

CHAPTER

3

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Adult Communication Disorders

OVERVIEW OF NORMAL COMMUNICATION PROCESSES (p. 55)

• Speech is just one component in the human repertoire of ways to get a message across. We use facial expression, gesture, tone of voice, writing, singing—in fact, many modes—to communicate a variety of intents.

HEARING (pp. 55–56)

- The human auditory mechanism analyzes sound according to changes in frequency (pitch) and intensity (loudness) over time.
- An audiologist uses an audiometer to measure hearing. Frequencies heard can be tested between 250 and 8000 hertz (Hz). Intensity is measured in decibels (dB) of sound pressure levels (SPLs), and can be tested from 0 to approximately 120 dB (the threshold for pain is around 125 dB).
- The “speech range” extends roughly from 400 to 4000 Hz (4 kHz). Speech contains frequencies below 400 Hz and above 4 kHz, but they are not necessary for nearly perfect intelligibility of routine conversational speech.

VOICE (pp. 57–58)

- Voice is the audible sound produced by phonation, but is only one component of the total speech act. Phonation is sound being made by rapid vocal fold movement excited by the exhaled airstream. Normal voice and speech are produced during the exhalation phase of respiration wherein the vocal folds adduct to constrict the glottis. This momentary interruption of the flow of air from the trachea through the larynx is repeated hundreds of times per second, resulting in phonation. The terms most commonly used in the context of discussing phonation are found in Table 3–1.
- The outcome of speech has three phonological characteristics that are used to describe “voice”: pitch, quality, and loudness (see Table 3–1).
- Fundamental frequency (pitch) and intensity (loudness) are two elements of voice and speech that are controlled primarily by the interaction of the respiratory and laryngeal systems. The average fundamental frequency (pitch) for men is around 125 Hz; for women, it is around 200 Hz.

TABLE 3-1 Definitions of Terms Related to Phonation

Voice: Audible sound produced by phonation

Vocal parameters: The elements of voice: pitch, loudness, quality, and flexibility

Pitch: The perceptual correlate of frequency

Loudness: The perceptual correlate of intensity

Quality: The perceptual correlate to complexity

Flexibility: The perceptual correlate of frequency, intensity, and complexity variations

Dysphonia: Abnormal voice, as judged by the listener, involving either pitch, loudness, quality, flexibility, or combinations thereof

Aphonia: Absence of a definable laryngeal tone. The voice is either severely breathy or whispered

Mute: Unable to phonate and articulate

Vocal folds: Synonymous with vocal cords—shelves of thyroarytenoid muscle covered with mucous membrane and fibroelastic tissue that project into the laryngeal airway

Glottis: The space between and bordered by the vocal folds when the latter are partially or fully abducted

Adduction (of vocal fold): Movement of the vocal folds medially, toward the midline of the laryngeal airway

Abduction (of vocal fold): Movement of the vocal folds laterally, away from the midline of the laryngeal airway

Adapted with permission from Aronson AE: Clinical Voice Disorders. New York, Thieme, 1985, p. 5.

- Voices vary widely by age and sex, and are judged as normal or abnormal on the basis of cultural standards, education, environment, and other similar factors.

SPEECH (p. 57)

- Speech is the motor activity by which the respiratory, laryngeal, and oral structures produce the sound patterns (phonemes) to communicate.
- Speech sounds are divided into vowels and consonants. Vowels are produced with a relatively open vocal tract, with the sound source beginning at the level of the larynx and the differentiation of one vowel from another determined primarily by tongue posture and degree of lip opening. During the classic throat examination, the tongue is down and the mouth is wide open to say “aah,” the vowel sound produced in the word “caught.” Consonants are produced at varying points along the vocal tract and at varying degrees of constriction, from completely closed for plosive sounds to closely constricted, as in the earlier example, for the /s/ sound. In this context the role of the velopharyngeal (V/P) port should be mentioned: when the V/P port is open and sound is being resonated through the nasal cavity, the nasal consonants /m/, /n/, and /ŋ/ are produced. This aspect of speech, termed *resonance*, relates to the degree of nasality in the speech.

