

THIRD EDITION

Motor Speech Disorders

DIAGNOSIS AND TREATMENT



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Contents

<i>Preface</i>		<i>ix</i>
<i>About the Author</i>		<i>xiii</i>
CHAPTER 1	A Brief Historical Review of Motor Speech Disorders	1
	Case Reports from Ancient Greece	3
	Case Reports from the Middle Ages and Renaissance	6
	Two Early Theories on the Localization of Reason	7
	From the 19th Century to Today	9
CHAPTER 2	The Motor System	15
	Components of the Motor System	16
	Structure and Function of the Motor System	27
	Summary of the Motor System	53
	Study Questions	53
CHAPTER 3	Evaluation of Motor Speech Disorders	55
	Goals of a Motor Speech Evaluation	57
	Speech Production Components and Disorders	58
	Standardized Tests for Dysarthria	63
	Standardized Tests for Apraxia of Speech	64
	Conducting a Motor Speech Evaluation	67
	Instructions for the Motor Speech Evaluation	70
	Auditory-Perceptual Evaluations of the Motor Speech Mechanism	78

	Summary of the Evaluation of Motor Speech Disorders	84
	Study Questions	85
	Appendix 3–1: Motor Speech Examination	86
CHAPTER 4	Flaccid Dysarthria	99
	Definitions of Flaccid Dysarthria	100
	Neurologic Basis of Flaccid Dysarthria	101
	Causes of Flaccid Dysarthria	114
	Speech Characteristics of Flaccid Dysarthria	118
	Key Evaluation Tasks for Flaccid Dysarthria	122
	Treatment of Motor Speech Disorders	123
	Treatment of Flaccid Dysarthria	126
	Summary of Flaccid Dysarthria	139
	Study Questions	140
CHAPTER 5	Spastic Dysarthria	141
	Definitions of Spastic Dysarthria	142
	Neurologic Basis of Spastic Dysarthria	142
	Causes of Spastic Dysarthria	146
	Speech Characteristics of Spastic Dysarthria	148
	Spastic Dysarthria Versus Flaccid Dysarthria	153
	Key Evaluation Tasks for Spastic Dysarthria	154
	Treatment of Spastic Dysarthria	155
	Summary of Spastic Dysarthria	163
	Study Questions	164
CHAPTER 6	Unilateral Upper Motor Neuron Dysarthria	165
	Definitions of Unilateral Upper Motor Neuron Dysarthria	166
	Neurologic Basis of Unilateral Upper Motor Neuron Dysarthria	166
	Causes of Unilateral Upper Motor Neuron Dysarthria	170
	Speech Characteristics of Unilateral Upper Motor Neuron Dysarthria	173
	Key Evaluation Tasks for Unilateral Upper Motor Neuron Dysarthria	177

	Treatment of Unilateral Upper Motor Neuron Dysarthria	177
	Summary of Unilateral Upper Motor Neuron Dysarthria	179
	Study Questions	180
CHAPTER 7	Ataxic Dysarthria	181
	Definitions of Ataxic Dysarthria	182
	Neurologic Basis of Ataxic Dysarthria	182
	The Cerebellum and Speech	187
	Causes of Ataxic Dysarthria	188
	Speech Characteristics of Ataxic Dysarthria	192
	Key Evaluation Tasks for Ataxic Dysarthria	196
	Treatment of Ataxic Dysarthria	197
	Summary of Ataxic Dysarthria	203
	Study Questions	203
CHAPTER 8	Hypokinetic Dysarthria	205
	Definitions of Hypokinetic Dysarthria	206
	Neurologic Basis of Hypokinetic Dysarthria	206
	Causes of Hypokinetic Dysarthria	211
	Speech Characteristics of Hypokinetic Dysarthria	214
	Key Evaluation Tasks for Hypokinetic Dysarthria	219
	Treatment of Hypokinetic Dysarthria	219
	Summary of Hypokinetic Dysarthria	234
	Study Questions	235
CHAPTER 9	Hyperkinetic Dysarthria	237
	Definitions of Hyperkinetic Dysarthria	238
	Neurologic Basis of Hyperkinetic Dysarthria	239
	Causes of Hyperkinetic Dysarthria	242
	Key Evaluation Tasks for Hyperkinetic Dysarthria	259
	Treatment of Hyperkinetic Dysarthria	260
	Summary of Hyperkinetic Dysarthria	265
	Study Questions	266

