the skills and knowledge specified in the American Speech-Language-Hearing Association's (ASHA) 2005 Standards for the Certificate of Clinical Competence (CCC) that address the Knowledge and Skills Acquisition Summary (KASA), as well as ASHA's 2016 Scope of Practice for Speech-Language Pathology and 2004 Scope of Practice for Audiology.

Overview

This text was designed for students to learn and enjoy reading about the essentials of communication sciences and disorders. One thing students will immediately notice is that all of the illustrations, photos, and figures are in full color. Students will also find the writing clear and understandable, with many colorful stories and examples of real-life cases. In other words, we have created an inviting place for students to learn.

The text presents the most recent literature in each chapter. It also cites literature that is not often mentioned in introductory texts. It includes many references from professional journals outside of speech-language pathology and audiology that are relevant to our professions. These resources were included to help students understand that important information from other professions relates directly and indirectly to our work.

Notably, *Essentials* includes literature from numerous foreign journals that are not usually cited by an American author. This was done for several reasons. First, there is a vast amount of literature published in journals around the world that adds important information to our understanding of the many disorders we work with and provides directions for assessment and treatment. Second, this text was written for an international market: speech-language pathology and audiology are practiced in countries around the world. Third, it is important for students to realize that in many countries where they may choose to travel or live and work, they will have a fraternity of speech-language pathologists (SLPs) and audiologists with whom they can immediately relate.

Key Features

Essentials was carefully organized for the benefit of students and for ease in teaching. Each chapter begins with learning objectives, a list of key terms, a chapter outline, and an introduction.

When an important term is first introduced in the text, it is placed in bold type to highlight it. The terms are also defined in a comprehensive glossary.

Throughout the text, "Insight Questions" encourage students to consider how they might relate the information presented to their personal lives, or how the information may relate to them in ways they had not expected.

PERSONAL STORY: SHOT IN THE HEART

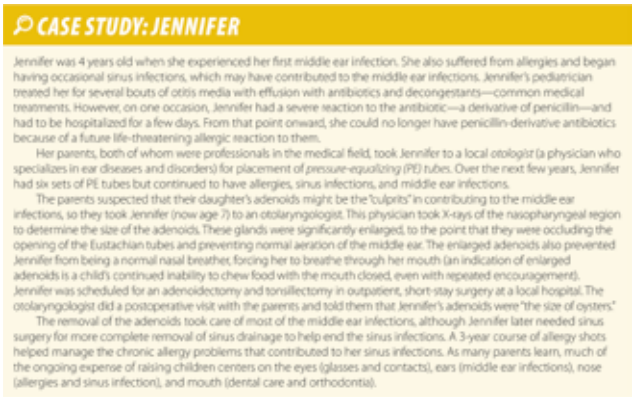
Jared was 7 years old when he was referred to me by a public school speech therapist. Jared was a severe stutterer and had been in therapy for more than a year, but had made only minimal progress. The therapist was going to continue with his treatment, but then a dramatic change occurred in Jared's life. On a Saturday morning, Jared was playing in the front yard of his house when a teenager who lived across the street fired a BB gun through his own home's screen door; the shot hit Jared. The BB went through Jared's T-shirt, passed through his skin and chest muscles between two ribs, and entered his heart. Jared did not fall but quickly grabbed his chest. His mother saw that something was wrong and ran to him. She saw the hole in his T-shirt and some blood. She immediately called 911, and within minutes the fire department ambulance was at the home.

Jared was rushed to the hospital. In the emergency room, the doctor tried to extract the BB from Jared's heart, but he could not find it. Upon reviewing Jared's chest X-rays, the doctor discovered the BB lodged in his right shoulder. Apparently, the BB had directly entered Jared's left ventricle, was pumped out through the aorta, and then traveled to the right subclavian artery, which carried it to his right shoulder, where it lodged in a smaller artery. The doctor removed the BB from Jared's shoulder and "patched him up."

After the shooting incident, Jared was seen by a psychologist to help him "work through" the incident. After Jared returned to school, his speech therapist thought he needed a different approach to help his stuttering, as well as someone who could work with the parents. Working with the parents was essential, and I spent many hours in Jared's home talking with them about stuttering in general and Jared's stuttering in particular. Because Jared was aware of his stuttering and motivated to work on it, a direct approach was used.

Although Jared made significant improvements in his fluency and received therapy from other SLPs after me, he continues to have some difficulty with stuttering. It is important for clinicians to appreciate that even when we provide our best therapy, not all outcomes are what we or the clients and their families hope for.

Chapters include both case studies and personal clinical stories that are relevant to the material. These features are intended to help paint a vivid picture of our professions, long before students have the opportunity to participate in a clinical practicum.



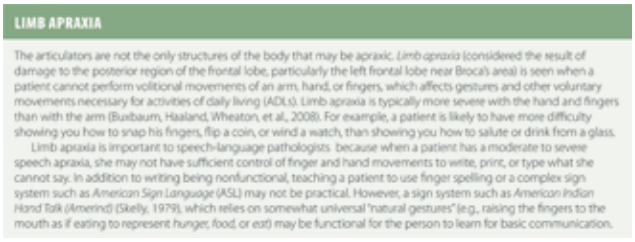
CASE STUDY: JENNIFER

Jennifer was 4 years old when she experienced her first middle ear infection. She also suffered from allergies and began having occasional sinus infections, which may have contributed to the middle ear infections. Jennifer's pediatrician treated her for several bouts of otitis media with effusion with antibiotics and decongestants—common medical treatments. However, on one occasion, Jennifer had a severe reaction to the antibiotic—a derivative of penicillin—and had to be hospitalized for a few days. From that point onward, she could no longer have penicillin-derivative antibiotics because of a future life-threatening allergic reaction to them.

