

THIRD EDITION

Communication Sciences and Disorders

From Science to
Clinical Practice

Ronald B. Gillam
Thomas P. Marquardt



THIRD EDITION

Communication Sciences and Disorders

From Science to
Clinical Practice

Ronald B. Gillam, PhD

Thomas P. Marquardt, PhD



JONES & BARTLETT
LEARNING

World Headquarters
Jones & Bartlett Learning
5 Wall Street
Burlington, MA 01803
978-443-5000
info@jblearning.com
www.jblearning.com

Jones & Bartlett Learning books and products are available through most bookstores and online booksellers. To contact Jones & Bartlett Learning directly, call 800-832-0034, fax 978-443-8000, or visit our website, www.jblearning.com.

Substantial discounts on bulk quantities of Jones & Bartlett Learning publications are available to corporations, professional associations, and other qualified organizations. For details and specific discount information, contact the special sales department at Jones & Bartlett Learning via the above contact information or send an email to specialsales@jblearning.com.

Copyright © 2016 by Jones & Bartlett Learning, LLC, an Ascend Learning Company

All rights reserved. No part of the material protected by this copyright may be reproduced or utilized in any form, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without written permission from the copyright owner.

The content, statements, views, and opinions herein are the sole expression of the respective authors and not that of Jones & Bartlett Learning, LLC. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not constitute or imply its endorsement or recommendation by Jones & Bartlett Learning, LLC and such reference shall not be used for advertising or product endorsement purposes. All trademarks displayed are the trademarks of the parties noted herein. *Communication Sciences and Disorders, Third Edition* is an independent publication and has not been authorized, sponsored, or otherwise approved by the owners of the trademarks or service marks referenced in this product.

There may be images in this book that feature models; these models do not necessarily endorse, represent, or participate in the activities represented in the images. Any screenshots in this product are for educational and instructive purposes only. Any individuals and scenarios featured in the case studies throughout this product may be real or fictitious, but are used for instructional purposes only.

The authors, editor, and publisher have made every effort to provide accurate information. However, they are not responsible for errors, omissions, or for any outcomes related to the use of the contents of this book and take no responsibility for the use of the products and procedures described. Treatments and side effects described in this book may not be applicable to all people; likewise, some people may require a dose or experience a side effect that is not described herein. Drugs and medical devices are discussed that may have limited availability controlled by the Food and Drug Administration (FDA) for use only in a research study or clinical trial. Research, clinical practice, and government regulations often change the accepted standard in this field. When consideration is being given to use of any drug in the clinical setting, the health care provider or reader is responsible for determining FDA status of the drug, reading the package insert, and reviewing prescribing information for the most up-to-date recommendations on dose, precautions, and contraindications, and determining the appropriate usage for the product. This is especially important in the case of drugs that are new or seldom used.

09650-7

Production Credits

Chief Executive Officer: Ty Field
President: James Homer
Chief Product Officer: Eduardo Moura
VP, Executive Publisher: David D. Cella
Publisher: Cathy L. Esperti
Acquisitions Editor: Laura Pagluica
Editorial Assistant: Taylor Ferracane
Production Assistant: Talia Adry
Marketing Manager: Grace Richards

VP, Manufacturing and Inventory Control: Therese Connell
Composition: Integra Software Services Pvt. Ltd.
Cover Design: Michael O'Donnell
Interior Text Design: Kristin E. Parker
Rights & Media Research Coordinator: Abigail Reip
Media Development Editor: Shannon Sheehan
Cover Image: © Olha Rohulya/Shutterstock
Printing and Binding: RR Donnelley
Cover Printing: RR Donnelley

Library of Congress Cataloging-in-Publication Data

Communication sciences and disorders : from science to clinical practice / [edited by] Ronald B. Gillam and Thomas P. Marquardt. —Third edition.

p. ; cm.

Includes bibliographical references.