FLUENCY AND PROSODY (p. 58)

- *Fluency* is the smoothness with which sounds, syllables, words, and phrases are joined together during oral language with lack of hesitations or repetitions.

TABLE 3-2 Definitions and Examples of the Five Dimensions of Language

Dimension	Definition	Example
Phonology	Rules governing the way the sounds of a language are organized	/ks/ sound in English can occur in the middle of a word (<u>boxer</u>) or the end (<u>books</u>), but never at the beginning.
Semantics	Rules governing the meaning of words and word combinations	Pen = an instrument containing ink and used for writing.
Morphology	Rules governing how words are formed	Grammatical morphemes may change the tense and aspect of sentences (e.g., plays, <u>playing</u> , <u>played</u>).
Syntax	Rules governing how words are combined into larger meaningful units of phrases, clauses, and sentences	"Off the boat got" is <i>not</i> a well-formed, grammatical sentence.
Pragmatics	Rules governing the use of language in context	A speaker must be appropriate in initiating a conversation or changing a topic.

The average number of words per minute (wpm), or speaking rate, is 125; however, extremes of normal are seen in relation to a given person's educational, intellectual, and regional status. *Prosody* can also be discussed in the context of rate. Prosody encompasses the rate, rhythm, loudness, and pitch contours that signal stress and therefore carry additional meaning beyond individual speech sounds, words, or sequences of words.

LANGUAGE (pp. 58–59)

- In adults, language can be affected secondary to a host of neurological injuries, including stroke and brain injury. Table 3-2 includes definitions and examples of the five aspects of language.
- Language is *arbitrary* (e.g., the word "drink" is a sign that the community arbitrarily assigned meaning to) and that arbitrariness has implications for the rehabilitation of persons with language impairment.
- There are *levels of language usage*. Adults possess automatic speech such as counting or reflexive language (e.g., profanity) that might not be used to convey a message and can be termed the *automatic* level of language usage. The next level of language usage is *imitation*—simply repeating what is heard. This language is also not typically at the level needed to get a need met. The highest level of language usage, and the one that gets at the functional nature of communication, is the *propositional* level of language. For example, I may be able to recite the days of the week (automatic), or repeat what is said to me (imitative), but neither of these abilities will assist me in getting a need met. The core of communication is to *propositionalize*—to convey a message, a want or need, a joke, and so forth.

TABLE 3-3 Scale of Hearing Impairment

Average Threshold Level (dB)	Suggested Description*
0–25	Normal hearing
26–40	Mild hearing loss
41–55	Moderate hearing loss
56–70	Moderately severe hearing loss
71–90	Severe hearing loss
≥91	Profound hearing loss

* Average threshold level per ANSI-1989 for 0.5, 1, and 2 kHz.

Modified with permission from Yantis P: Purotone Air-Conduction Threshold Testing. In Katz J (ed): Handbook of Clinical Audiology, ed 4. Baltimore, Williams & Wilkins, 1994, pp. 97–108.

ADULT COMMUNICATION DISORDERS (pp. 59–72)

Hearing Impairment (p. 59)

- Hearing impaired is a generic term that refers both to persons who are hard of hearing and those who are deaf. Hearing loss refers to the measured extent, or severity, of hearing impairment. Hearing sensitivity is measured in decibels. The terms generally used to describe the extent of hearing loss are given in Table 3–3. Types of hearing impairment are related to the site of damage or dysfunction and are termed conductive, sensorineural, mixed, and central (Table 3–4).