Her parents, both of whom were professionals in the medical field, took Jennifer to a local *otologist* (a physician who specializes in ear diseases and disorders) for placement of *pressure-equalizing (PE) tubes*. Over the next few years, Jennifer had six sets of PE tubes but continued to have allergies, sinus infections, and middle ear infections.

The parents suspected that their daughter's adenoids might be the "culprits" in contributing to the middle ear infections, so they took Jennifer (now age 7) to an otolaryngologist. This physician took X-rays of the nasopharyngeal region to determine the size of the adenoids. These glands were significantly enlarged, to the point that they were occluding the opening of the Eustachian tubes and preventing normal aeration of the middle ear. The enlarged adenoids also prevented Jennifer from being a normal nasal breather, forcing her to breathe through her mouth (an indication of enlarged adenoids is a child's continued inability to chew food with the mouth closed, even with repeated encouragement). Jennifer was scheduled for an adenoidectomy and tonsillectomy in outpatient, short-stay surgery at a local hospital. The otolaryngologist did a postoperative visit with the parents and told them that Jennifer's adenoids were "the size of oysters."

The removal of the adenoids took care of most of the middle ear infections, although Jennifer later needed sinus surgery for more complete removal of sinus drainage to help end the sinus infections. A 3-year course of allergy shots helped manage the chronic allergy problems that contributed to her sinus infections. As many parents learn, much of the ongoing expense of raising children centers on the eyes (glasses and contacts), ears (middle ear infections), nose (allergies and sinus infection), and mouth (dental care and orthodontia).



LIMB APRAXIA

The articulators are not the only structures of the body that may be apraxic. *Limb apraxia* (considered the result of damage to the posterior region of the frontal lobe, particularly the left frontal lobe near Broca's area) is seen when a patient cannot perform volitional movements of an arm, hand, or fingers, which affects gestures and other voluntary movements necessary for activities of daily living (ADLs). Limb apraxia is typically more severe with the hand and fingers than with the arm (Buxbaum, Haaland, Wheaton, et al., 2008). For example, a patient is likely to have more difficulty showing you how to snap his fingers, flip a coin, or wind a watch, than showing you how to salute or drink from a glass.

Limb apraxia is important to speech-language pathologists because when a patient has a moderate to severe speech apraxia, she may not have sufficient control of finger and hand movements to write, print, or type what she cannot say. In addition to writing being nonfunctional, teaching a patient to use finger spelling or a complex sign system such as *American Sign Language* (ASL) may not be practical. However, a sign system such as *American Indian Hand Talk (Amerind)* (Skelly, 1979), which relies on somewhat universal "natural gestures" (e.g., raising the fingers to the mouth as if eating to represent *hunger, food,* or *eat*) may be functional for the person to learn for basic communication.

Multicultural considerations are discussed in nearly all chapters, as the text material relates specifically to this important area.

Each chapter includes a summary that highlights some of the basic concepts discussed.

Numerous study questions are also provided at the end of each chapter that are based on Bloom's (1956) taxonomy of educational objectives. That is, three general levels of question difficulty are presented for each chapter: (1) knowledge and comprehension, (2) application, and (3) analysis and synthesis. By answering these questions, students can demonstrate several levels of learning. Each chapter ends with an extensive list of references that students may use to research the information and concepts presented.

New to the Second Edition

Several new and expanded chapters in this text discuss specific topics that were more briefly discussed in large chapters in the first edition:

- Motor Speech Disorders in Children (includes discussion of childhood apraxia of speech and childhood dysarthria)
- Attention-Deficit/Hyperactivity Disorders and Auditory Processing Disorders
- Autism Spectrum Disorders and Developmental Disabilities
- Traumatic Brain Injury in Children
- Cognitive-Linguistic Disorders in Adults
- Swallowing Disorders/Dysphagia
- Essential Counseling Principles for Speech-Language Pathologists and Audiologists

There are new and expanded discussions of the following topics:

- Childhood apraxia of speech
- Childhood (developmental) dysarthria
- Emotional and social effects of attention-deficit/hyperactivity disorders and auditory processing disorders
- Treatment of communication deficits related to autism spectrum disorder: evidence-based practice
- Concussion in sports
- Treatment of traumatic brain injury: evidence-based practice
- Right hemisphere syndrome
- Dementia

Instructor and Student Resources

There are some important, new support tools in the second edition:

- Videos of most of the disorders discussed in the book.
- Modifiable (customizable) PowerPoint slides for each chapter. The author has created slides for each chapter, which individual instructors can build on.
- A Test Bank for each chapter. Beyond the end-of-chapter study questions, the author has created a test bank of various kinds of questions (true/false, multiple choice, short answer, essay) with various levels of difficulty (easy, moderate, difficult).

Please visit www.go.jblearning.com/Fogle2e for additional information on how to access these resources.

Audience

Some other groups of students (besides future SLPs and audiologists) will find the *Essentials* text helpful—students who take an introductory course in speech-language pathology and audiology who may not intend to major in communication sciences and disorders. During the years I taught the introductory course, students from a wide range of majors took the course because someone recommended it, it sounded interesting, or it just fit into their schedules. Some of these students find the information very interesting and change their majors. For them, the course was serendipitous. These students often brought into their new major valuable perspectives from their past majors, such as pre-medicine, pre-dentistry, pre-pharmacy, education, psychology, business, and many others. The professions of speech-language pathology and audiology are all the richer for welcoming students from other majors. Nevertheless, students who take the introduction to communication sciences and disorders course and do not change their major will also benefit from having an understanding of how this course and this text can relate to their future professions and jobs, particularly in education and the healthcare fields. In addition, students later realize that much of what they learn can help their personal lives as parents and possible caregivers to family members. As instructors of the introductory course, we know the information we present relates to life in general, rather than just to the disciplines of speech-language pathology and audiology.