ISBN 978-1-284-04307-5 (pbk. : alk. paper)

I. Gillam, Ronald B. (Ronald Bradley), 1955-, editor. II. Marquardt, Thomas P., editor.

[DNLM: 1. Communication Disorders. 2. Communication. 3. Speech—physiology. WL 340.2]

RC423

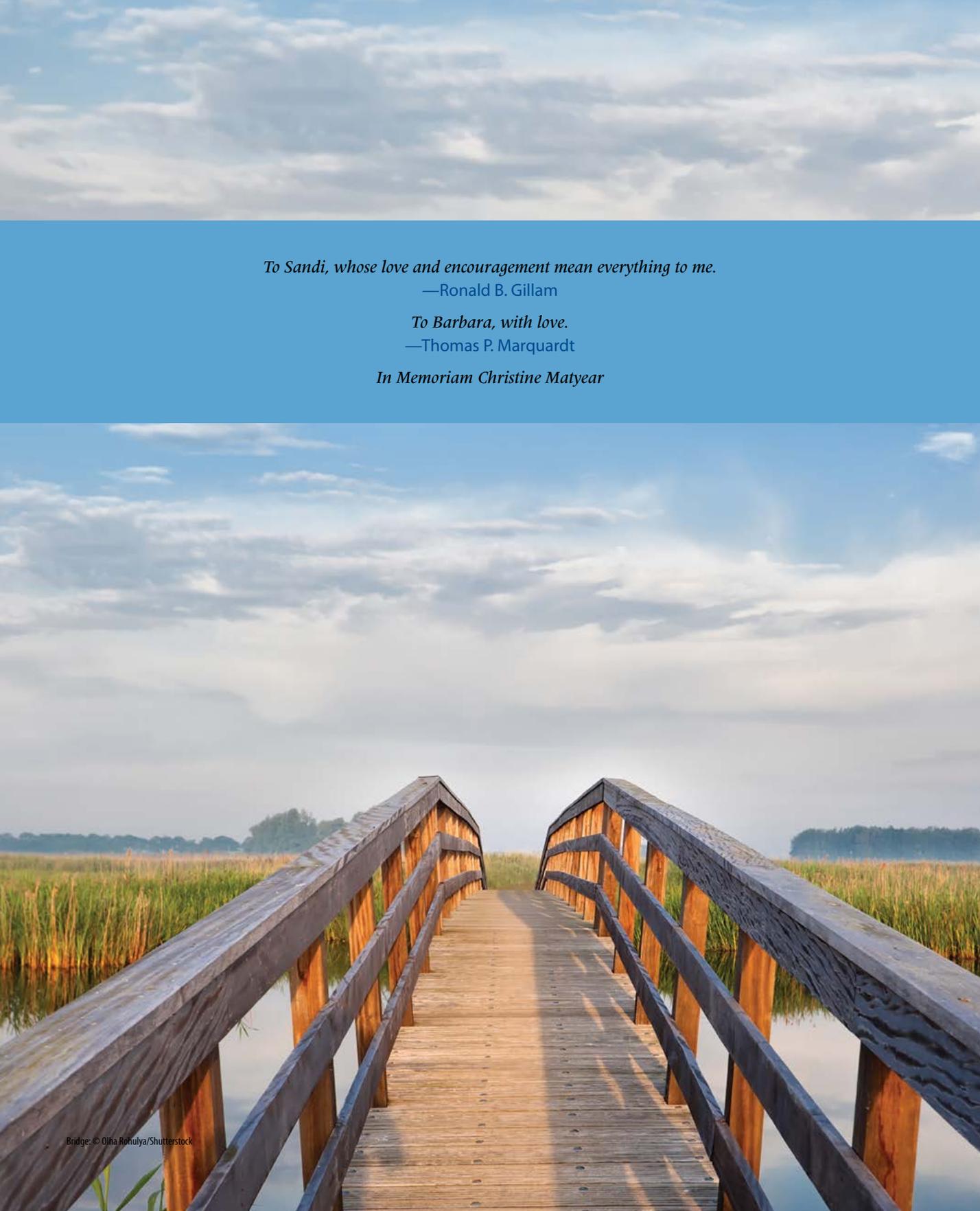
616.85'5—dc23

2015012337

6048

Printed in the United States of America

19 18 17 16 15 10 9 8 7 6 5 4 3 2 1

A wooden bridge with a dark railing extends from the foreground into the distance, crossing a body of water. The water is surrounded by tall reeds and grasses. The sky is filled with soft, white clouds, and the overall atmosphere is peaceful and serene.

To Sandi, whose love and encouragement mean everything to me.

—Ronald B. Gillam

To Barbara, with love.