TABLE 3-4 Definitions of Types of Hearing Loss and Various Causes

Type of Hearing Loss	Definition	Possible Causes
Conductive	Hearing loss resulting from dysfunction of the outer and/or middle ear systems	Occluding cerumen Perforated eardrum Otitis media Otosclerosis
Sensorineural	Hearing impairment resulting from damage/dysfunction of the inner ear (cochlea), or neural fibers of the eighth cranial nerve	Prebycusis Noise-induced Trauma Viral/bacterial illness Ménière's disorder Tumors Hereditary
Mixed	Hearing loss with both conductive and sensorineural components	(See Conductive and Sensorineural)
Central	Hearing impairment resulting from damage or dysfunction of the central auditory pathways; may influence ability to comprehend spoken language, especially in difficult listening situations	Trauma Tumors Vascular damage Demyelinating disease

Voice Disorders (pp. 59–61)

- A voice disorder is said to exist when the quality, pitch, or loudness of the voice, individually or severally, differs from that of other persons of similar age, sex, cultural background, and geographic location.
- Laryngeal disorders have traditionally been classified as either functional or organic, depending on their specific causes. Disorders range from aphonia (no voice) to various dysphonias (disorders of sound quality).
- An otolaryngologist should initially see the person with a voice complaint. Following this the voice evaluation should (1) attempt to determine the cause; (2) describe the current vocal status; and (3) arrive at a communication diagnosis, prognosis, and plan.
- Adult dysphonias that are due to a mass effect are often caused by a faulty phonatory attack (voice misuse or abuse) or substance abuse (smoking and alcohol). The interruption of the smooth approximation of the vocal folds results in a dysphonia. Causes of dysphonias include vocal nodules (a callous formation at the anterior middle third of the vocal folds), laryngitis (an inflammation of the vocal fold mucosa), vocal polyps (fluid-filled sacs that can occur anywhere along the median edge of one or both vocal folds), and contact ulcers (which occur around the area of the arytenoid cartilages).
- Adult dysphonia of neurological origin (excluding dysarthria) may be related to unilateral or bilateral vocal cord paralysis. The folds can be paralyzed in adduction (closed, a life-threatening condition) or in varying stages of abduction (opening). Patients with cords fixed in an adducted position usually require a tracheostomy to maintain a functional airway. They phonate by occluding the stoma and exhaling for speech. In persistent closure due to abductor paralysis, surgical intervention might be indicated to reposition a cord laterally to provide sufficient opening for air. The surgical result, however, often leaves the patient with a breathy voice because the cords are unable to fully approximate. In the case of adductor paralysis (folds in the open position), surgical intervention typically involves either injecting material into a fold to create a mass effect or surgically repositioning a cord to bring it closer to midline.
- Voice disorders of psychosocial origin may need psychological intervention in concert with the SLP voice regimen. The symptoms can range from a variety of dysphonias to complete aphonia.
- A voice disorder can also be one of the first symptoms of laryngeal cancer. Patients with laryngeal cancer may be candidates for a laryngectomy, the total or partial surgical removal of the larynx. A partial laryngectomy might or might not affect vocal quality depending on whether vocal fold tissue has been excised. The postlaryngectomy patient has at least three speaking and several nonspeaking options. The “speaking options” include (1) *tracheoesophageal shunt*; (2) *esophageal voice*, which is produced by oral injection of air into the esophagus followed by a rapid vibrating expulsion; and (3) *an artificial larynx*. Nonspeaking options include writing, complex and simple gestures, communication board, and portable personal computer.

Speech Disorders (pp. 61–64)***Apraxia of Speech*** (pp. 61–62)

- *Apraxia of speech* (AOS) is a sensorimotor disorder of articulation and prosody that often accompanies Broca’s aphasia and can also coexist with dysarthria. The four salient characteristics of AOS are:

Effortful, trial-and-error, groping articulatory movements, and attempts at self-correction

Dysprosody unrelieved by extended periods of normal rhythm, stress, and intonation

Articulatory inconsistency on repeated productions of the same utterance

Obvious difficulty initiating an utterance

- Most experts (but not all) believe that AOS is not due to a language disorder, paralysis, weakness, or incoordination of the speech musculature. Patients with suspected AOS typically have left frontal lesions adjacent to Broca's area. The discriminating behaviors that differentiate AOS from aphasia and dysarthria are the following: relatively spared automatic speech, the absence of any significant motor control problems, and other language modalities that are superior to speech.