Conceptual Approach to the Text

The conceptual approach to this text is based on several considerations that are themes throughout the chapters:

- First and foremost, *Essentials* is evidence based; that is, it is built on the best available up-to-date research on theories, assessment, and treatment of the many disorders clinicians may encounter.
- The text has a life span approach, covering age groups from newborns to individuals at the end of life.
- A team approach is emphasized, with the most important person on the team being the person with the communication disorder.
- Therapy always involves working with the central and peripheral nervous systems.
- People of all ages with communication impairments often have emotional and social reactions to their problems. As clinicians, we must work with our clients and patients holistically; in other words, we must work with the whole person and not just the disorders that we diagnose and treat. Likewise, the family members of our clients and patients often experience their own emotional and social effects from their loved one's problems.
- There is a joy in being a therapist—a person in a helping profession. As clinicians, we receive much satisfaction from our work. People recognize that we are excited about our work even after doing therapy for many years.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Acknowledgments

This text emphasizes the team approach when working with clients and patients. Likewise, the writing of this text was a team approach, with many people contributing their time, energy, and talents to my education, professional development, and ultimately this writing.

Mr. Rex Fisher, my high school biology and anatomy and physiology teacher, and eventually my friend, introduced me to the fascinating study of science and the human body. These lessons became the foundations of my life's work.

Dr. Joseph Sheehan and Mrs. Vivian Sheehan inspired my interest in stuttering, trained me well at the Psychology Adult Stuttering Clinic at the University of California, Los Angeles (UCLA), and encouraged me to pursue my doctorate in speech-language pathology. Dr. Dean Williams, professor and expert in stuttering at the Wendell Johnson Speech and Hearing Center, University of Iowa, was my mentor and dissertation advisor. His statement to the students in one of his classes remains an inspiration to me: "I hope all of you find someone who helps you become more than what you ever thought you could be." Dr. Williams was that person for me.

Dr. Marlene Salas-Provance contributed significantly to the multicultural considerations material throughout this text. Dr. Salas-Provance is an ASHA Fellow and a recipient of ASHA's Certificate of Recognition for Special Contributions in Multicultural Affairs and ASHA's Certificate of Recognition for Outstanding Contributions in International Achievement. She is past Coordinator of ASHA's Special Interest Group 14, Communication Disorders and Sciences in Culturally and Linguistically Diverse Populations; past president of the Hispanic Caucus, an ASHA-related professional organization; a founding steering committee member and coordinator of ASHA's Special Interest Group 17, Global Issues in Communication Sciences and Related Disorders; and a past member of ASHA's Multicultural Issues Board. She is a professor and an Associate Dean of Academic and Student Affairs in the School of Health Professions at the University of Texas Medical Branch, Galveston. Dr. Salas-Provance is also president and CEO of Bilingual Advantage, Inc., a medical interpreter training company. She has traveled worldwide with a medical team serving children with cleft palate, spending the last 7 years developing sustainable services in Lima, Peru. She is coauthor, with Dr. Yvette Hyter, of the 2017 textbook *Culturally Responsive Practices in Speech, Language, and Hearing Sciences*.

Rotary International and Rotaplast International Cleft Palate Teams provided opportunities for me to travel to Venezuela, Egypt, and India to work with infants, children, and adults with cleft lips and palates; photographs from those "missions" have been included in this text. Rotary International sent me to Oradea, Romania, in 2014 and 2017 to work with children on the autism spectrum at the Pyramid Learning Center with Ioana Coromaki and her therapists.

The libraries of Macquarie University, Sydney, Australia; Canterbury University, Christchurch, New Zealand; and the University of Reading, Reading, England, provided excellent facilities for research for the international emphasis of this text.

Nancy Barcal, M.A., CCC-SLP, owner of Granite Bay Speech in Roseville, California, generously provided the many clients for videotaping, and Kimberli Door, B.S., SLPA, skillfully videotaped those clients, allowing students to view children and adults with various speech, language, and cognitive disorders.

United Cerebral Palsy of Sacramento, California, allowed me to interview and videotape two of their adult clients for students to better understand the adult lives of individuals with cerebral palsy, both congenital and acquired through a childhood traumatic brain injury.

Allen D. Sato is the person who keeps my computers working; without his help and support, the manuscript for this text could not have been completed.

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Carol Fogle, RN, my wife of more than 45 years, has given me love, support, and encouragement for all of my projects, allowing me to contribute to the profession I love. My daughters Heather Brooke Morris and Heather Lea Fogle are appreciated and loved for being such joys in my life. Carlos Ruiz and Jayne Morris, my birthparents, who never had the opportunity to know me, or me to know them. Special appreciation goes to my new families who accepted me into theirs. Finally, I would like to thank the following individuals for providing feedback that helped improve the second edition in many ways:

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About the Author

Paul T. Fogle, Ph.D., CCC-SLP (Fogle is pronounced with a long o, as in FO-GULL), has been studying, training, and working in speech-language pathology for more than 45 years. Although he earned all of his degrees in speech-language pathology, he minored in psychology throughout each degree. He earned his Bachelor of Arts in 1970 and his Master of Arts in 1971, both at California State University, Long Beach. After receiving his M.A., he worked for 2 years as an aphasia classroom teacher for the Los Angeles County Office of Education and started the first high school aphasia class in California, teaching and working with adolescents who had sustained traumatic brain injuries, strokes, and other neurological impairments.

Between 1970 and 1973, Dr. Fogle worked as a therapist at the University of California, Los Angeles (UCLA) Psychology Adult Stuttering Clinic, training under Dr. Joseph Sheehan and Mrs. Vivian Sheehan. Concurrently, he trained at Rancho Los Amigos Medical Center in Southern California performing human brain autopsy.

Dr. Fogle earned his doctorate in 1976 from the University of Iowa. He specialized in neurological disorders in adults and children and stuttering. His dissertation was directed by Dr. Dean Williams and he was awarded membership in Sigma Xi, the Scientific Research Society of North America, for his research. Although he minored in psychology throughout all of his degrees, in the early 1990s, he began training in counseling psychology, educational psychology, clinical psychology, and family therapy (Marriage, Child, Family Therapy). Most recently he has been studying neuropsychology.