—Thomas P. Marquardt

In Memoriam Christine Matyear

TABLE OF CONTENTS

Preface	xi
Acknowledgments	xiii
Contributors	xv

SECTION 1

General Considerations **1**

CHAPTER ONE

An Introduction to the Discipline of Communication Sciences and Disorders **3**

Sandra L. Gillam and Ronald B. Gillam

Communication	4
Individuals with Communication Disorders	4
Types of Communication Disorders	7
The Professions	15
Professional and Scholarly Associations	22
Regulation	23
Ethics	25
Summary	27
Study Questions	30
Key Terms	30
References	31
Suggested Readings	32

CHAPTER TWO

Communication Across the Life Span **33**

Ronald B. Gillam, Lisa M. Bedore, and Barbara L. Davis

The Process of Language Production and Comprehension	35
The Building Blocks of Speech	36
The Building Blocks of Language	39
The Development of Speech and Language	41
From Crying to Short Phrases: Ages 0 to 24 Months	44
From Early Sentences to Stories: Ages 2 to 5 Years	48
From Oral Language to Written Language: The School-Age Years	51
Adulthood	57
Summary	59
Study Questions	61
Key Terms	61

References	62
Suggested Readings	62

CHAPTER THREE

The Social and Cultural Bases of Communication **63**

Elizabeth D. Peña and Janice E. Jackson

The Social Context of Communication	64
Socialization: Learning the Rules of Family and Society	66
What Should We Do If There Is a Mismatch?	69
Dialects and Bilingualism	72
Summary	85
Study Questions	85
Key Terms	86
References	86
Suggested Readings	88

SECTION 2

Speech Disorders **89**

CHAPTER FOUR

Speech Science **91**

Thomas P. Marquardt and Christine L. Matyear

Nervous System	92
Central Nervous System	94
Peripheral Nervous System	98
Hemispheric Specialization/Localization of Function	99
Motor Pathways	102
Respiration	103
Phonation	108
Articulation	114
Speech Production	117
Summary	124
Study Questions	124
Key Terms	125
References	125
Suggested Readings	126

CHAPTER FIVE

Developmental Speech Disorders **127**

Barbara L. Davis and Lisa M. Bedore

Definition and Incidence	129
A Framework for Understanding Articulation and Phonology	130

Articulation and Phonological Disorders	133
Assessment and Treatment	140
Summary	147
Study Questions	149
Key Terms	149
References	149
Suggested Readings	150

CHAPTER SIX

Voice Disorders **151**

Rodger Dalston and Thomas P. Marquardt

Voice Disorders	153
Vocal Fold Abnormalities That Affect Voice	154
Voice Disorders Resulting from Neurological Impairment	160
The Voice Evaluation	164
Laryngectomy	169
Summary	173
Study Questions	174
Key Terms	175
References	175
Suggested Readings	176

CHAPTER SEVEN

Cleft Lip and Palate **177**

Rodger Dalston and Thomas P. Marquardt

Oral-Facial Clefts: An Overview	178
The Speech of Children with Cleft Lip and Palate	183
Management of Patients with Oral-Facial Clefts	185
Summary	190
Study Questions	190
Key Terms	191
References	191
Suggested Readings	192

CHAPTER EIGHT

Fluency Disorders **193**

Courtney T. Byrd and Ronald B. Gillam

The Nature of Fluent Speech	195
What Is Stuttering?	197
Individuals Who Stutter	199
The Etiology of Stuttering	202

The Development of Stuttering	205
Factors That Contribute to Chronic Stuttering	210
Assessment of Stuttering	213
Treatment	219
Summary	224
Study Questions	226
Key Terms	226
References	227
Suggested Readings	228

CHAPTER NINE

Motor Speech Disorders **229**

Thomas P. Marquardt

Childhood Apraxia of Speech	230
Acquired Apraxia of Speech	232
Dysarthria in Children	233
Cerebral Palsy	233
Acquired Dysarthria	239
Assessment of Individuals with Dysarthria	245
Treatment of Individuals with Dysarthria	247
Augmentative Communication	249
Summary	253
Study Questions	254
Key Terms	255
References	255
Suggested Readings	256

CHAPTER TEN

Dysphagia **257**

Dena Granof

Examples of Dysphagia	258
Role of the Speech-Language Pathologist	260
Stages of Swallowing	261
Dysphagia in Adults	264
Management of Adult Dysphagia	267
Dysphagia in Children	274
Pediatric Dysphagia Evaluation	275
Summary	277
Study Questions	277
Key Terms	277
References	278
Suggested Readings	278

