

Sixth Edition

Articulation and Phonology in Speech Sound Disorders

A Clinical Focus

Jacqueline Bauman-Waengler



Pearson

Director and Publisher: Kevin Davis
Portfolio Manager: Aileen Pogran
Managing Content Producer: Megan Moffo
Content Producer (Team Lead): Faraz Sharique Ali
Content Producer: Deepali Malhotra
Portfolio Management Assistant: Maria Feliberty
Development Editor: Krista McMurray
Executive Product Marketing Manager: Christopher Barry
Executive Field Marketing Manager: Krista Clark
Procurement Specialist: Deidra Headlee

Cover Design: Pearson CSC, Jerilyn Bockorick
Cover Art: Tetra Images/Shawn O'Connor/Brand X Pictures/Getty Images
Full Service Vendor: Pearson CSC
Full Service Project Management: Pearson CSC, Prince John William Carey
Editorial Project Manager: Pearson CSC, Carmina Jimenez
Printer-Binder: LSC Communications, Inc./Willard
Cover Printer: Phoenix Color/Hagerstown
Text Font: 10/12 Charis SIL Regular

Copyright © 2020, 2016, 2012 by Pearson Education, Inc. 221 River Street, Hoboken, NJ 07030. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the publisher. Printed in the United States.

Acknowledgements of third-party content appear on page in text, which constitute an extension of this copyright page.

Unless otherwise indicated herein, any third-party trademarks that may appear in this work are the property of their respective owners and any references to third-party trademarks, logos, or other trade dress are for demonstrative or descriptive purposes only. Such references are not intended to imply any sponsorship, endorsement, authorization, or promotion of Pearson's products by the owners of such marks, or any relationship between the owner and Pearson Education, Inc., or its affiliates, authors, licensees, or distributors.

Library of Congress Cataloging-in-Publication Data

Names: Bauman-Waengler, Jacqueline Ann, author.

Title: Articulation and phonology in speech sound disorders : a clinical focus / Jacqueline Bauman-Waengler.

Description: Sixth edition. | Boston : Pearson Education, [2018] | Includes bibliographical references and indexes.

Identifiers: LCCN 2018046080 | ISBN 9780134990576 | ISBN 0134990579

Subjects: LCSH: Articulation disorders. | English language—Phonetics.

Classification: LCC RC424.7 .B378 2018 | DDC 618.92/855—dc23

LC record available at <https://lcn.loc.gov/2018046080>

*To all the speech-language pathologists who are
working hard to make a difference to the
children and adults they serve.*

About the Author

JACQUELINE BAUMAN-WAENGLER has been a professor for more than 25 years. Her main teaching and clinical emphases are phonetics and phonology, including disorders of articulation and phonology in children and child language disorders. She has published and presented widely in these areas both nationally and internationally. In addition to the sixth edition of *Articulation and Phonology in Speech Sound Disorders: A Clinical Focus*, Bauman-Waengler has also published *Introduction to Phonetics and Phonology: From Concepts to Transcription* (2009) with Pearson. A new book, coauthored with Diane Garcia, will be available at the end of November from Plural Publishing, San Diego, CA. It is titled *Phonological Treatment of Speech Sound Disorders in Children: A Practical Guide*.

Preface

The concept for this book grew out of a perceived need to create a bridge between theoretical issues in speech-language pathology and their clinical application. The goal for the sixth edition has remained the same: to tie strong academic foundations directly to clinical applications. To this end, every chapter contains suggestions for clinical practice as well as clinical examples and clinical applications. These features will assist the reader in developing an understanding of how basic concepts and theoretical knowledge form the core for clinical decision making in the assessment and remediation of speech sound disorders. Learning aids located throughout the chapter include video clips and clinical applications. Those learning aids at the end of every chapter include case studies, critical thinking, and multiple-choice questions.

New to This Edition

With the publication of this sixth edition, this book will have been in use for 20 years. Therefore, this edition of *Articulation and Phonology in Speech Sound Disorders: A Clinical Focus* has had a serious overhaul with significant changes.