CHAPTER 10	Mixed Dysarthria	267
	Definitions of Mixed Dysarthria	268
	Neurologic Basis of Mixed Dysarthria	268
	Causes of Mixed Dysarthria	271
	Treatment of Mixed Dysarthria	281
	Summary of Mixed Dysarthria	284
	Study Questions	285
CHAPTER 11	Apraxia of Speech	287
	Definition of Apraxia of Speech	288
	Overview of the Apraxias	290
	Neurologic Basis of Apraxia of Speech	294
	Causes of Apraxia of Speech	296
	Speech Characteristics of Apraxia of Speech	297
	Assessment of Apraxia of Speech	301
	Differential Diagnosis of Apraxia of Speech	302
	Additional Diagnostic Considerations	305
	Treatment of Apraxia of Speech	310
	Summary of Apraxia of Speech	324
	Study Questions	324
	<i>References</i>	327
	<i>Glossary</i>	339
	<i>Index</i>	353

Preface

It is exciting to have this third edition of *Motor Speech Disorders: Diagnosis and Treatment* move to Plural Publishing. Although it has a new publisher, the overall goals of this book have not changed. It is still an introductory textbook for a complicated collection of disorders. This bulleted list from the second edition is also valid for this new edition:

- An orientation for students and beginning clinicians
- An emphasis on presenting the neurologic bases of these disorders in a direct, uncomplicated manner
- An easy-to-read writing style
- A nearly identical organization of most chapters, with all the critical information (e.g., causes, characteristics, assessment, and treatment) presented in single chapters that are devoted to individual disorders
- The inclusion of clinical examples and videos to enhance understanding of what these disorders look and sound like
- Descriptions of treatment procedures that are detailed enough for beginning clinicians to use them successfully in their clinical practice

Organization

The overall organization of the book has not changed. Chapter 1 is a review of ancient case reports that seem to involve speech or language disorders. It is designed as a historical introduction to the study of motor speech disorders. Chapter 2 is an introduction to the human motor system, an absolutely amazing part of the

nervous system. It is very important that clinicians have at least a basic understanding of the motor system if they are to accurately diagnose and treat motor speech disorders. Chapter 3 explores how to evaluate these disorders. It includes a step-by-step explanation of the motor speech examination that is found at the end of the chapter (Appendix 3–1). Each exam task is fully described, along with an explanation of why it is important. Chapters 4 through 11 cover the six pure dysarthrias, mixed dysarthria, and apraxia of speech. Throughout these chapters, a consistent organization is maintained, so as to facilitate the readers understanding of the disorders. Each chapter begins with the neurological basis of the condition; then continues with the etiologies causes of the disorder, an examination of the relevant speech characteristics, and key evaluation tasks specific to the disorder; and concludes with treatment suggestions. There are additional features in most of the chapters:

- Outlines at the beginning of each chapter to identify the major topics of discussion.
- A revision of all illustrations. Some are new, and others have been extensively revised to enhance clarity.
- PluralPlus icons have been placed throughout the text to refer the readers to online clinical summaries and video clips of individuals with motor speech disorders.
- Summaries at the end of most chapters emphasize key points for students.
- Study questions at the end of most chapters help students review the topics that were discussed.

New in the Third Edition

The most exciting additions to this new edition are the color illustrations. Several medical illustrators helped create these drawings, and now their skills are revealed in full color. The clarity of the new illustrations provides much better insight into the neuroanatomy associated with motor speech disorders. These improvements are evident in every drawing. Readers now can visualize these neuroanatomical structures with much better clarity than was possible in the prior edition.

Other changes include modest revisions and additions to most chapters, especially in the treatment sections of the chapters. To reflect the drive for evidence-based treatment, extra references have been included for as many treatment procedures as possible. Moreover, discussions of some treatment procedures have been

expanded and reorganized to better reflect current research into various disorders. However, information about some older treatment techniques has been retained. A good example of this is Darley, Aronson, and Brown's apraxia of speech treatment procedure. Some readers might think that it is too dated to be included in a current textbook (it first appeared in the 1970s). But as a clinician, I have successfully used it with severely impaired patients to help them independently produce a core vocabulary of functional words. It worked when some of the other apraxia procedures did not. Because I know it can be useful, it remains in this new edition.