SECTION 3 Individuals with Language Impairment 279

CHAPTER ELEVEN

Language Impairment in Children 281

Sandra L. Gillam and Ronald B. Gillam

What Is language impairment?	283
Patterns of Language Impairment	284
What Constitutes a Problem with Language Form?	284
What Constitutes a Language Problem in the Area of Content?	288
What Constitutes a Language Problem in the Area of Language Use?	290
Diagnostic Conditions That Are Characterized by Language Impairment	293
Assessment	298
Assessing Children's Language	301
Language Intervention	306
Summary	312
Study Questions	314
Key Terms	315
References	315
Suggested Readings	318

CHAPTER TWELVE

Acquired Neurogenic Language Disorders 319

Thomas P. Marquardt and Swathi Kiran

Causes of Brain Damage	320
Aphasia	322
Assessment and Diagnosis of Aphasia	331
The Treatment of Aphasia	334
Right Hemisphere Communication Deficits	340
Brain Trauma	342
Sports Concussion	344
Dementia	345
Summary	347
Study Questions	347
Key Terms	348
References	348
Suggested Readings	350

SECTION 4 Hearing and Hearing Disorders 351

CHAPTER THIRTEEN

Hearing Science 353

Craig A. Champlin

Fundamentals of Sound	354
The Auditory System: Structure and Function	362
Summary	376
Study Questions	377
Key Terms	377
Suggested Readings	378

CHAPTER FOURTEEN

Hearing Disorders 379

Karen Muñoz

Hearing Loss	380
Hearing Tests	381
Electrophysiological Tests	387
Types of Hearing Loss	390
Summary	397
Study Questions	398
Key Terms	399
References	399
Suggested Readings	400

CHAPTER FIFTEEN

Audiologic Rehabilitation 401

Lauri H. Nelson and Karen Muñoz

Personal Hearing Devices	402
Audiologic (Re)habilitation Across the Life Span	414
Summary	423
Study Questions	424
Key Terms	425
References	425
Suggested Readings	426
Glossary	427
Index	447

PREFACE

This is the third edition of an introductory textbook that is intended to provide a foundation for undergraduate students who are enrolled in their first course in communication sciences and disorders. We revised the book with two important assumptions in mind. First, we assumed that the students who read it would have relatively little prior knowledge about the scientific study of communication, the nature of communication disorders, or the professions of audiology and speech-language pathology. Second, we assumed that if students found the content of this book to be interesting, they would be likely to enroll in courses that would examine most of the topics that are included in much greater detail.

Given these assumptions, we focused on providing the reader with a wide-angle view of communication sciences and disorders. We wanted to show the considerable forest that is communication sciences and disorders without having to focus on too many individual trees. Whenever possible, we selected a wide-angle lens rather than a narrow lens. We wanted readers to get a sense of the variety of topics that speech, language, and hearing scientists study and the variety of individuals that audiologists and speech-language pathologists treat.

The book contains basic information about speech disorders that are related to impairments in articulation, voice, and fluency; language disorders in children and adults; and hearing disorders that cause conductive and sensorineural hearing losses. We have also included basic information about speech, language, and hearing sciences and some practical information about assessment and intervention practices.

We did not want to tell readers everything we know about each topic. To this end, we describe only the most critical concepts in detail, provide many examples, and cite only seminal works. If we have selected our topics wisely and have explained them well, the content of this book will provide students with the background knowledge they need to get the most out of subsequent undergraduate and graduate courses.

Finally, we have provided students with a means for seeing and hearing the human communication disorders they are reading about. The video segments accompanying the book enable professors to provide information about common or unusual cases in a single, highly accessible format, and enables students to watch the segments many times over to make the most of the enhanced learning opportunities they provide.

The third edition of this book includes a number of changes. We reorganized the sections so that they follow the way many instructors sequence

their introductory classes. The text begins with overviews of the professions, the nature of communication across the life span, and social-cultural issues that affect communication and communication disorders. The second section examines the variety of speech disorders. We begin with a summary of basic principles of speech science, and then we provide chapters that focus on speech sound disorders in children, voice disorders, cleft lip and palate, fluency disorders, motor speech disorders, and dysphagia. The third section of the book contains chapters on language disorders in children and acquired neurogenic language disorders. The last section of the book concerns hearing and hearing disorders. We begin with a summary of basic principles of hearing science, and then provide a survey of hearing disorders and hearing testing and a summary of audiologic rehabilitation (hearing aids and cochlear implants) that includes a description of the education of students who are deaf or hard of hearing.

