CHAPTER

1

Introduction

The purpose of this text is to provide a clinically oriented, introductory framework for the major speech-language-communication disorders encountered by speech-language pathologists (SLPs) and other clinicians who work with adults with acquired neuropathologies. Specifically, this text will deal with the symptoms, etiology, diagnosis, and treatment of aphasia; the communication disorders associated with right hemisphere damage, dementia, traumatic brain injury (TBI), and schizophrenia; dysarthria; and apraxia of speech. The order is as follows: disorders of language due to focal brain activity, disorders of language due to diffuse brain activity, and motor speech disorders.

These communication disorders were chosen because they are the most frequent of the adult neuropathologies, and because they resemble one another in certain features. It is important to differentiate these particular speech-language-communication disorders from one another, because speech and/or language therapy might be similar, different, or not indicated at all. A glossary of professional terms can be found near the end of the text, along with two appendices for the computerized version of Time-Altered Word Association Tests (TAWAT), including data that show different patterns of responses for neurotypical adults (both older and younger) and populations of adults with aphasia, dementia, and chronic undifferentiated schizophrenia.

Throughout this text we will cite evidence-based practice guidelines established by the Academy of Neurologic Communication Disorders and Sciences (ANCDS). Each writing committee of ANCDS searched through electronic databases and conducted hand searches to complete exhaustive literature reviews. The purpose of each review was to assess levels of evidence, based on objective criteria agreed on by the committee, and to write guidelines based on the reviews and assessments of levels of scientific evidence. ANCDS then sought to make this information available to practicing clinicians and to determine areas where further research was needed.

Protocols for evaluating research related to interventions included reviewing some or all of the following (see, for example, Bayles et al., 2006, p. 14): the purpose of the study; characteristics of the participants; control of threats to internal, external, and content validity; characteristics of dosage of treatments, including frequency, intensity, and duration; measures of outcomes; results; and methodology.

In an early paper (Frattali et al., 2003), ANCDS identified the following five disorders as subjects of practice guidelines: dysarthria, acquired apraxia of speech, aphasia, dementia, and cognitive-communication disorders after traumatic brain injury. In the present text, the current authors will refer to more than 25 reports prepared by ANCDS writing committees.

Clinical practice recommendations reflect the level of the research evidence (Ehlhardt et al., 2008, p. 8):

Class I studies: prospective, randomized controlled clinical trials; masked outcome assessment; representative population with qualifiers

Class II: prospective, matched group cohorts; masked outcome assessment; representative population; lacking one criterion for Class I evidence

Class III: all other controlled trials where outcome assessment is independent of patient treatment representative population

Class IV: evidence from uncontrolled studies, e.g., case reports, expert opinion

Periodically throughout this text, we will refer to the International Classification of Functioning, Disability, and Health (abbreviated in the literature as ICF), developed by the World Health Organization (WHO, 2002). The purpose of the ICF is to establish a universally accepted set of terms for classifying health, as well as changes in body structure and function. "Function" applies to an individual's typical environment, as well as to one defined as standard, and accounts for environmental and personal factors.

There are three levels of functioning, according to the ICF: body or body part, person, and person in an environment or social context. ICF components of body systems include the following operational definitions:

Body structures refers to organs, limbs, and their components; in other words, the anatomical composition of the body.

Impairments refers to significant deviation or loss, caused by problems in body function or structure.

Activity refers to execution of an action or a task by an individual, who may have *activity limitations*.

Participation refers to involvement in a life situation, where the individual may have *participation restrictions*.

Environmental factors refers to the individual's physical and social environments, as well as attitudes toward these environments.

A document from the American Speech-Language-Hearing Association (2005) indicates that speech-language pathologists should know about and apply computerized and other technologies when working with individuals with cognitive-communication disorders. Among the cognitive process to be addressed are helping clients develop functional skills, compensatory strategies, and support systems. Accordingly, we have included a section on augmentative-alternative communication (AAC) in the chapter on apraxia of speech, and note that AAC is an appropriate intervention for many individuals with the other disorders discussed in this text. In addition, we provide a Web link, navigation instructions, and manual for the computerized version of Time-Altered Word Association Tests, based on our own research (see the appendices at the end of the text).

Following are some definitions of terms that will be used throughout the text. They are presented, along with some of the characteristics typically associated with each of the communication disorders, for the purpose of showing some of the similarities and differences among the disorders.