- *Chapter Applications: Case Study at the beginning of each chapter.* These applications focus on real-life experiences that beginning students and clinicians will be confronted with. For example, what does a beginning clinician need to know to be able to choose one therapy approach versus another? They are all directly related to the content of the specific chapter.
- *American Speech-Language Hearing Association's (ASHA) position statements, definitions, and practice policies.* Several of the chapters have sections delineating new definitions, such as the current definition of speech sound disorder; practice policies, such as the alignment with ASHA and the World Health Organization's diagnostic practices; ASHA's position on dialects and cultural competence; and specific treatment overviews, such as for dysarthria. This will aid students as they transition into competent clinicians.
- *More user-friendly phonetic descriptors.* This edition has also seen a shift from describing and, in cases, transcribing vowels and consonants in a more user-friendly manner. An attempt has been made to align the descriptive process according to the International Phonetic Alphabet chart in its new 2015 revision. This will aid students in learning the specific descriptions without being unnecessarily burdened with cumbersome terminology.
- *New topic: Anatomy and physiology.* New to this edition is a brief overview of the anatomy and physiology of the speech mechanism (Chapter 2). This is applicable to the discussion of normal speech production as well as those disorders, for example, cleft palate, cerebral palsy, and acquired dysarthria, in which characteristic deviations of the processes underlying speech production are a portion of the clinical picture.
- *New topic: Principles of motor learning.* A new section has been added that discusses the conditions of practice and feedback for motor learning (Chapter 9). Therapeutic applications specific to articulation disorders are given as well as research documenting the efficacy of such principles in childhood apraxia of speech, for example.

- *New topic: Classification of speech sound disorders (Dodd, 2013).* This diagnostic classification system is now introduced (Chapter 1) and expanded upon in several chapters. For example, in Chapter 7 the characteristics of four of the categories—articulation disorder, phonological delay, consistent phonological disorder, and inconsistent phonological disorder—are noted. A case study example is given for each to provide the student with more information on how each of these categories could look clinically. This will give students a much needed structure of how to organize their diagnostic data. A clinical application is also given of a child demonstrating an articulation *and* a phonological disorder. This is often difficult for students to understand.
- *Expanded and reorganized topics: Diagnostic protocols.* Chapter 6, Assessment and Appraisal, provides expanded information on contextual testing and the use of multisyllabic words within the diagnostic process. Specific measures are noted that a clinician could use to assess these variables. In addition, updated lists of standardized speech assessment, language screening measures, prosodic assessment protocols, the testing or screening of phonological and phonemic awareness, and the assessment of a child’s communicative participation are given. The student or practitioner will have resources for a large number of formal and informal measures to assess each of these areas.
- *Expanded and reorganized topics: Summarizing data.* The analysis of collected data from a standardized speech assessment and spontaneous speech sample have been completely redone for Chapter 7. Thus, the analysis of the inventory, distribution, stimulability, and determining phonemic contrasts has been streamlined. New analysis forms and a new case study have been used to organize these data and demonstrate their use. Results have been tied to the previously noted classification of speech sound disorders. This will be especially valuable to beginning clinicians as they attempt to organize and categorize the data they have collected. Also new to this edition are measures of whole-word accuracy and variability. A case study is provided so that students can understand how to apply and calculate these measures.
- *Expanded and reorganized topics: Theoretical foundations and their clinical application.* Several of the theoretical constructs have been deleted from this chapter (Chapter 4), while others, such as feature geometry and optimality theory have been expanded to include more practical clinical applications that the student can work through easily. Sonority theory and implicational universals have also been included in this chapter as well as distinctive features and their use in maximal oppositions target selection. These principles are a major portion of specific phonological target selection and therapies which are presented in Chapter 10.
- *Expanded and reorganized topics: Treatment of Phonological Disorders (Chapter 10).* This chapter has been expanded to include more information on several of the therapies that are considered to be phonological in respect to the target selection or treatment options. However, this chapter has also been streamlined so that a clinician is able to obtain an overview of the treatment process. This includes returning to the classification system noted in Chapter 1, utilizing variables such as the age of the child and the severity of the disorder to determine who would maximally benefit from each type of treatment possibility. Also new to this chapter is the categorization “inconsistent speech disorder.” Diagnostic criteria and the treatment process are discussed. For each of these phonological treatment methods a case study new to this edition demonstrates how this child’s error patterns might be implemented to establish treatment targets and goals.