We want students in introductory courses to begin to understand what it means to have a communication disorder. We have added personal stories about events in our careers and case studies to the chapters to highlight the human side of the professions of speech-language pathology, audiology, and deaf education. We want these vignettes, together with the video segments, to demonstrate that the concepts and principles in the chapters relate to real people who have real needs that can be addressed by caring and well-educated professionals. We hope the students who read this book will find this subject matter to be both interesting and uplifting.



ACKNOWLEDGMENTS

Many people have contributed to the creation of this book. We would like to thank Tami Pyfer, Allison Hancock, and Danielle Stoddard for their helpful assistance in preparing the revised manuscript. At Jones & Bartlett Learning, Taylor Ferracane, Laura Pagluica, and Sean Fabery provided a great deal of advice and encouragement at the most critical times.

A number of people assisted us in creating the video segments. LaVae Hoffman shot and edited many of the original clips, some of which have been retained in this edition. Without her loyalty, ingenuity, and hard work, this project would not have been possible. The third edition contains a number of new videos, which were shot and edited by Tami Pyfer. We thank many of our colleagues and students who agreed to appear in the video segments. Grateful appreciation is extended to Mr. Chad Smiddy who created the embryologic morphing sequence of the human face.

Finally, the editors and authors thank those individuals with communication disorders and their family members who allowed their images and words to be included on the video segments. We applaud their continuing struggle to compensate for or overcome their communication disorders, and we share their hope that their appearance on the videos will contribute to the education of the next generation of speech-language pathologists, audiologists, and deaf educators.

CONTRIBUTORS

Lisa M. Bedore, PhD (CCC-SLP), is a professor in the Department of Communication Sciences and Disorders at the University of Texas at Austin and Director of the University of Texas Speech and Hearing Center. She teaches courses on language development, language disorders, and bilingualism. Her research interests are in the areas of language and phonological development in Spanish-English bilingual children with typically developing language skills and language disorders.

Courtney T. Byrd, PhD (CCC-SLP), is an associate professor at the University of Texas at Austin and Director of the Michael and Tami Lang Stuttering Institute. She teaches courses in assessment and treatment of child speech and language disorders, fluency disorders, and voice disorders. Her primary research focus is the contribution of linguistic and motor planning to developmental stuttering with a secondary focus on evidence-based practice for young children who stutter.

Craig A. Champlin, PhD (CCC-A), is the Lillie Hage Jamail Centennial Professor of Communication Sciences and Disorders at the University of Texas at Austin. He teaches courses and conducts research in the areas of psychoacoustics, auditory electrophysiology, and diagnostic audiology. Craig is a Fellow of the American Academy of Audiology and the American Speech-Language-Hearing Association.

Rodger Dalston, PhD (CCC-SP), is an emeritus professor in the Department of Communication Sciences and Disorders at the University of Texas at Austin. He taught courses in voice disorders, craniofacial anomalies, and research design. His primary research interest concerned oral-facial clefts and their impact upon speech and language development.

Barbara L. Davis, PhD (CCC-SLP), is the Houston Harte Centennial Professor of Communication at the University of Texas at Austin. She teaches courses in the Department of Communication Sciences and Disorders in infant-toddler intervention, developmental speech disorders, and phonetics. Her research interests focus on the interactive influences of production and perception on speech acquisition in typically developing children, children with speech disorders, and children with early identified hearing impairment.

Ronald B. Gillam, PhD (CCC-SLP), holds the Raymond and Eloise Lillywhite Chair of Speech-Language Pathology in the Department of Communicative

Disorders and Deaf Education at Utah State University, where he teaches courses on research methods and evidence-based practices. His research primarily concerns the neuroscience of information processing, diagnostic markers of language impairments, language intervention procedures, and narrative development in children.

Sandra L. Gillam, PhD (CCC-SLP), is a professor in Communication Disorders and Deaf Education at Utah State University and the Vice President for Speech-Language Pathology Practice for the American Speech, Language, and Hearing Association. She teaches the introductory course for the department as well as courses in phonological development and disorders and clinical practice. Her research interests include assessment and intervention for language and literacy impairments, multicultural populations, and processes involved in text comprehension.