Dysarthria (p. 62)

- *Dysarthria* is a collective name for a group of motor speech disorders associated with disturbed neuromuscular control of speech due to central or peripheral nervous system damage. The person with dysarthria is able to understand spoken language, read, write, and use a communication board, book, or device.

DIFFERENTIAL DIAGNOSIS

- Six types of dysarthria can be distinguished on the basis of perceptual characteristics: (1) flaccid, (2) spastic, (3) ataxic, (4) hypokinetic, (5) hyperkinetic, and (6) mixed (see Table 3-7 in the Textbook for a detailed listing).

ASSESSMENT

- Motor speech disorders can be assessed by both perceptual and physiological approaches. The clinician screens hearing and vision and conducts an oral peripheral examination that includes testing alternating motion rates (e.g., rapid repetition of "puh, tuh, kuh"), sequential motor rates (e.g., rapid repetition of "puh, puh, puh"), and prolongation of "aah."

TREATMENT

- The overall goal of dysarthria treatment is enhanced functional communication.
- For anarthria (no speech), a nonverbal communication system may be developed that permits the patient to reliably communicate basic daily living needs.
- For severe dysarthria with the potential for verbal communication, treatment attempts to address three overriding goals, namely: (1) maximization of speech intelligibility, (2) speech efficiency, and (3) functional independence. The general prioritized dysarthria hierarchy of treatment moves through three stages: (1) early, to establish functional verbal skills; (2) middle, to maximize speech intelligibility; and (3) final, to increase the naturalness of speech.

Fluency Disorders (p. 64)

- *Stuttering* is defined as gaps, prolongations, or involuntary repetitions of a sound or syllable that occur during speech production. The most common type of stuttering is developmental dysfluency. Acquired stuttering is fairly rare, and only a few percent begin after age 10 years. Because acquired stuttering is primarily due to brain injury, it has been termed *cortical* or *neurogenic*

TABLE 3-5 Decision Tree for Classifying and Localizing Aphasia after a Left-Sided Cerebrovascular Accident

Impairment and Symptoms	Classification	Localization
Language impairment affecting linguistic components of semantics, syntax, phonology, or pragmatics, or any combination of these	Broca's	MCA, frontal lobe
	Wernicke's	MCA, temporal lobe
	Conduction	MCA, arcuate fasciculus
	Anomic	MCA, angular gyrus
	Global	MCA, multilobes
	Transcortical motor	ACA, prefrontal
	Transcortical sensory	PCA, parieto-occipital
	Isolation	ACA/PCA, watershed area
	Subcortical	Thalamus and basal ganglia
	Alexia with agraphia	PCA, angular gyrus
	Alexia without agraphia	PCA, medial-occipital and splenium of corpus callosum

Abbreviations: MCA, middle cerebral artery; ACA, anterior cerebral artery; PCA, posterior cerebral artery.

stuttering. An additional variety of acquired stuttering that does not fit the above description (except for its relative rarity) is psychogenic stuttering of adult onset.

DIFFERENTIAL DIAGNOSIS

- See page 64 of the Textbook for a description of conditions often confused with neurogenic stuttering.

Aphasia (pp. 64–69)

- *Aphasia involves* an acquired impairment of the language processes underlying receptive and expressive modalities, usually caused by damage to areas of the brain that are primarily responsible for the language function. Aphasia is most common after a left hemisphere stroke.
- The clinician should classify the type of aphasia. There are many classification systems in aphasiology (see Table 3-8 in the Textbook); however, many experts contest the usefulness or even the existence of syndromes.
- Syndromes of aphasia are *not* hard neurological signs but simply suggestive of the presence of brain damage in a particular location of the brain. Table 3-5 summarizes the various aphasia syndromes and suggested localization following a left cerebrovascular accident.
- Three particular discriminating binary language behaviors helpful in classifying aphasia by syndrome are: (1) fluency, (2) comprehension, and (3) repetition. *Fluency* suggests a binary anteroposterior view of the left cortex because non-fluent patients typically have anterior (frontal lobe) lesions, whereas fluent patients typically have posterior (temporal, parietal, or occipital lobe) lesions. *Comprehension* is another binary dimension wherein patients who have suffered strokes in the distribution of the left middle cerebral artery (MCA) can exhibit some degree of deficit in listening comprehension, whereas patients who have