Dr. Fogle is a Professor Emeritus. During his 35 years as a university professor he taught undergraduate courses on Introduction to Speech-Language Pathology and Audiology, Anatomy and Physiology of Speech, Speech Science, and Organic Disorders. At the graduate level, he taught Neurology and Neurological Disorders in Adults, Motor Speech Disorders, Cerebral Palsy, Dysphagia/Swallowing Disorders, Gerontology, Voice Disorders, Cleft Palate and Oral-Facial Anomalies, and Counseling Skills for Speech-Language Pathologists.

Dr. Fogle has worked extensively in hospitals, including Veterans Administration Hospitals, university hospitals, and acute, subacute, and convalescent hospitals. He has maintained a year-round private practice for more than 35 years. He has presented numerous seminars, workshops, and short courses on a variety of topics at state, ASHA, and international conferences and conventions, including the International Association of Logopedics and Phoniatrics, the International Conference on Speech-Language Pathology, and the Asia-Pacific Society for the Study of Speech-Language Pathology and Audiology.

Dr. Fogle has presented all-day workshops in cities throughout the United States and in countries around the world on counseling skills for speech-language pathologists and audiologists, and on auditory processing disorders and attention-deficit disorders. He has worked on numerous medical-legal cases as an expert witness in several states for more than 30 years, testifying in depositions, court hearings, and court trials.

Dr. Fogle's primary publications have been textbooks and clinical materials. He is the author of *Foundations of Communication Sciences and Disorders* (Delmar Cengage Learning, 2008) and coauthor of *Counseling Skills for Speech-Language Pathologists and Audiologists* (first edition 2004, second edition 2012, Delmar Cengage Learning), *Ross Information Processing Assessment-Geriatric* (first edition 1996, second edition 2012, Pro-Ed), the *Classic Aphasia Therapy Stimuli* (CATS) (Plural Publishing, 2006), and *The Source for Safety: Cognitive Retraining for Independent Living* (LinguiSystems [now Pro-Ed], 2008). His website is www.PaulFoglePhD.com and his email address is paulfoglephd@gmail.com.


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Letter to Students

Dear Students,

Welcome! Thank you for purchasing this text for the beginning of your study about the professions of speech-language pathology and audiology. I hope you find not just interest in the information, but a genuine joy in its learning. If you do, there is a good chance that joy will remain with you throughout your education and life as you continue to learn about and work in these remarkable professions.

You will find several themes throughout this text that will help you in your learning and work as either a speech-language pathologist or an audiologist.

First, our work always follows a team approach. The most important person on the team is the person with the communication disorder, because without that person no other team members are needed.

Second, all of our therapy is "brain therapy." In other words, whether we are working with a child or an adult with an articulation disorder, language disorder, fluency disorder, neurological disorder, or other disorder, we are working with neurons, axons, dendrites, and synapses within the person's brain to change the muscles that relax and contract for specific behaviors to occur. More subtly, when we are helping people change their attitudes, beliefs, feelings, and reactions toward their communication problems (e.g., stuttering), we are working with the brain.

Third, people of all ages with communication impairments have emotional and social reactions to their problems. A problem may be physical—for example, a cleft palate or a hearing loss—but there are always emotional and social effects of the problem. As clinicians, we must work with our clients and patients holistically—by addressing the whole person and not just the disorders that we diagnose and treat. Likewise, family members of our clients and patients commonly have their own emotional reactions to their loved one's problems. The therapy we provide one person often has subtle to profound effects on the lives of a constellation of people. If you become a speech-language pathologist or audiologist, you will touch countless lives.

Fourth, there is a joy to being a therapist, a person in a helping profession. We give our time, energy, and talents to others, but we receive back more than we give. Yes, you can make a living and support yourself with your profession. However, we go into our profession and stay in it not so much because of the income we derive from it, but because of the satisfaction we receive from knowing that we have helped others have better lives. Ultimately, that becomes our greatest reward.

I hope you enjoy reading and studying this text as much as I enjoyed writing it for you.

Best Wishes, Paul T. Fogle, Ph.D., CCC-SLP
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UNIT 1

Communication Disorders and the Professionals Who Work with Them


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CHAPTER 1

Essentials of Communication and Its Disorders

KEY TERMS

acquired disorder
aphasia
aphonia
articulate (articulation)
articulation disorder
audiologist
clinician
cluttering
cognition
cognitive disorder (cognitive impairment)
communicate (communication)
communication disorder (communicative disorder)
conductive hearing loss
congenital disorder
consonant
context
dementia
disability
disorder
dysphonia
etiology
expressive language
functional disorder
General American English (GAE)/ Standard American English (SAE)
grammar
habilitate (habilitation)
handicap
hearing impairment (hearing loss)
hypernasal (hypernasality)
hyponasal (hyponasality)/denasal (denasality)
impairment
incidence
inner speech (self-talk)
intelligible (intelligibility)
language
language delay
language difference
language disorder
linguistics
literacy
modality
morpheme
morphology
motor speech disorder
organic disorder
phoneme
phonological disorder
phonology
pragmatics
prevalence
(mental or cognitive) process (processing)
prosody (prosodic)/melody (melodic)
quality of life
receptive language
rehabilitate (rehabilitation)
resonance disorder
semantics
sensorineural hearing loss
speech
speech disorder
speech-language pathologist (SLP), speech pathologist, or speech therapist
stuttering (disfluency)
syllable
syndrome
syntax
traumatic brain injury (TBI) or head trauma
voice disorder (dysphonia)
vowel

LEARNING OBJECTIVES

After studying this chapter, you will be able to:

- State the modalities of communication.
- Describe the essential components of oral language: phonology, morphology, syntax, semantics, and pragmatics.
- Briefly explain each of the major communication disorders.
- Explain the emotional and social effects of communication disorders on the person and family.