Dena Granof, PhD (CCC-SLP), is a senior lecturer (retired) in Communication Sciences and Disorders at the University of Texas. She formerly taught courses in dysphagia and language disorders in children and adults. Her primary clinical interests are in assessment and treatment of communication and swallowing disorders in children with multiple handicaps.

Janice E. Jackson, PhD (CCC-SLP), is President of Speaking Strategies Inc. and a clinical service provider for Dekalb County School District in Georgia, with expertise in language acquisition and disorders in diverse populations. She earned her Ph.D. at the University of Massachusetts, where she contributed to the development of the Diagnostic Evaluation of Language Variation (DELV) tests, non-biased language assessments published by Pearson, Inc. Her current research interests include examining linguistic foundations of language related to deep structure indicators of language impairment that can be identified cross-linguistically.

Swathi Kiran, PhD, is a professor in the Department of Speech, Language, and Hearing Sciences and research director of the Aphasia Resource Center at Boston University. She conducts research on aphasia recovery.

Thomas P. Marquardt, PhD (CCC-SLP), is the Ben F. Love Regents professor in the Department of Communication Sciences and Disorders at The University of Texas. He conducts research on speech motor control disorders in children and adults and teaches courses on acquired neurogenic speech and language disorders in addition to introduction to communication disorders. He is a Fellow of the American Speech-Language-Hearing Association.

Christine L. Matyear, PhD, (deceased) was a senior lecturer in Communication Sciences and Disorders at the University of Texas at Austin. She was an award winning instructor for courses in phonetics, speech science, hearing science, anatomy and physiology, deafness, and research. Her research interests included speech acquisition in infants and the acoustic analysis of speech sounds.

Karen Muñoz, EdD (CCC-A), is an associate professor in Communication Disorders and Deaf Education at Utah State University and the associate director of the National Center for Hearing Assessment and Management (NCHAM). She teaches courses in pediatric audiology, amplification, and counseling. Her research interests are in the area of pediatric audiology and include pediatric hearing aid use, audiological counseling and psychosocial aspects influencing treatment adherence.

Lauri H. Nelson, PhD, is a pediatric audiologist and a deaf educator. She is an assistant professor in Communicative Disorders and Deaf Education at Utah State University and directs the Listening and Spoken Language Deaf Education graduate training program. Her research interests are in the spoken language development and academic achievement of young children who are deaf or hard of hearing.

Elizabeth D. Peña, PhD (CCC-SLP), is George Christian Professor of Communication Sciences and Disorders at the University of Texas at Austin. She teaches courses in language development, language disorders, psychometrics, and bilingualism. Her research interests are in the areas of language development and assessment of Spanish English bilingual children with typically developing language skills and language disorders.

SECTION 1

General Considerations





CHAPTER 1

An Introduction to the Discipline of Communication Sciences and Disorders

Sandra L. Gillam and Ronald B. Gillam

LEARNING OBJECTIVES

- 1.** To learn about the major processes in communication
- 2.** To understand how disorders of hearing, speech, and language adversely affect communication
- 3.** To summarize the major types of speech, language, and hearing disorders
- 4.** To learn about the educational background and professional activities of audiologists and speech-language pathologists
- 5.** To understand the regulation of the professions of audiology and speech-language pathology by state agencies and professional organizations

Communication

This is a book about communication, the kinds of disorders that disrupt communication, and the ways that audiologists and speech-language pathologists treat individuals who have communication disorders. **Communication** involves an exchange of meaning between a sender and a receiver. Communication is important because it is the primary means by which we share our thoughts and feelings, express our identity, build relationships, pass on traditions, conduct business, teach, and learn. Most of the time, meaning is exchanged via a code, called **language**, which includes the words, sentences, and texts that are used to convey ideas and feelings. Language can be spoken, written, or signed. A simple way to differentiate between language and speech is to think of language as *what* you say and speech as *how* you say it.

Speakers articulate a series of programmed movements to form sequences of sounds that represent words, phrases, and sentences. Sequences of spoken sounds leave the mouth in the form of sound waves. Then listeners interpret the message by converting the acoustic (sound) energy that reaches their ears into mental representations of words and sentences. Through communication, individuals can influence society at large. At the same time, social and cultural experiences play an important role in shaping the way individuals communicate.