Lastly, new videos of individuals with motor speech disorders have been added, and many of the older ones have been remastered for better picture and sound quality. This video collection is viewable online on a PluralPlus companion website. Not only is that a convenient way to study the videos, it also allows for easier updates and upgrades whenever new recordings come my way. All the individuals in these clips generously contributed their time to help beginning clinicians learn about these disorders. They were happy to do it, and their contributions are greatly appreciated.

Motor speech disorders remain an important area of research with many determined investigators reporting their findings. As was true for the second edition, the Academy of Neurologic Communication Disorders and Sciences remains an important source of information for motor speech disorders, as well as for other neurologically based communication disorders. Students and professionals should not neglect this organization's freely available reports and research.

About the Author



Donald Freed is a professor in the Department of Communicative Sciences and Deaf Studies at California State University, Fresno. He received both his MS and PhD from the University of Oregon. Prior to joining the Fresno faculty, he worked as a speech pathologist in acute care and rehabilitation facilities and served as a research speech pathologist at the Portland Veterans Affairs Medical Center. His research has concentrated on aphasia and motor speech disorders. He has published articles in journals such as *Aphasiology*, *Clinical Aphasiology*, *American Journal of Speech and Language Pathology*, and *Journal of Speech and Hearing Research*.

To Clyde and Jean for being great parents

Chapter 1

A Brief Historical Review of Motor Speech Disorders

Case Reports from Ancient Greece
Case Reports from the Middle
Ages and Renaissance

Two Early Theories on the
Localization of Reason
From the 19th Century to Today

The term motor speech disorders is an apt description of the deficits that are examined in this textbook. For readers who are new to the study of motor speech disorders, a discussion of the meaning of each word in this term will be beneficial. First, motor refers to the part of the nervous system that controls voluntary movements. Neuroanatomists call this portion of the nervous system the “motor system.” Speech is communication through the use of vocal symbols, sometimes also defined as the physical production of language. Disorders means an abnormality of function; the plural form of the word indicates that there is more than one abnormality in this condition. Motor speech disorders, therefore, are a collection of speech production deficits that are caused by the abnormal functioning of the motor system. Altogether, this collection of motor speech disorders consists of seven types of dysarthria and one type of apraxia.

Although the following chapters contain detailed discussions of dysarthria and apraxia, these disorders should be briefly defined now. The literal definition of dysarthria is “disordered utterance” (dys means disordered or abnormal; arthria means to utter distinctly, from the Greek, arthroun). A more comprehensive definition is that dysarthria is the impaired production of speech because of disturbances in the muscular control of the speech mechanism. The layperson’s concept of dysarthria is someone with slurred speech, but this disorder certainly includes many more speech production deficits than just poor articulation. It can involve respiration, prosody, resonance, and phonation as well.

Apraxia of speech also is a motor speech disorder. Apraxia means without action (a means absence of; praxia means performance of action, from the Greek, praxis). Actually, apraxia of speech is a deficit in the ability to smoothly sequence and place the tongue, lips, and jaw during speech. Apraxia of speech primarily affects articulation and prosody. Although apraxia of speech occurs frequently when the left hemisphere of the brain is damaged, the general public seems to be less aware of the characteristics of this disorder than they are of dysarthria.

This chapter reviews a small selection of ancient medical reports that mention speech and language disorders. It is important to examine these early reports because a valuable part of any study is understanding the historical context from which the subject developed. Whether the topic is science or entertainment, a historical perspective adds a sense of depth and continuity that is otherwise difficult to obtain. While reading the following pages, keep in mind that some of the individuals in these case studies experienced their speech and language disorders more than 2000 years ago.

One of the most remarkable aspects of preparing this chapter was the discovery of how “modern” many of these ancient medical writers were. From today’s perspective, it is easy to view them as quaint at best or frightfully ignorant at worst. But when examined in the context of the time in which they lived, these physicians’ conclusions about anatomy and physiology show that most of them were trying to take an analytical approach to medicine. When reading their descriptions of their medical practice, it is easy to imagine them as today’s state-of-the-art practitioners.

Case Reports from Ancient Greece

Some of the earliest written accounts of speech and language disorders appear in the Greek texts known as the **Hippocratic Corpus**. Originally, these texts were a collection of 70 volumes that described numerous medicines, diseases, and treatments, as observed by ancient Greek physicians. Only about 60 of these volumes survive to the present time, and they contain descriptions of anatomy, explanations of symptoms, and case studies of patients. A sampling of the individual titles gives an idea of the wide-ranging topics covered in these works—“On Ancient Medicines,” “On Fractures,” “The Book of Prognostics,” and “Of the Epidemics.” There are even volumes devoted to ulcers and hemorrhoids. Some of these works were written for educated physicians and contain surprising amounts of specific information about medical disorders and how to treat them. Other volumes were written for the general public and are, accordingly, more plainspoken in their advice.