CHAPTER OUTLINE

Introduction

Welcome! You are beginning the study of a basic human need: the need to **communicate**. When two people are interacting, a message is always being communicated, even when neither person is speaking. The old adage still holds true: *We cannot not communicate.* Our ability to communicate is often taken for granted until we have some difficulty communicating or see someone else having difficulty. This text is about the difficulties that children and adults of all ages (newborns to end of life) have with **communication disorders**. As **clinicians**, we need to have a solid foundation in the understanding of the **modalities** of communication—that is, the various ways we communicate. Although **speech-language pathologists (SLPs)** and **audiologists** focus on the *auditory–verbal* modalities (hearing and speaking), *nonverbal modalities* (body language and facial expressions) are also essential to our ability to understand what a person is saying and communicate our own messages in return.

In a way, good communication is like a dance in which each person takes turns leading and following. The individuals try to stay "in step" with each other, "reading" every nuance of choice of words, tone of voice, *inflections* (variations of pitch during speech), pauses, hesitations, facial expressions, postures, and gestures (i.e., *total communication*) so that the conversation has an easy and enjoyable flow. When we meet someone new, it usually does not take long before we decide whether we can "dance" well together and whether we even want to try to dance again.

We use communication to survive and thrive in our homes, communities, schools, and work places. With a communication disorder, however, surviving and thriving can be much more difficult.

Communicate: Any means by which individuals relate their wants, needs, thoughts, feelings, and knowledge to another person.

Communication disorder: An impairment in the ability to receive, comprehend, or send messages, verbally, nonverbally, or graphically; any articulation, language, voice, resonance, cognitive, or hearing impairment that interferes with conveying or understanding a person's wants, needs, thoughts, feelings, and knowledge.

Clinician: Healthcare, rehabilitation, and educational professionals, such as physicians, nurses, physical therapists, occupational therapists, speech-language pathologists, audiologists, psychiatrists, or psychologists, involved in clinical practice who base their practice on direct observation and treatment of patients and clients.

INSIGHT QUESTION

Much of your education in speech-language pathology and audiology involves learning professional terminology. How do you feel about that?

The Study of Human Communication

The evolution of communication from basic sounds and signs to more sophisticated systems is one of the most important developments in human history. Cave paintings of geometric symbols and animals, dated from more than 30,000 years ago, are among the earliest forms of communication designed to preserve human experiences. More than 3000 years ago, Egyptians used pictographic hieroglyphs as a formal writing system, with symbols for words and letters of the Egyptian alphabet being carved into stone and later painted on papyrus.

In the modern era, Wolfgang von Kempelen (1734–1804), a Hungarian author and inventor, described, illustrated, and constructed mechanical devices that could produce speech sounds for words. His devices (**FIGURE 1-1**) were composed of bellows for the lungs, a vibrating reed for the vocal folds, and a leather tube whose shape helped produce different vowel sounds, with constrictions controlled by fingers for generating consonants. To study the production of plosive sounds (e.g., p, b, t, d, k, g), von Kempelen included movable "lips" and a hinged "tongue" in his device. The device could produce intelligible whole words and short sentences. Von Kempelen may be considered the first speech scientist (Gedeon, 2006).

Communication Modalities

Communication means conveying messages through one or more modalities (**FIGURE 1-2**). We have three primary modes to *receive* communications: auditory, visual, and tactile. Likewise, we have three primary modes to *send* communications: verbal (including grunts and other noises), graphic (including writing and illustrations), and gestural (including facial expressions, gestures, and body language). As clinicians, we learn to be increasingly aware of the interactions of these modalities and the effects of subtle to complete breakdowns in these modalities.

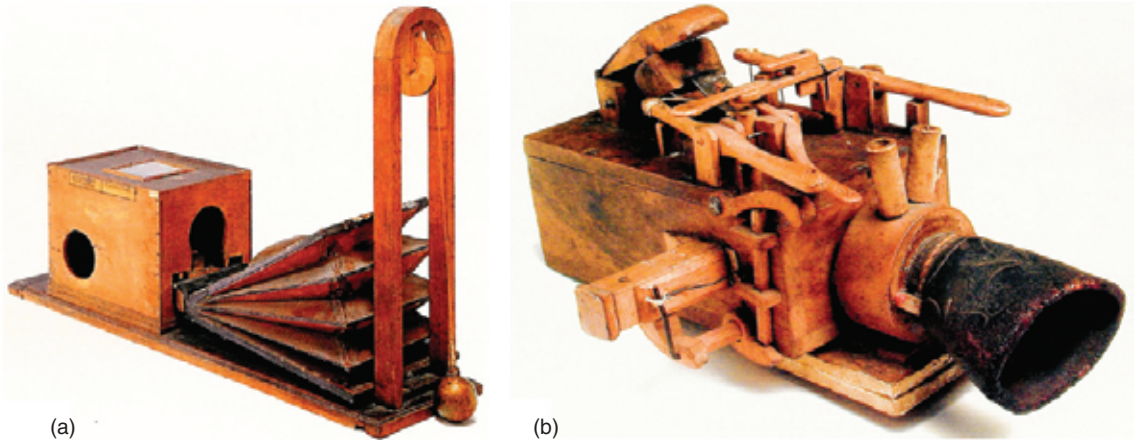
We normally think of communication as occurring between two or more people; however, much of what we "hear" every day is us talking to ourselves. We commonly have an internal monologue (known as **inner speech** or **self-talk**) going on inside our heads that we refer to as *thinking*. We silently (and sometimes not so silently) talk to ourselves and even argue with ourselves, wrestling with decisions ranging from the mundane ("Where am I going to have lunch?") to the profound ("What am I going to do with my life?"). Our verbal communication is

Modalities: Any sensory avenue through which information may be received, that is auditory, visual, tactile, taste, and olfactory (smell).