Definitions

A *communication disorder* (ASHA, 1993) is an impairment in the ability to receive, send, process, and comprehend concepts of verbal, nonverbal, and graphic symbol systems. It may

be evident in the processes of hearing, language, and/or speech. It may range in severity from mild to profound and may be developmental or acquired. Individuals may demonstrate one or any combination of communication disorders. The communication disorder may be a primary disability or it may be secondary to other disabilities.

A *speech disorder* (ASHA, 1993) is an impairment of the articulation of speech sounds, fluency, and/or voice. An *articulation disorder* is the atypical production of speech sounds characterized by substitutions, omissions, additions, or distortions that may interfere with intelligibility. A *fluency disorder* is an interruption in the flow of speaking characterized by atypical rate, rhythm, and repetitions in sounds, syllables, words, and phrases. This may be accompanied by excessive tension, struggle behavior, and secondary mannerisms. A *voice disorder* is characterized by the abnormal production and/or absence of vocal quality, pitch, loudness, resonance, and/or duration, which is inappropriate for an individual's age and/or sex.

A *language disorder* (ASHA, 1993) is impaired comprehension and/or use of spoken, written, and/or other symbol systems. The disorder may involve the form of language (phonology, morphology, syntax). *Phonology* is the sound system of a language and the rules that govern the sound combinations. *Morphology* is the system that governs the structure of words and the construction of word forms. *Syntax* is the system governing the order and combination of words to form sentences, and the relationships among the elements within a sentence.

The disorder may involve the content of language (semantics). *Semantics* is the system that governs the meanings of words and sentences. It must be noted that a disturbance in the semantic aspect of language is probably the most common error found in all of the neurogenic adult language disorders. The disorder may also involve the function of language (pragmatics). *Pragmatics* is the system that combines the above language components into functional and socially appropriate communication. Pragmatics (Prutting & Kirchner, 1987) would involve eye contact with the listener, topic maintenance, turn-taking, modulation of loudness, proper decorum in the communicative setting, facial and bodily gestures that reflect the mood, proper use of register, and providing relevant information to the listener.

Cognitive functioning involves orientation, arousal, attention, speed of processing, memory, abstract reasoning, and visuospatial perception. *Orientation* is the ability to locate oneself in one's environment with reference to time (year, month, day, date, hour, etc.), place (thinking where one is at the moment), and person (the identification of self and other people). *Arousal* is an aspect of consciousness and is the next step above coma, which is a loss of consciousness.

Attention is attending to stimuli in space and the ability to hold objects, events, words, or thoughts in one's consciousness. *Selective attention* is the ability to zero in on selected visual or auditory stimuli despite a host of other, competing stimuli. It is the ability to pick out the figure from the background and maintain attention to that figure long enough to complete a successful response. For example, selective attention is a concern if someone is shown a strongly limned picture of a sailboat (figure) to respond to but instead the individual attends to some faintly drawn cloud in the distance (background) or to a number in the corner of the picture (background). (For a further discussion of attention, see the chapter on communication disorders associated with traumatic brain injury.)

Speed of processing refers to the amount of time it takes for a person to absorb information. It is especially apparent under timed conditions. *Memory* is the mental faculty or power that enables one to retain and to recall, through unconscious associative processes, previously experienced sensations, impressions, ideas, and concepts, and all information that has been consciously learned (*Mosby's*, 1994). (For a further discussion of memory, see the chapters on communication disorders associated with dementia and those associated with traumatic brain injury.)

Abstract reasoning is the process of looking at evidence, making inferences, and drawing conclusions. This reasoning allows one to draw inferences from experience and to find similarities among different but related phenomena (e.g., putting things in categories according to size, color, function, material, etc.). For example, someone looks at a picture of an old Ford Model T and another picture of a 2011 Ford automobile and puts both pictures in the category called "cars," despite the vehicles' obvious differences. Abstract reasoning is the ability to find the common thread (four wheels, a steering wheel, an area for the engine, an area for the driver and others, etc.) among things that appear superficially different.

Perception refers to the ability to organize incoming sensory stimuli by recognizing features and their relationships and then combining them with previous knowledge of these features (memory). Perception is the level above basic vision or hearing, and the level below reading or auditory comprehension. *Visuospatial perception* skills can include the ability to copy two- and three-dimensional drawings (e.g., circle, red cross, cube, cylinder, etc.), connect a series of numbers, draw on command a house or clock face, or reproduce figures that an examiner makes out of matches (Cummings & Benson, 1992).

Emotion includes mood and affect. Mood indicates the inner and subjective feelings of the patient, whereas affect is the outward expression of emotion. *Personality* is a third aspect of emotion, and refers to the total behavior over time and to the person's immediate emotional state (Cummings & Benson, 1992).