TABLE 3-6 Components of the General Language Assessment

Auditory comprehension	Word identification/discrimination Yes/no reliability for personal/general questions Ability to follow commands, length and complexity Sentence/paragraph level retention and understanding
Visual comprehension	Ability to match symbols/letters Word identification skills Sentence/paragraph retention and comprehension Oral reading Functional reading skills
Speech	Social/automatic speech Word/sentence repetition Confrontation/responsive naming Verbal agility, mean length of utterance, fluency rating Analysis of form and content
Writing	Biographical information Letters, numbers: copying/dictation Word/sentence level Spontaneous sample

From Porcelli J: Aphasia assessment and treatment. *Phys Med Rehabil Clin North Am* 1991; 2:487-500. Used by permission.

suffered strokes in the left posterior cerebral artery (PCA) exhibit some degree of deficit in reading comprehension. *Repetition* distinguishes patients with MCA infarcts from those with lesions outside the MCA distribution. A left CVA patient who cannot repeat is thus suspected of having a Broca's, Wernicke's, conduction, or global aphasia. The aphasia syndromes listed in Table 3-6 are summarized briefly below.

BROCA'S APHASIA

- Broca's aphasia characteristics:

Nonfluent

Telegraphic speech (like a telegram with the connecting words left out)

Reduced verbal content

Phrase length is generally less than four words

Verbal repertoire is almost exclusively composed of content words (e.g., nouns and verbs), with a notable absence of function words (prepositions and conjunctions)

Functional comprehension is present but patients have trouble following complex grammatical statements

WERNICKE'S APHASIA

- Wernicke's aphasia characteristics:

Fluent with what is termed paragrammatism—speech running on with some semblance of grammatical structure

Phrase length is generally greater than five words and verbal productions are punctuated with paraphasic errors (word substitutions, e.g., pen for pencil)

Poor repetition

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Listening comprehension difficulty is a cardinal sign
Secondary language skills of reading and writing are typically also impaired

ANOMIC APHASIA

- Anomic aphasia characteristics:

Striking “loss of words” both orally and in writing
Circumlocute (talk around a word)
Generally have functional reading and listening skills
Fluency and repetition skills are also unremarkable

GLOBAL APHASIA

- Global aphasia characteristics:

Severely impaired in all language modalities, which results in an almost total
inability to communicate orally
Fluency, repetition, and comprehension all seriously compromised

CONDUCTION APHASIA

- Conduction aphasia characteristics:

Difficulty repeating a word or phrase back to the examiner
Spontaneous speech relatively fluent with functional comprehension

TRANSCORTICAL MOTOR APHASIA

- Transcortical motor aphasia characteristics:

Fluency and comprehension resembling that of a person with Broca’s aphasia,
but the repetition skills are spared
Hallmark of this syndrome is adynamia (difficulty initiating speech)

TRANSCORTICAL SENSORY APHASIA

Relatively rare syndrome is similar to Wernicke’s aphasia, save for the retained
ability to repeat

ISOLATION SYNDROME

Rare syndrome with severe impairment in all language-processing abilities
except for being able to repeat

Assessment (pp. 66–67)

- Table 3–6 summarizes the components of a general language assessment.