Speech-language pathologist: A professional who is specifically educated and trained to identify, evaluate, treat, and prevent speech, language, cognitive, and swallowing disorders.

Audiologist: A professional who is specifically educated and trained to identify, evaluate, treat, and prevent hearing disorders, plus select and evaluate hearing aids, and habilitate or rehabilitate individuals with hearing impairments.

Inner speech/self-talk: The nearly constant internal monologue a person has with himself at a conscious or semiconscious level that involves thinking in words; a conversation with oneself.



(a) (b)

FIGURE 1-1 Von Kempelen's (1791) (a) "lungs" and "voice box" and (b) articulating mouth.

Courtesy of Deutsches Museum, Munich, Archive, CD29908; Courtesy of Deutsches Museum, Munich, Archive, BN37401.

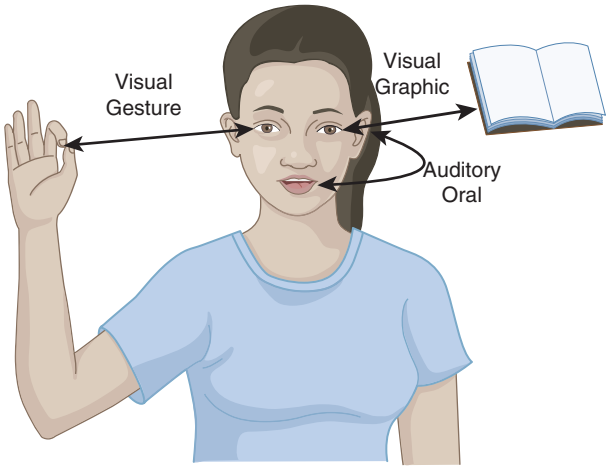


FIGURE 1-2 Modalities of communication.

mostly a reflection of our wants, needs, thoughts, feelings, and knowledge (i.e., sharing information).

However, spoken words may communicate only a small portion of a person's total message. SLPs and audiologists also need to become skilled in "reading" facial expressions and nonverbal communication (Fogle, 2009). Burgoon, Guerrero, and Floyd (2009) reviewed more than 100 studies on verbal (oral) and nonverbal (body postures, gestures, eye contact, and facial expressions) communication and, among other points, determined the following:

- Verbal content is more important for factual, abstract, and persuasive communication; nonverbal content is more important for judging emotions and attitudes.
- When verbal and nonverbal channels conflict, adults rely more on nonverbal cues (i.e., people believe what they see more than what they hear).

When we think of communication disorders, we usually think of talking and listening. Indeed, most of your education and training in speech-language pathology and audiology will focus on these modalities. Nevertheless, because communication may involve three primary **language** input modalities (auditory, visual, and tactile) and three primary output modalities (verbal, graphic, and gestural), SLPs and audiologists work with more than just speech and hearing. Any or all of the input and output modalities may be involved in a communication disorder.

Language: A socially shared code or conventional system for representing concepts through the use of arbitrary symbols (sounds, letters, gestures), and rule-governed combinations of those symbols.

Oral/Spoken Language

When sounds are organized into **syllables** and words are organized into grammatical sentences, spoken language is generated. Language has been defined as "a socially shared code or conventional system for representing concepts through the use of arbitrary symbols [sounds and letters] and rule-governed combinations of those symbols [grammar]" (Owens, 2015). Spoken language is our primary and usually most efficient form of communication. There are approximately 7000 "living languages" (languages widely used as a primary form of communication by specific groups of people) and an unknown number of dead or extinct languages (Lewis, 2015).

Spoken language gives the listener not only the *content* (the words in the message) but also the **prosody (prosodic)/melody (melodic)** that helps the listener

Syllable: Either a single vowel (V) or a vowel and one or more consonants (C); for example V+ consonant (VC), VCC, CV, CCV, CVC, etc.

Prosody (prosodic)/melody (melodic): Voice inflections used in a language such as stress, intensity, changes in pitch, duration of a sound, and rhythm that help listeners understand the true intent of a message and that convey the emotional aspects of a message, such as happiness, sadness, fear, or surprise.

understand the true intent of the message by using voice inflections to emphasize or deemphasize aspects of the spoken language (e.g., the difference between "I scream" and "ice cream"). Prosody is important in conveying the emotional aspects of messages, such as happiness, sadness, fear, and surprise. When we cannot see a person's face (e.g., while on the telephone), we usually can still discern the emotions behind the messages based on the prosody.

Linguistics

Linguistics: The scientific study of the structure and function of language and the rules that govern language; includes the study of phonemes, morphemes, syntax, semantics, and pragmatics.

Linguistics is the scientific study of language, and *linguists* are individuals who specialize in the study of linguistics. Traditionally, linguists divide language into several components: **phonemes** (sounds), **morphemes** (groups of sounds that form words or parts of words), **syntax** (rules for combining words into sentences), **semantics** (meaning of the language or message), and **pragmatics** (the rules governing the use of language in social situations). *Linguistic competence* is a person's underlying knowledge about the system of rules of a language. Linguistic competence helps us recognize when a sentence is grammatically correct or incorrect.

Phonology

Phonemes: The shortest arbitrary unit of sound in a language that can be recognized as being distinct from other sounds in the language.

Morphemes: The smallest unit of language having a distinct meaning, for example, a prefix, root word, or suffix.

Syntax: The rules that dictate the acceptable sequence, combination, and function of words in a sentence; the way in which words are put together in a sentence to convey meaning.

Semantics: The study of meaning in language conveyed by words, phrases, and sentences.

Pragmatics: The rules governing the use of language in social situations; includes the speaker–listener relationship and intentions and all elements in the environment surrounding the interaction—the *context*.

Phonology: The study of speech sounds and the system of rules underlying sound production and sound combinations in the formation of words.

Speech: The production of oral language using phonemes for communication through the process of respiration, phonation, resonation, and articulation.