Individuals with Communication Disorders

Unfortunately, there are many ways that the processes involved in communication can break down. Approximately 46 million people have a communication disorder that negatively affects their ability to hear or talk (National Institute on Deafness and Other Communication Disorders, 2015b). Some of these individuals have congenital disorders, meaning they were born with a condition such as deafness (an inability to hear sounds) or cleft palate (a large opening in the roof of the mouth). Other individuals have acquired disorders, meaning the disorder manifested itself after birth, sometimes as a result of diseases (such as meningitis) or accidents (traumatic brain injury). Fortunately, there are professionals known as speech-language pathologists (SLPs) and audiologists who can assist individuals with communication disorders and their families.

This chapter presents a systematic classification of communication differences and disorders and the kinds of communicative disruptions that individuals experience when they have difficulties with one or more of the processes that contribute to speech, language, and hearing. It is important to realize that communication is a system with many reciprocal relationships. A problem with one aspect of the communication process often affects many of the other processes that are related to it. For example, children who have a hearing loss receive limited acoustic input, which adversely affects the development of their language and speech. The language and speech problems experienced by children who have a hearing loss often have an adverse impact on their social and academic development.

Communication Disorders

There are appropriate and inappropriate ways to refer to people who have unusual difficulties with communication. According to the World Health Organization (2011), the word **impairment** should be used to refer to any loss or abnormality of psychological, physiological, or anatomic structure or function. This is a relatively neutral term with respect to a person's ability to function in society. For example, a hearing impairment means only that someone has unusually poor hearing. It does not mean that the individual cannot function well in daily living and working situations. With hearing aids, the person with a hearing impairment might live life as completely and fully as people who hear well. The concept of impairment leads us to ask questions such as, "What is wrong with the person, and can it be fixed? What does this person do well? What skills and abilities can be used to compensate for this person's impairment?"

The word **disability** refers to a reduced competence in meeting daily living needs. The person with a disability might not be able to perform a particular life activity in a particular context. For example, a person with hearing impairment might not be able to communicate well on the telephone, even when he or she is wearing a hearing aid. In this case, the hearing impairment led to a disability. The concept of a disability leads us to ask, "What are the communication requirements of the environments that the individual functions in every day, and to what extent can the person access important daily living activities if some sort of compensation (such as a hearing aid) is provided?"

The term **communication disorder** is sometimes used as a synonym for impairment and other times as a synonym for disability. In this text, we use the term *communication disorder* to refer to any communication structure or

function that is diminished to a significant degree. In essence, a communication disorder interferes with the exchange of meaning and is apparent to the communication partners. Unless specifically stated, we do not imply any cultural, educational, or vocational disadvantage. Unfortunately, many people with communication disorders experience communication disabilities and **handicaps**, although this is not necessarily so.

Communication Differences

Some people communicate in ways that differ from that of the mainstream culture. We use the term **communication difference** to mean communication abilities that differ from those usually encountered in the mainstream culture even though there is no evidence of impairment. For example, when they begin school, children who have spoken Spanish for most of their lives will not communicate like their monolingual English-speaking classmates. Children who learn Spanish without any difficulty do not have a communication disorder. Unfortunately, these children's communication differences may contribute to periodic social and educational disadvantages within the school environment. These children may need extra assistance in learning English as a second language. However, unless children present communication impairments (characterized by loss of or decline in communicative structures or functions that adversely affect their communication in all the languages they speak), they should not be diagnosed with a communication disorder and should not be treated by SLPs or audiologists. There is much more information about communication differences in Chapter 3.

Person-First Language

The problems that individuals experience do not define who they are. For example, a person who stutters is not best described as a stutterer. That person may be a caring parent, a good friend, a successful business owner, and even a good communicator. For this reason, most researchers and clinicians use **person-first language** to refer to individuals with communication disorders. By "person-first," we mean that the communication disorder is a descriptor of the individual and not a person's primary attribute. We follow that convention as much as possible in this text by using such phrases as "children with language disorders" instead of "language-disordered children." When we refer to groups of individuals who present a particular disorder, we might sometimes use the name of the disorder alone (e.g., "aphasics").

When we use the name of a communication disorder to refer to the group of individuals who present that disorder, readers should know that we do not mean to imply that the disorder is the sole defining characteristic of individuals who happen to present that kind of problem. As a matter of fact, many of the people we work with tell us that they do not like to be defined by their disabilities.