The authorship of the Hippocratic Corpus is a bit of a mystery. Although it carries his name, **Hippocrates** (ca. 460–377 BC) was not the sole writer of this collection (Figure 1–1). In fact, it is not certain that he wrote any of the volumes. Most experts believe that numerous writers contributed to the collection during a period of at least 100 years. It is possible that the actual writers were physicians who were part of a school founded by Hippocrates on the Greek island of Kos.

Among the many descriptions of disorders in the Hippocratic Corpus are numerous references to patients being “speechless” or having “loss of speech.” A few of these seem to be references to neurologically based speech or language disorders. For example, in Book One in “Of the Epidemics” (ca. 400 BC), there is a description of what could be an instance of aphasia and right hemiplegia.

A woman, who lodged on the Quay, being three months gone with child, was seized with fever, and immediately began to have pains in the loins. On the third day, pain of the head and neck, extending to the clavicle, and right hand; she immediately lost the power of

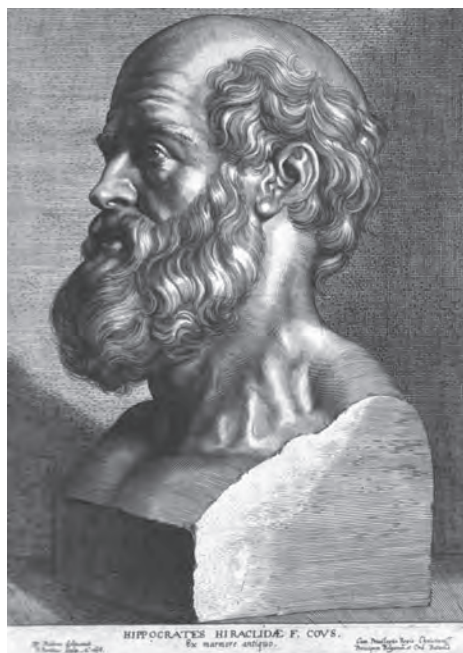


FIGURE 1-1. An artist’s representation of Hippocrates (ca. 460–377 BC), who may or may not have contributed to the ancient medical texts that carry his name. *Source:* Image obtained from the History of Medicine database of The National Library of Medicine.

speech; was paralyzed in the right hand, with spasms, after the manner of paraplegia; was quite incoherent; passed an uncomfortable night. (“Of the Epidemics” [400 BC/1995])

Fortunately, the woman’s speech or language deficit, whatever it might have been, was only temporary because on the next day, she “recovered the use of her tongue,” and on the sixth day, she “recovered her reason.”

Another volume in the Hippocratic Corpus contains descriptions that also may be references to neurologically based speech or language disorders. In the “Aphorisms” (400 BC/1995), the writer makes an intriguing comment about the rapid onset of a condition that is accompanied by speechlessness. “When persons in good health are suddenly seized with pains in the head, and straightway are laid down speechless, and breathe with stertor, they die in seven days, unless fever comes on.” Although it is impossible to determine with certainty, this may be a description of the sudden onset of a stroke or some other neurologic disorder. Garrison (1925/1969) suggested that this passage describes a subarachnoid hemorrhage, a condition that is nearly always accompanied by a sudden, painful headache and the rapid onset of other neurologic signs.

A second intriguing comment from the “Aphorisms” seems to be a reference to the loss of speech after a head injury, “In cases of concussion of the brain produced by any cause, the patients necessarily lose their speech.” As with the prior quote, it is difficult to determine which modern-day condition this may be describing. It could be that the loss of speech is the result of aphasia, severe dysarthria, or merely a temporary loss of consciousness.

One of the more detailed accounts of head injury resulting in a speech or language deficit is found in Book Five of “Of the Epidemics.” The account describes what happened to a young woman who was playing with a friend.