Phonology is the study of **speech** sounds (phonemes) and the rules for using them to make words in a language. The English language has a limited number of phonemes, but an almost limitless variety of sound combinations can be used in words and to make up new words. Each year, hundreds of words are added to our language that must follow phonological rules. Consider, for example, all of the new words that were created when televisions first arrived on the scene or when computers were being invented.

For new words to be accepted by the public, certain phonological rules for combining sounds must be followed. For example, a single letter is not used as a new word, nor is a combination of more than two **consonants** with no **vowels**. A combination of three or more vowels also is not considered to follow English phonological rules. Some foreign languages are difficult for English speakers to learn because their phonologies use consonant and vowel combinations not used in English. Also, many people trying to learn English as a second language find it difficult because the pronunciation of a word may vary considerably depending on the **context**, and the differences in the pronunciation can significantly change a word's meaning. Examples include "He could lead if he got the lead out," "The girl had tears in her eyes because of the tears in her dress," and "Since there is no time like the present, he decided to present the present."

Authors of fiction books sometimes create new words by following phonological rules of English. For example, J. R. R. Tolkien, in *The Lord of the Rings* trilogy, created a great number of new words, including *hobbit, glede,* and *Fallohides*. J. K. Rowling, the author of the *Harry Potter* books, also created *quidditch* and *muggle* (*muggle* is now in the *New Oxford English Dictionary*). These words "sound like they could be words," just as any new technical word must follow accepted English phonological rules to eventually become part of our vocabulary (e.g., *byte, megabyte,* and *telecommunication*).

Morphology

Morphology is the study of the way words are formed out of basic units of language—morphemes. Morphemes are one or more letters or sounds that may be used as prefixes, such as *un*comfortable; base (root) words, such as *comfort*; or suffixes, such as *able*. When a morpheme is able to stand alone—that is, when it

does not need any other morphemes attached to it to make it a true word—it is called a *free morpheme* (e.g., *culture*, *accept*, and *comfort*). Morphemes that cannot stand alone and must be attached to a free morpheme are referred to as *bound morphemes* (e.g., prefixes such as *pre-*, *dis-*, and *mis-*; suffixes such as the plural *-s,* the past tense *-d,* and the gerund *-ing*; and *base words* such as *-celerate-* and *audio-*). **TABLE 1-1** shows how prefixes, base words, and suffixes (morphemes) combine to make whole words.

Syntax

Syntax and morphology are the two major categories of language structure (i.e., **grammar**). Syntax refers to the rules for acceptable sequences (order) and word combinations in sentences. Various languages have different word orders for sentences. In an English declarative sentence, the subject comes before the verb: "David is going to work." However, when the subject (*David*) and the auxiliary or helping verb (*is*) are reversed in order, the sentence becomes a question: "*Is David* going to work?" English syntax has the adjective preceding the noun (e.g., the green room); in contrast, the syntax of Spanish and French has the adjective following the noun (e.g., the room green). Most English sentences flow from subject to verb to objects or complements.

Native speakers of a language develop a "grammatical intuition" that helps them recognize when a sentence is not quite grammatically correct, but they may have some difficulty pinpointing or explaining what is not correct about it. When people who have learned English as a second language are speaking, they may use some incorrect word order or omit morphemes (e.g., the plural *-s*) that a native speaker of English recognizes and may be a little uncomfortable with, feeling a need to correct the non-native speaker.

Semantics

Semantics is the study of meaning in language that is conveyed by the words, phrases, and sentences communicated. Semantics may be thought of as the *content expressed* by the speaker and the *content understood* by the listener. Miscommunication occurs when there is a discrepancy between the two.

Social and cultural factors play significant roles in the way we use and understand language. For example, a word's meaning in one region of the United States may be quite different from its meaning in another region. In many western regions of the United States, *dinner* is the evening meal; in contrast, in many midwestern and southern regions, *dinner* is the noon meal and *supper* is the evening meal. In English-speaking countries, significant differences also can arise in the use of different words for the same thing. For example, in England a *restroom* is sometimes

Consonant: Speech sounds articulated by either stopping the outgoing air stream or creating a narrow opening of resistance using the articulators.

Vowel: Voiced speech sounds from the unrestricted passage of the air stream through the mouth without audible stoppage or friction.

Context: The circumstances or events that form the environment within which something exists or takes place; also, the words, phrases, or narrative that come before and after a particular word or phrase in speech or a piece of writing that helps to explain its full meaning.

Morphology: The study of the structure (form) of words.

Grammar: The rules of the use of morphology and syntax in a language.

INSIGHT QUESTION

How good is your grammatical intuition; that is, how easily do you automatically detect or recognize grammatical errors in other people's speech? In your own speech?

TABLE 1-1 Examples of Whole Words, Prefixes, Base Words, and Suffixes

Whole Word	Prefix	Base Word	Suffix
miscommunication	mis	communicate	tion
indefensible	in	defense	ible
disorienting	dis	orient	ing

called a *water closet* (WC) and in Australia a *napkin* is a *diaper.* The differences in the semantic use of words and the meanings of words can certainly affect communication, even among people who do not have communication disorders.

Pragmatics

Pragmatics comprises the rules governing the use of language in social situations. Some elements included in pragmatics are the *relationship* of the people talking (e.g., friend, relative, or stranger), the context or environment they are in (e.g., social versus business), and the *intentions* of the communication (e.g., friendliness or hostility). The context in which a message is framed significantly affects its true meaning. Pragmatics places greater emphasis on the functions of language than on the structure of language.

Pragmatics is culturally based or influenced. For example, in some regions of the world, such as the Middle East, an initial business meeting may be devoted to sharing about family and friends, and the business may not be discussed until a later meeting. Also, the beginning of each new business meeting may be devoted to extended casual conversation rather than moving to the task at hand. When business people do not know the cultural traditions of the people with whom they are dealing, disastrous consequences may result.