An adaptation of ASHA standards (2009) provides an overall view of the components of cognition, language, and speech involved in basic human communication. They are presented in schematic form in **Figure 1.1**.

Communication Disorders

The following communication disorders are discussed in this text.

Adult Aphasia

Adult aphasia typically has a sudden onset in middle and older age. The etiology is a brain lesion in the language-dominant hemisphere. The disorder is mostly chronic, with some cases of progressive aphasia. Typically, cognitive abilities are normal or near normal.

COGNITION →	LANGUAGE →	SPEECH
Components	Components	Components
1. Attention	1. Phonology	1. Respiration
2. Memory	2. Morphology	2. Phonation
3. Sequencing	3. Syntax	3. Resonance
4. Problem solving	4. Semantic	4. Articulation
5. Executive functioning	5. Pragmatic	5. Prosody

Figure 1.1 ASHA standards schematic.

The impairment can range from mild to severe, but the language components are affected regardless of severity. In many cases, the language components are affected unevenly; that is, some components are better than others.

The language impairment does stand out in relation to other abilities. Generally, the phonologic, morphologic, syntactic, and semantic components can be affected, with the pragmatic component mostly intact. Personality and behavior are typically normal or near normal. Therapy mostly involves a language stimulation approach.

Communication Disorders Associated with Right Hemisphere Damage

These disorders typically have a sudden onset in middle and older age. The etiology is a brain lesion in the right hemisphere (nondominant for language). The disorder is mostly chronic. Cognitive abilities can be affected, resulting in such problems as impaired recognition of faces (anosognosia) and left visuospatial neglect.

Language impairment, if present, is mostly in the mild range and does not stand out in relation to other abilities. The phonologic, morphologic, and syntactic components remain intact, while the semantic and pragmatic components may be affected. Personality and behavior may also be affected and can range from bizarre to near normal. Therapy mostly involves cognitive and executive planning approaches, with some language stimulation if needed.

Communication Disorders Associated with Dementia

These disorders typically have a gradual onset (although those accompanying vascular dementia can occur abruptly) in older age. The etiology is brain damage involving both hemispheres. The disorder is mostly progressive. Cognitive abilities involving thinking and recall are affected in direct proportion to the mild, moderate, and advanced stages of the disorder. Although deficits in lexical-semantic memory, and, to a lesser degree and in later stages, procedural memory are principle characteristics of dementia, we focus more on linguistic deficits in this text.

In *cortical dementia*, typically, the language components are affected according to the stage of the disorder. In the mild stage, the phonologic, morphologic, and syntactic components are all intact, while the semantic and pragmatic components begin to deteriorate. In the moderate stage, the phonologic component is intact, while the morphologic and syntactic components begin to deteriorate, and the semantic and pragmatic components further deteriorate. In the advanced stage, the phonologic component begins to deteriorate, along with a further deterioration of the morphologic and syntactic components, and a still greater deterioration of the semantic and pragmatic components. The language impairment does not stand out in relation to other abilities.

In *subcortical dementia*, typically there is no distinctive language breakdown. Language becomes restricted and simplified, and in the advanced stages there may be auditory comprehension and naming problems. Of the language components, the semantic and pragmatic aspects would most likely be affected. Speech can be dysarthric.

Personality and behavior are affected in both cortical and subcortical dementias. Therapy involves mostly cognitive approaches and, if necessary, the methods used for dysarthria.

Communication Disorders Associated with Traumatic Brain Injury

These disorders have a sudden onset and mostly appear in younger age (primarily in males) and in those older than 75 years. Typically, the etiology is brain damage involving both hemispheres. The disorder can be temporary or chronic. Cognitive abilities typically are affected in direct proportion to the severity of the disorder (mild, moderate, severe).

The language components are affected according to the stage of the disorder. In the mild stage, the phonologic, morphologic, and syntactic components are intact, but the semantic and pragmatic components may be impaired. In the moderate stage, the phonologic, morphologic, and syntactic components are intact, the semantic component may be impaired, and the pragmatic component is impaired. In the severe stage, the phonologic component remains intact, the morphologic and syntactic components may be impaired, and the semantic and pragmatic components are impaired.

The language impairment does not stand out in relation to other abilities. Personality and behavior are affected according to the severity of the disorder and can range from bizarre (severe stage) to near normal (mild stage). Therapy involves mostly cognitive and executive planning approaches.