- *Expanded and reorganized topics: Speech Sound Disorders in Selected Populations (Chapter 11).* This chapter now includes a section on Down syndrome, which contains general as well as articulatory/phonological characteristics. In addition, when possible, the therapy section examines treatment efficacy studies that are based on reviews of controlled studies to determine which treatment protocols demonstrate maintenance and generalization of the treatment effects and increased performance. This is important information for clinicians as they are faced with a large number of treatment choices.
- *Categorical learning objectives.* These have been fine-tuned in each chapter so that the reader begins each chapter with a set of easily identifiable goals for the chapter's learning process. Each set of learning objectives provides the scaffolding for major divisions of the chapter and leads directly to quizzes and critical thinking components that compartmentalize key concepts.
- *New clinical exercises.* This text includes a number of new or revised clinical exercises to allow the student to master theoretical concepts by applying them to real-life situations. The eText edition of this text also contains embedded videos that can be used in conjunction with these clinical exercises, allowing for additional analysis opportunities.
- *Updated references.* References in each chapter have been updated to reflect the most recent research in the field.

The eText edition of this text offers interactive digital features, including:

- *Digital functionality.* The digital eText version of this title provides interactive tools to enhance students' experience with the material, including tools that allow students to search the text, make notes online, print important activities, and bookmark passages for later review.
- *Video Examples.* Video Examples have been added to the eText edition. They give students an inside look at the world of communication disorders. These videos, chosen specifically for this text, illustrate critical concepts in easily digestible 2- to 3-minute clips.
- *Video Tool Exercises.* One Video Tool Exercise per chapter in the eText edition offers students an opportunity to engage with chapter content further. These activities consist of a video accompanied by short-answer questions to promote deeper understanding of key concepts.
- *Linked glossary.* Key terms throughout the text are linked, giving students one-click access to crucial definitions.

Instructor's Resource Manual

To help instructors in preparing their courses, we have provided an Instructor's Resource Manual. This supplement is available online or can be obtained by contacting a Pearson sales representative. To download and print the Instructor's Resource Manual, go to www.pearsonhighered.com and then click on "Educators."

Acknowledgments

Preparing the sixth edition—as with previous editions—might appear at first to be a simple process but it actually was a large time investment supported by many people. I have to admit, based on past experience, I was a bit skeptical about a “team”. However, this team has been wonderful, helpful, knowledgeable, and efficient. First, I would like to thank Aileen (Berg) Pograd, who is the Executive Portfolio Manager of this sixth edition and relatively new to Pearson. Her support has been amazing. Other team members include Krista (Slavicek)

McMurray, Development Editor, whose eye for detail has been really very helpful; Faraz Sharique Ali, Content Producer US (Team Lead), who has been a behind the scenes person but could be relied on for all sorts of needs, thank you; Carmina Jimenez, Editorial Project Manager, who is so quick and efficient, great; Prince John William Carey, Project Manager, who has been so kind and helpful in spite of my having to change deadlines constantly; and Jon Theiss, Digital Development Editor, always providing a top notch video. A special thanks to Deepali Malhotra, Content Producer, who recently took a vague concept of mine and turned it into a cover design which is so perfect: a child who is happy and hopeful, representing to me the future and the possibilities. Thank you to Deepali and her team. All of these amazing people have been so supportive and helpful as I proceeded through this task.

For this edition, I would like to say a special thanks to my reviewers: Christine Fiestas from Texas A&M -Kingsville; Carol Tessel from Florida Atlantic University; Haralambia Kollia from William Paterson University; Maria Grigos from New York University; Peter Richtsmeier from Oklahoma State University; Tim Brackenbury from Bowling Green State University. I hope that you can recognize many of the wonderful suggestions that guided me through these revisions.