Reading and Writing

Literacy: The ability to communicate through written language, both reading and writing.

process (mental or cognitive process): The things individuals do with their brains (minds) that involve attention, perception, memory, ideation, imagination, belief, reasoning, use of language, volition, emotion, and others; the process of thinking.

Many speech-language pathologists, particularly in the public schools, are involved in the area of **literacy** with children who have reading and writing problems. Reading and writing may be more challenging for the brain to **process (mental or cognitive process)** and, therefore, more difficult to develop than auditory-verbal abilities. In a way, we have two languages: listening-speaking (*auditory-verbal* or *aural-oral*) and reading-writing (*visual-graphic*). The auditory-verbal language is developed in the early years of life; however, the reading-writing language does not normally start developing until the early years of schooling. Also, a person may become verbal and be considered a good communicator, but that does not mean he is an equally good reader or writer.

Disorders of Communication

Articulation: The modifying of the airstream (voiced and unvoiced sounds) into distinctive sounds of a language to produce speech. In speech-language pathology, the movement of the *articulators* (mandible, lips, tongue, and soft palate) to produce sounds of speech.

When we listen to someone talk, we typically (consciously or subconsciously) pay attention or notice several features. We notice the person's **articulation** and how clearly and easily we can understand him or her. We pay attention to the person's voice and whether we think it is appropriate for the person's age and gender, and whether it is relatively clear and pleasant. We hear whether a person has a *resonance problem* and sounds like she is either "talking through her nose" or has a "stuffy nose." We listen for the person's language skills and determine whether good syntax is being used with a reasonably appropriate choice of words. We notice whether the person's speech is relatively fluent or whether she has unusual pauses and hesitations, repetitions of sounds and words, or prolongations of sounds. We also notice whether the person's hearing is adequate when we are talking with her or whether we have to speak more loudly than normal or repeat ourselves often. We also may notice whether the person seems embarrassed or frustrated with her own communication. In social conversations, when we notice problems in any of these areas, we usually try not to let the speaker know that we are aware of them. However, in our professional work as speech-language pathologists and audiologists, we need to recognize, analyze, diagnose, and treat a person's communication disorders.

Definitions

A communication **disorder** may be defined as an impairment in the ability to receive, comprehend, or send messages, verbally, nonverbally, or graphically. Alternatively, based on the earlier definition of *communication* (i.e., any means by which individuals relate their wants, needs, thoughts, feelings, and knowledge to another person), a communication disorder may be defined as any speech, language, cognitive, voice, resonance, or hearing impairment that interferes with conveying or understanding a person's wants, needs, thoughts, feelings, and knowledge.

Disorder: As defined by the World Health Organization (WHO), any loss or abnormality of psychological, physiological, or anatomical structure or function that interferes with normal activities.

As professionals, SLPs and audiologists try to maintain objectivity in their definitions of terms and diagnoses of communication disorders. In reality, the subjective feelings of clients and patients and their listeners are what determine how much a communication disorder actually affects an individual. Some individuals have very negative reactions to even minor communication problems, whereas others appear (or try to appear) remarkably tolerant, unconcerned, or unaware of even fairly significant problems. In essence, a communication disorder can affect a person's **quality of life**, and the tasks of SLPs and audiologists are to **habilitate** or **rehabilitate** our clients and patients to help improve their quality of life, and the quality of life of their families. Note that the term **handicap** is generally avoided when referring to communication disorders because of its negative connotations, with the terms **disability** and **impairment** now more commonly used.

Quality of life: A global concept that involves a person's standard of living, personal freedom, and the opportunity to pursue happiness; a measure of a person's ability to cope successfully with the full range of challenges encountered in daily living; the characterization of health concerns or disease effects on a person's lifestyle and daily functioning.

Habilitate: The process of developing a skill or ability to be able to function within the environment; the initial learning and development of a new skill.

Rehabilitate: Restoration to normal or to as satisfactory a status as possible of impaired functions and abilities.

Handicap: As defined by the World Health Organization (WHO), loss or limitation of opportunities to take part in the life of the community on an equal level with others; a congenital or acquired physical or intellectual limitation that hinders a person from performing specific tasks.

Prevalence

The term **prevalence** refers to the estimated number of individuals diagnosed with a particular disorder, disability, or disease at a given time in a region or country. The term **incidence** refers to the total number of new diagnoses of a disorder, disability, or disease in the population of a region or country over a 1-year period (or some other specified time span). The prevalence of disorders is more clinically relevant and, therefore, more commonly reported than the incidence.

It is nearly impossible to determine the precise prevalence of communication disorders in the United States or any country. Moreover, general estimates likely undercount the number of individuals with these disorders, because not all communication disorders are diagnosed or diagnosed with the same criteria, or systematically reported to calculate their totals. In the United States, one in seven children has a developmental, mental, or behavioral disorder that may involve speech, language, and/or cognition. More than 25% of all children with learning or physical disabilities also have one or more communication disorders (e.g., speech, language, literacy, cognitive, and/or hearing). Males are more likely to have communication disorders at all ages than females (American Speech-Language-Hearing Association [ASHA], 2008a; Bitsko, Holbrook, Robinson, et al., 2016; Catts & Kamhi, 2012).

Classification of Communication Disorders

There are numerous approaches to classification of **speech disorders** and **language disorders**. (In addition to the term *disorder*, clinicians often use the words *impairment* or *disability*, or more colloquially, *problem* or *difficulty*.) In general, communication disorders are divided into those affecting *articulation* (articulation disorders, phonological disorders, and motor speech disorders), *language* (receptive language and expressive language), *fluency* (stuttering and cluttering), *voice* (aphonia and dysphonia), *resonance* (hypernasality and hyponasality), *cognition* (developmental and acquired disorders), *literacy* (reading and writing disorders), and *hearing* (conductive, sensorineural, and mixed losses) (**FIGURE 1-3**). Although a *swallowing disorder* (discussed in the *Swallowing Disorders/Dysphagia* chapter) is