Communication Disorders Associated with Schizophrenia

The cause of schizophrenia is not known, and the brain pathology is functional deficit (primarily in the frontal lobes) rather than structural deficit. Age of onset generally ranges from the teens to the late 30s. Cognitive abilities may range from severely impaired to exceptionally gifted, even in florid episodes of schizophrenia. There may also be extended periods of relative lucidity.

The language components are affected in a manner similar to those appearing in other disorders, making differential diagnosis crucial. In most cases, phonology and morphology are preserved, syntax may be intact or mildly impaired, the semantic component is often impaired, and the pragmatic component is most obviously impaired.

The effect of long-term ingestion of antipsychotic medication may be a form of dysarthria, accompanied by a movement disorder called *tardive dyskinesia*.

Personality and behavior are greatly affected, but the underlying symptom is a thought disorder. Speech-language therapy alone is not usually effective for the language disorder, but may be useful in treating symptoms of dysarthria.

Dysarthria

Dysarthria can have a sudden or gradual onset and can appear at any age. The etiology can be neurological impairment within the central nervous system (brain and spinal cord), or the peripheral nervous system (cranial nerves and spinal nerves). The site of lesion can be either focal, multifocal, or diffuse. The disorder can be temporary, chronic, or progressive. Typically, cognitive abilities are normal or near normal.

Dysarthria is a motor speech disorder involving motor execution problems within the neuromuscular system, and should present no language impairment. The affected speech components can involve respiration, phonation, resonation, articulation, and prosody in any combination. Personality and behavior are mostly normal or near normal. Therapy involves the re-establishment of the neuromuscular system's motor execution capabilities in the presence of an intact motor programming component.

Apraxia of Speech

Apraxia of speech typically has a sudden onset in middle and older age. The etiology is a brain lesion in the language-dominant hemisphere (focal). The disorder is mostly chronic. Typically, cognitive abilities are normal or near normal.

Apraxia of speech is a motor speech disorder involving programming problems within the neuromuscular system, and should present no language impairment. However, if accompanied by aphasia, as it often is, language will be impaired. The affected speech components involve articulation and prosody. Personality and behavior are mostly normal or near normal.

Therapy involves the re-establishment of the neuromuscular system's motor programming capabilities in the presence of an intact motor execution component.

A Note About Dysphagia

Swallowing disorders (*dysphagia*) are common consequences of stroke. Dysphagia may be manifested as aspiration, defined as the entry of food or liquid into the airway below the true vocal folds (Logemann, 1998). Videofluoroscopy, as opposed to bedside examination, is the current gold standard of evaluation of aspiration in acute stroke (Baylow et al., 2009). Frequently present during the acute phase of a cerebrovascular accident (CVA, or stroke), dysphagia can be a life-threatening complication because of its apparent sequela, aspiration pneumonia. Dysphagia with the co-occurrence of inadequate airway protection during swallowing has also been associated with the development of sepsis, dehydration, and malnutrition. Typically taught as a separate course, this important topic is not addressed as a chapter in the present text.

Organization of the Text

At the end of each chapter is a brief case or clinical description, representing people the authors have worked with or have known. Identifying information has been changed in order to ensure privacy. The case description is followed by 10 questions for discussion, 5 addressing theoretical areas and 5 therapeutic issues. Finally, there is a multiple-choice question on a topic addressed in the chapter, with 5 possible answers. Each option is explained. The authors recommend that the reader create a new multiple-choice question and explain each option, as a way of increasing mastery of the subject.

Goldfarb and Serpanos (2009) have noted that students are required to take multiple-choice tests from elementary through graduate school and beyond (Praxis II exam, ASHA special interest division continuing education quizzes), often from instructors who have had little or no formal training in preparing them. A multiple-choice item contains a *stem* and usually four or five *options*, or possible answers. The correct answer is the *key*, and the other options are *distractors* or *decoys*. Level I questions only assess knowledge, and require the cognitive behavior of remembering and understanding previously learned information. Level II questions are designed to test knowledge in context, and require the cognitive behavior of interpretation, that is, understanding the *why* and *how* of the situation. A question of this sort should present a problem to be solved by understanding a theory, principle, or technique. Level III questions assess evaluation and decision making. They require the cognitive behavior of synthesis of elements into a comprehensive whole. These questions may include hypothetical case information, in order to stimulate the process of designing or modifying treatment based on evidence. Standardized examinations, such as the Praxis II in speech-language pathology and audiology, mainly use Level II and III questions. Detailed information about multiple-choice test construction may be found in some professional writing books (e.g., Goldfarb & Serpanos, 2009).

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