Types of Communication Disorders

Communication disorders typically are categorized into speech disorders, language disorders, and hearing disorders. Additional parameters of classification include the etiological basis (cause) of the disorder and the point during the maturation of the individual that the disorder occurred. **Organic** disorders have a physical cause. For example, an adult with difficulty retrieving words after a stroke and a child who has problems producing speech sounds as a result of inadequate closure between the nose and mouth after the repair of a cleft palate have a physical problem that can account for the communication problem. In contrast, there are communication disorders termed **functional** for which a physical cause cannot be identified. For example, a man may speak at a very high pitch (sounding more like a child than an adult male) even though his vocal folds are normal. In this case of a functional disorder of the voice, there is no physical basis for the problem.

For some communication problems, it is difficult to determine whether the cause of the disorder would best be described as organic or functional. A young child may have difficulty producing speech sounds in comparison with peers, but it may not be known for sure whether the disorder is organic in nature (e.g., a result of delayed maturation of the nervous system) or functional (e.g., a result of poor speech models or lack of environmental opportunity for speaking).

When a communication disorder occurs is also an important consideration. **Developmental disorders**, such as delays in speech and language development, occur early in the maturation of the individual but may continue into adulthood. **Acquired disorders**, such as speech and language disorders resulting from brain trauma following an accident or stroke, often occur after communication skills have been fully developed. What is important to remember is that acquired disorders are those that occur *after* someone has begun to learn or has mastered his or her native language.

With these distinctions in mind, we provide a brief overview of hearing, speech, and language disorders. We make some reference to the **incidence**

(percentage of the population that experienced a disorder during their lifetime) and **prevalence** (percentage of individuals with a disorder at a particular point in time) of communication disorders. More detailed information about each disorder is provided in later chapters.

Speech Disorders

Speech disorders (TABLE 1-1) result from an interruption in the process of speech production. This process starts with the programming of motor movements and ends with the acoustic signal that carries the sound to the listener. By historical convention, speech disorders are categorized on the basis of the aspect of speech production (articulation, fluency, voice, etc.) that is affected.

Articulation and Phonological Disorders

Individuals with **articulation and phonological disorders** have problems with the production of speech sounds. Such problems result from deviations in anatomic structures, physiological functions, and learning. When the speech production problem is based on the way sounds are represented in the brain, it is commonly referred to as a phonological

TABLE 1-1

Examples of Speech Disorders

Disorder	Characteristics
Articulation and phonological disorders	Problems producing speech sounds correctly as a result of differences in anatomic structures, physiological functions, or learning
Cleft palate	Nasal loss of air during consonant production, abnormal resonance, speech sound production errors
Cerebral palsy	Articulation and voice disorders associated with abnormal muscle function in children
Fluency disorder	Unusual disruptions in the rhythm and rate of speech, often characterized by repetitions or prolongations of sounds or syllables plus excessive tension

disorder. Articulation and phonological disorders can be minimal at one extreme (interfering with the way that one or two speech sounds, like /s/ or /r/, are produced) or severe, rendering speech unintelligible. Included in this category are developmental speech disorders, neuromuscular speech disorders in adults and children, and articulation disorders resulting from orofacial anomalies such as cleft palate. The prevalence of speech disorders in preschool children is between 8% and 9%. By the time children reach first grade, approximately 5% demonstrate noticeable speech disorders (National Institute on Deafness and Other Communication Disorders, 2015b).

Fluency Disorders

A **fluency disorder** is an unusual interruption in the flow of speaking. Individuals with fluency disorders have an atypical rhythm and rate and an unusual number of sound and syllable repetitions. Their disruptions in fluency are often accompanied by excessive tension, and they may struggle visibly to produce the words they want to say. The most common fluency disorder is stuttering. Children between the ages of 2 and 6 constitute the largest group of those who stutter, which is estimated at more than 3 million Americans. However, fewer than 1% of adults stutter, suggesting that many outgrow the problem (National Institute on Deafness and Other Communication Disorders, 2015b).

Voice Disorders

The category of voice disorders usually is divided into two parts: phonation and resonance. **Phonatory disorders** result from abnormalities in vocal fold vibration that yield changes in loudness, pitch, or quality (e.g., breathiness, harshness, or hoarseness). Problems closing the opening between the nose and the mouth during production of speech sounds are termed **resonance disorders**. Approximately 7.5 million people in the United States have some type of a voice disorder (National Institute on Deafness and Other Communication Disorders, 2015a).

Language Disorders

Language refers to the words and sentences that are used to represent objects, thoughts, and feelings. A language disorder is a significant deficiency in