The pretty virgin daughter of Nerius was twenty years old. She was struck on the bregma [front of the head] by the flat of the hand of a young woman friend in play. At the time she became blind and breathless, and when she went home fever seized her immediately, her head ached, and there was redness about her face. On the seventh day foul-smelling pus came out around the right ear, reddish, more than a cyathus [one-fifth of a cup]. She seemed better, and was relieved. Again she was prostrated by the fever; she was depressed, speechless; the right side of her face was drawn up; she had difficulty breathing; there was a spasmodic trembling. Her tongue was paralyzed, her eye stricken. On the ninth day she died. (Smith, 1994, p. 191)

This description indicates clearly that the author believed that the cause of the woman's speechlessness was the blow to her head. However, the type of speech or language disorder she had is difficult to determine. A modern-day reader might assume that dysarthria was a part of the problem because of the reference to a paralyzed tongue and facial contractions, but this conclusion would be little more than a guess.

Numerous examples of disordered voice are found in Book Seven of "Of the Epidemics." One of the more intriguing reports describes a woman with arthritis whose "voice was checked during the night and up to midday." Although she could not talk, "she could hear, her mind was clear; she indicated with her hand that the pain was around the hip joint" (Smith, 1994, p. 399). That her auditory comprehension was functional and that she could gesture appropriately suggest that her speechlessness was from a laryngeal disorder, although it is difficult to say with certainty. Another case report tells of a man in Olynthus who had a "fever" for 17 days. The writer described him as having a "dreadful disorganization of body" and that his "voice [was] broken, a task to hear it, but intelligible" (Smith, 1994, p. 377). Once again, the author's imprecise description of the man's deficits make it difficult to know what was wrong with his speech or voice. The man might have been demonstrating the effects of a neurologic speech impairment such as dysarthria, or perhaps his voice was only soft and breathy from his weakened condition.

All of these case studies from the Hippocratic Corpus show that the ancient Greeks understood that speech difficulties could be the result of physical injury. Most important, these writings indicate that the Greeks knew that injury to the head could cause speechlessness (O'Neill, 1980). It is less certain whether they had a modern-day understanding of how voice, speech, and language differ, as can be seen in their vague medical descriptions of these communicative processes. Nevertheless, the influence of the Hippocratic Corpus on Western medicine was long-lasting; it was part of the standard medical curriculum for nearly 2000 years. As late as the 18th century, some physicians were still studying and practicing the Hippocratic teachings on medicine.

Case Reports from the Middle Ages and Renaissance

Early descriptions of speech and language disorders did not end with the Greeks. Medical texts from the Middle Ages and Renaissance also provide various examples of these problems. For

instance, in the early 1300s, a physician named Bernard of Gordon described individuals who omitted and added syllables to their speech (O'Neill, 1980). His examples of their spoken words (e.g., saying “Aristoles” for “Aristoteles”) are intriguing and have characteristics that are similar to those in apraxia of speech. But, as with the case studies from the Hippocratic Corpus, the exact natures of the patients’ disorders cannot be determined from the writer’s descriptions of their speech.

Another example of a speech or language disorder from the medieval era comes from an Italian physician, Lanfranc. He wrote about an incident in which a man fell from a horse and injured his head. After regaining consciousness, the man’s initial attempts at speech were filled with what Lanfranc described as a child’s babble—something that today might be labeled neologistic jargon or perhaps language of confusion. The man did survive the accident, and his speech eventually became intelligible again. Unfortunately, the recovery was not complete, because Lanfranc reported that the man never regained all of his mental abilities.

In the mid-1500s, a physician named Niccolo Massa recorded the details of another head injury that resulted in disordered speech. His case report is of a young man who was hit in the head with a spear, which apparently pierced deeply into his skull.

Also returned to health by my work is the noble youth, Marcus Goro who was wounded by the sharp point of a spear. . . . There was fracture of not only the cranial bone, but of the meninges, and of the brain substance as far as to the basilar bone. . . . Besides all his other difficulties, the young man had been speechless for eight days. . . . Since the physicians declared they had seen no bone, I thought that the reason for the extinction of the voice was that there was a piece of bone fixed in the brain, and taking an instrument from a certain surgeon who was there, I extracted the bone from the wound, and immediately, he began to speak, and said, “Praise God, I am healed.” (O'Neill, 1980, p. 185)

Two Early Theories on the Localization of Reason

Early medical writings were not confined to case reports of injuries. Many of them also included the author’s thoughts on how the human body functioned. Some of the most interesting of these are the theories of where human reasoning (and by implication, speech and language) was located in the body. One of the most long-lasting theories stated that reasoning was housed in the four cerebral