Prognosis (p. 67)

- The speech-language pathologist can usually make a best “guestimate” about the odds of recovery based on many factors including age, education, intelligence, handedness, extent of lesion, site of lesion, classification of disorder, memory and attentional deficits, and motivation. Factors that are felt to limit response to aphasia therapy include perseveration and severe auditory comprehension deficit, inability to match objects, unreliable yes/no responses, and jargon and empty speech without self-correction.

Treatment (pp. 67–69)

- Today the focus of treatment is on function!
- Enhance functional capacity by assisting the person with aphasia to change behavior through functional communication treatment.

- Reduce demands of the environment by removing noise in the system (e.g., turning off the TV) and optimizing transmission of signals (e.g., having action pictures in a communication book available).
- Provide assistive devices and alternative methods by determining the menu of core needs and abilities, then training the person with aphasia in the use of alternative communication options to convey wants and needs (the use of Amer-Ind Code is an example of this approach).

Right Hemisphere Communication Disorder (pp. 69–70)

- In an isolated speech and language task, persons with right hemisphere stroke will typically exhibit no difficulty on language and speech tasks done in the laboratory. The patient will break down when the same task is done in a context, however, such as when the individual is required to appreciate the emotion in another's voice, the words on the left side of a newspaper, or the face of a friend or family member. These are the symptoms of a problem that has as its basis the visual-attentional processing mechanism of the right hemisphere.

Traumatic Brain Injury (pp. 70–71)

- Patients who suffer traumatic brain injury can experience a variety of communication disorders including aphasia, anarthria, dysarthria, AOS, and cortical stuttering. The communication problem that is most commonly associated with traumatic brain injury, however, is not based on language, speech, or fluency but on cognition.
- *Cognitive-communication impairments* is the generic term used to refer to the cognitively based communication disorders resulting from deficits in both linguistic and nonlinguistic cognitive processes. This population differs from the language-impaired patients following stroke in that they are typically younger, have lesions that are more diffuse, have a longer recovery period, and often have academic and vocational reentry as significant functional goals. Specific cognitive skills that may be impaired in traumatic brain injury are attention, perception, discrimination, organization, recall, and reasoning/problem solving. Persons with traumatic brain injury can experience impairments in any or all stages of memory from attention and immediate recall to short- and long-term memory. Disturbances in executive functioning can occur even following a mild head injury with normal neuroradiological findings (see Chapter 49).

Dementia (pp. 71–72)

- Dementia is an organic syndrome characterized by decline of memory and other intellectual functions in comparison with the patient's previous level of function. Conditions that can resemble dementia but are clearly distinguishable from it are delirium, psychiatric states, depression, and hearing loss. Dementia is a syndrome that can be due to numerous diseases, infections, toxins, and trauma. Many of the causes of dementia are treatable or reversible.
- The most common cause of dementia is Alzheimer's disease (AD), accounting for 50% to 60% of all patients. Vascular dementias (dementias caused by multiple infarcts or ischemia [MID]) are seen in 20% of demented patients. Alzheimer's dementia and multiple infarct disease co-occur in approximately 15% of the sample, and other conditions such as Pick's disease, Parkinson's

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disease, progressive supranuclear palsy, and Creutzfeld-Jakob disease, account for the remainder of the irreversible dementias.

Differential Diagnosis (p. 72)

- The communication problems commonly seen in dementia can be differentiated from those seen in single left or right hemisphere strokes. Factors that help distinguish between aphasia and dementia include memory deficits, anomia, perseveration, dysfluency, jargon, and circumlocution. Additional factors include the cause, course (decline), and constellation of symptoms (decrements in judgment, affect, memory, cognition, and orientation).

Assessment (p. 72)

- Perhaps the most important portion of the assessment is the comprehensive case history obtained from the significant other to determine the type of onset, symptoms, and dysfunctional status of the person with dementia. The clinician should be sensitive to such reversible problems as drug use and depression. A tool commonly used to screen for dementia is the Mini-Mental Status Examination (MMSE), a 30-point screen that examines the patient's orientation, registration, calculation, memory, language, praxis, ability to follow commands, and level of consciousness.

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