Brief Contents

1	Clinical Framework: Basic Terms and Concepts	1
2	Articulatory Phonetics: Speech Sound Form	17
3	Phonetic Transcription and Diacritics	46
4	Theoretical Considerations and Practical Applications	71
5	Normal Phonological Development	114
6	Assessment and Appraisal: Collection of Data	155
7	Diagnosis: Summarizing Data and Classifying Speech Sound Disorders	196
8	Dialects and English as a Second Language	230
9	Therapy for Articulation Disorders: Obtaining an Accurate Production of a Speech Sound	269
10	Treatment of Phonological Disorders	342
11	Speech Sound Disorders in Selected Populations	393
	Glossary	443
	References	453
	Index	477

Contents

About the Author	iv		
Preface	v		
1 Clinical Framework: <i>Basic Terms and Concepts</i>	1		
Communication, Speech, and Language Disorders of Communication, Speech, and Language	1		
Articulation and Speech Sounds (Phones): Phonology and Phonemes	3		
Defining Speech Sound Disorders: Articulation and Phonological Disorders	4		
Classifying Speech Sound Disorders	7		
Subtypes and Etiological Factors: Speech Disorders Classification System	10		
Examining Error Patterns: The Differential Diagnosis System	10		
Summary 15 • Case Studies 15 • Think Critically 16	12		
2 Articulatory Phonetics: <i>Speech Sound Form</i>	17		
Phonetics: Definitions and Classification	18		
Anatomical-Physiological Review of the Foundations of Speech Production	19		
The Respiratory System	19		
The Phonatory System	22		
The Resonatory System	24		
The Articulatory System	26		
Vowels Versus Consonants	27		
General American English Vowels: Descriptive Parameters	29		
Front Vowels	30		
Back Vowels	30		
Central Vowels	30		
Diphthongs	31		
General American English Consonants: Descriptive Parameters	33		
Sounds in Context: Coarticulation and Assimilation	38		
Syllable Structure	40		
Clinical Significance	41		
Summary 43 • Case Study 43 • Think Critically 44			
APPENDIX 2.1 Selected Readings in Anatomy and Physiology of the Speech and Hearing Mechanisms			45
APPENDIX 2.2 Phonetic Symbols Used in Current Phonetic Transcription Texts			45
3 Phonetic Transcription and Diacritics			46
Phonetic Transcription as a Notational System	47		
The Use and Value of Phonetic Transcription for Speech-Language Therapists	51		
Defining Diacritics	51		
Diacritics Used with Consonants	53		
Diacritics Used with Vowels	59		
Diacritics for Stress, Duration, and Syllable Boundaries	62		
Additional Symbols	63		
Clinical Implications	65		
Summary 68 • Case Study 68 • Think Critically 69			
4 Theoretical Considerations and Practical Applications			71
The Evolution of the Phoneme Concept	73		
How Did the Concept of the Phoneme Develop?	73		
Speech Sound Versus Phoneme: Form and Function as a Unity	74		
Distinctive Feature Theories	76		
How Do Distinctive Features Work?	77		
Generative Phonology	83		
How Does Generative Phonology Work?	83		
How Did Generative Phonology Develop?	84		
Naturalness, Markedness, and Implicational Universals	85		
Natural Phonology	88		
How Does Natural Phonology Work?	88		
How Did Natural Phonology Develop?	91		
Nonlinear Phonologies: Exemplified by Feature Geometry and Optimality Theory	92		
Feature Geometry	94		
Optimality Theory	100		

The Sonority Theory and Sonority Sequencing Principles	107	Standardized Speech Assessments and Supplemental Testing	165
Summary 111 • Case Study 111 • Think Critically 112		Advantages and Disadvantages of Standardized Speech Assessments	165
5 Normal Phonological Development	114	Factors to Consider When Selecting a Standardized Speech Measure	166
Aspects of Structural and Functional Development	116	Assessment Procedures to Supplement Standardized Speech Measures	170
Early Perceptual Development	118	Organizing Standardized Speech Assessment Results: Describing the Error	170
Prelinguistic Stages: Before the First Words	121	Stimulability Testing	172
Vocoids: Nonphonemic Vowel-like Productions	124	Contextual Testing	173
Contoids: Nonphonemic Consonant-like Productions	124	Testing Multisyllabic (3-Plus Syllable) Words	173
Syllable Shapes	125	Spontaneous Speech Sample	174
Babbling and Its Relationship to Later Language Development	125	Organization of the Continuous Speech Sample	174
Prosodic Feature Development	126	Selection of Additional Measures in Other Areas	177
Transition from Babbling to First Words and the First-50-Word Stage	127	Language Screening	177
The First-50-Word Stage	127	Prosodic Screening and Testing	178
Segmental Form Development	128	Phonological and Phonemic Awareness Screening and Testing	178
Prosodic Feature Development	133	Cognitive Appraisal	180
Consonant, Vowel, and Prosodic Development of the Preschool-Age Child	135	Assessment of a Child's Communicative Participation	181
Segmental Form Development: Vowels	135	Special Considerations: A Child with Emerging Phonology	182
Segmental Form Development: Consonants	136	Special Considerations: A Child with Unintelligible Speech	187
Phonological Processes	139	Summary 190 • Case Study 190 • Think Critically 191	
Prosodic Feature Development	142	APPENDIX 6.1 Speech-Motor Assessment Screening Form	192
Consonants, Consonant Clusters, and Prosodic Development of the School-Age Child	143	7 Diagnosis: Summarizing Data and Classifying Speech Sound Disorders	196
Segmental Form Development	144	Inventory, Distribution, and Stimulability of Speech Sounds	197
Consonant Cluster Development	144	Outcome Measures: Which Sounds the Child Can Produce, Which Sounds the Child Cannot Produce, and Stimulability	197
Prosodic Feature Development	145	What Do the Inventory, Distribution, and Stimulability Results Tell Us as Clinicians?	198
Phonological Awareness, Emerging Literacy, and Phonological Disorders	146	Phonemic Contrasts: Establishing a Phonemic Inventory	204
Summary 151 • Case Study 152 • Think Critically 153		Phonemic Pattern Analysis:	208
6 Assessment and Appraisal: Collection of Data	155	Phonological Processes	211
Guidelines for Assessment: Objectives of Appraisal and Diagnosis	157	Classifying Speech Sound Disorders	211
Initial Procedures: Hearing Evaluation and Speech Mechanism Examination	159	Articulation Disorder	211
Initial Impression	159	Phonological Delay	213
Procedures for a Hearing Screening	160	Consistent Phonological Disorder	214
Evaluation of the Speech Mechanism	161	Inconsistent Phonological Disorder	216
What to Look for When Evaluating the Speech Mechanism	162		

Factors Affecting Intelligibility and Measurements of Intelligibility	218		
Factors Affecting Intelligibility	218		
Measures of Intelligibility	219		
Measures of Severity, Whole-Word Accuracy, and Variability	221		
Measures of Whole Words	222		
Summary 223 • Case Study 223 • Think Critically 225			
APPENDIX 7.1 Transcription from Jonah, Age 7 Years 4 Months, from the Goldman-Fristoe Test of Articulation (Goldman & Fristoe, 2015)	226		
APPENDIX 7.2 Matrix for Spontaneous Speech Sample from Jonah, Age 7 Years 4 Months	227		
APPENDIX 7.3 Minimal Word-Pairs Ordered by Vowel	228		
APPENDIX 7.4 Intelligibility Grid	229		
8 Dialects and English as a Second Language	230		
Dialects	231		
Regional Dialects	232		
Characteristics of Appalachian English, Ozark English, and African-American Vernacular English	235		
Appalachian Versus Ozark English	235		
Ethnicity, Race, and Culture	237		
African-American Vernacular English	238		
ASHA's Position on Dialects	241		
The Speaker of English as a Second Language	243		
Factors to Consider in the Phonological Development of Children Learning English as a Second Language	243		
Limited English Proficient Students	245		
Speech Sound and Selected Prosodic Characteristics of Spanish, Vietnamese, Cantonese, Korean, Filipino, Hmong, and Arabic American English	247		
Spanish American English	247		
Vietnamese American English	252		
Korean American English	255		
Cantonese American English	257		
Filipino/Tagalog American English	259		
Hmong American English	261		
Arabic American English	263		
Cultural Competence and Implications for Appraisal	265		
Guidelines	266		
Summary 267 • Case Study 267 • Think Critically 268			
9 Therapy for Articulation Disorders: <i>Obtaining an Accurate Production of a Speech Sound</i>	269		
Defining the Traditional Motor Approach	271		
Guidelines for Beginning Therapy: Articulation Disorders	272		
General Overview of Therapy Progression	272		
Sensory-Perceptual Training	273		
Production of the Sound in Isolation	274		
Sounds in Context	276		
Dismissal and Re-evaluation Criteria	279		
Principles of Motor Learning and Their Application to Therapy	281		
Conditions of Practice	282		
Conditions of Feedback	284		
The Traditional Motor Approach and the Most Frequently Misarticulated Speech Sounds	285		
Misarticulations of [s] and [z]	286		
Misarticulations of [ʃ] and [ʒ]	298		
Misarticulations of [k] and [g]	302		
Misarticulations of [l]	306		
Misarticulations of [ɹ] and the Central Vowels with r-Coloring	311		
Misarticulations of [θ] and [ð]	319		
Misarticulations of [f] and [v]	322		
Affricate Problems	325		
Voicing Problems	327		
Consonant Cluster Problems	329		
Group Therapy with the Traditional Motor Approach	332		
Summary 334 • Case Study 335 • Think Critically 335			
APPENDIX 9.1 Minimal Word-Pairs with Frequently Misarticulated Sounds	336		
10 Treatment of Phonological Disorders	342		
Minimal Pair Therapy: Minimal Oppositions Contrast Therapy and the Multiple Oppositions Approach	344		
Minimal Opposition Contrast Therapy	344		
Multiple Oppositions Approach	349		
Target Selection for Minimal Pair Therapy: Maximal Oppositions and the Complexity Approach	353		
Maximal Oppositions	353		
The Complexity Approach	357		

Cycles Phonological Remediation Approach	364	Articulatory and Phonological Characteristics	404
Inconsistent Speech Disorder and the Core Vocabulary Approach	369	Clinical Implications: Diagnostics	406
The Metaphon Approach	373	Clinical Implications: Therapeutics	407
Speech Sound Disorders with Concurrent Language Problems: The Treatment of Morphosyntax, Vocabulary, and the Child with Emerging Phonology	378	Cleft Palate	409
Connecting Phonology to Morphosyntax: Morphosyntax Intervention	378	Definition and General Features	409
Connecting Phonology to Semantics: Vocabulary Intervention	380	Articulatory and Phonological Characteristics	410
The Child with an Emerging Phonological System: Expanding the System and Vocabulary	381	Clinical Implications: Diagnostic	411
Treatment of Multiple Vowel Errors	383	Clinical Implications: Therapeutics	414
The Child with a Very Limited Vowel Inventory: Therapeutic Suggestions	384	Intellectual Disability (Intellectual Developmental Disorder)	417
The Child with a High Proportion of Vowel Substitutions: Therapeutic Suggestions	386	Definition and General Features	417
Summary 387 • Case Study 388 • Think Critically 389		Articulatory and Phonological Characteristics: General Information	418
APPENDIX 10.1 Probes for Initial Consonant Clusters That Could Be Targets	389	Down Syndrome: General Information	418
APPENDIX 10.2 Probes for Monitoring Generalization or Therapy Progress	390	Down Syndrome: Articulatory and Phonological Impairments	419
		Clinical Implications: Diagnostics	419
		Clinical Implications: Therapeutics	420
		Hearing Impairment	423
		Definition and General Features	423
		Articulatory and Phonological Characteristics	424
		Clinical Implications: Diagnostics	425
		Clinical Implications: Therapeutics	425
		Motor-Speech Disorders in Adults	428
		Acquired Apraxia of Speech	428
		The Dysarthrias	432
		Summary 438 • Case Study 438 • Think Critically 439	
11 Speech Sound Disorders in Selected Populations	393	APPENDIX 11.1 Protocol for Assessing Respiration, Phonation, Resonation, and Articulation of Dysarthric Speech	440
Childhood Apraxia of Speech: A Disorder of Speech Motor Control	394		
Definition and General Features	394	Glossary	443
Articulatory and Phonological Characteristics	395	References	453
Clinical Implications: Diagnostics	398	Index	477
Clinical Implications: Therapeutics	400		
Motor-Speech Disorders: Cerebral Palsy	403		
Definition and General Features	403		