Chapter 7

Cognitive Rehabilitation for Cerebrovascular Accidents and Alzheimer’s Disease

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The achievements of modern medicine and the emphasis placed on lifestyle changes over the past several decades are increasing the percentage of Americans older than age 65, from 8% in 1950 to a predicted 13% of the total population by the year 2000 (U. S. Bureau of the Census 1989; U. S. Department of Health and Human Services 1990). Over the past 15 years, the death rate from cardiovascular disease has decreased by 50%, but the incidence of dementing disorders resulting from cerebrovascular accidents (CVAs) and Alzheimer’s disease increases dramatically with advancing age. More than 20% of individuals older than age 80 are affected by CVAs or Alzheimer’s disease (U.S. Department of Health and Human Services 1990). Therefore, cognitive rehabilitation strategies geared toward the remediation of cognitive impairments in this population has become critical, and the amount of research in this area has grown dramatically.

In this chapter we describe and critically review the cognitive rehabilitation techniques that have been developed for the two most common causes of dementia, CVAs and Alzheimer’s disease. We summarize the most effective rehabilitation techniques and suggest future research in this area.

Cognitive Rehabilitation for Cerebrovascular Accidents

CVAs are the third leading cause of death in the United States (National Center for Health Statistics 1992). CVA mortality has been declining since the 1970s because of primary prevention efforts, such as hypertension education and control programs (McGovern et al. 1992). The decline in the CVA mortality...
rate has increased the number of patients who require long-term rehabilitation efforts focused on the cognitive and physical sequelae of CVAs.

The cognitive sequelae of CVAs include various intellectual and motor deficits that tend to be more specific than traumatic brain injuries. For example, CVAs involving the area served by the middle cerebral artery create specific deficits such as contralateral weakness, sensory loss, visual field defects, impaired spatial perception, or language disturbance. In addition to functional impairments, discrete personality changes can also result from CVAs (Stuss 1992). Finally, CVAs are not necessarily progressive conditions; the Framingham Study found that 58%–76% of all individuals who experience CVAs will not have a recurrence (Sacco 1982).

Because of the high incidence of CVAs, the specificity of associated deficits, and the potentially static (nonprogressive) nature of the illness, CVA patients provide an ideal population for studying cognitive rehabilitation efforts. Given the specific neuropsychological impairments that usually follow a CVA, long-term cognitive rehabilitation typically addresses specific post-CVA deficits. Cognitive functions most often affected by CVA include language, attention and concentration, perceptual functioning, and memory. Studies associated with each area are discussed in this chapter.

Language

One of the main areas addressed in rehabilitative efforts is language dysfunction, in part because of the frequency of language disorders after CVA. Twenty to 30% of all CVAs result in aphasia (Leske 1981). Aphasic patients have difficulty either comprehending language or formulating language, or both. In particular, difficulties occur with fluency, comprehension, repetition, and naming. Most aphasics develop after CVAs that involve the middle cerebral artery.

Types of aphasias. Language difficulties in aphasic patients range from mild to very severe and can include a number of areas, such as understanding both spoken and written language and oral and written communication. Obviously, it is instructive to understand the relationship between deficit symptomatology and the affected cerebral area. For example, posterior CVAs may lead to aphasia. These patients may have impaired comprehension, visual agnosia, and reading deficits but may not have problems in writing, spelling, and oral speech. In these individuals, alexia may occur without agraphia, the latter resulting from a disconnection between the left occipital cortex and the angular gyrus and language areas. These patients would be able to write a sentence without being able to read what was written. Therefore, a clear understanding of an individual’s post-CVA strengths and weaknesses through neuropsychological
or speech evaluation is essential to the development of an effective rehabilitation plan.

Several systems have been developed to classify types of aphasias. One system categorizes aphasias based on an assessment of impaired language functions (e.g., fluency, comprehension, repetition, and naming). In this system, which includes both functional difficulties and cerebral impairments, the primary forms of aphasia include Broca's, Wernicke's, conduction, global, anomic, transcortical-motor, transcortical-sensory, and transcortical-mixed. Table 7-1 lists the symptoms of the different types of aphasia and the anatomical sites believed to be involved.

Other categorization systems classify aphasia on expressive and receptive dimensions. Patients with expressive aphasias have difficulty expressing themselves, but typically have few problems comprehending language. Patients with receptive aphasias generally have few problems with language production, but

<table>
<thead>
<tr>
<th>Type</th>
<th>Verbal output</th>
<th>Repetition</th>
<th>Comprehension</th>
<th>Naming</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broca's</td>
<td>Nonfluent</td>
<td>Impaired</td>
<td>Normal</td>
<td>Slightly impaired</td>
</tr>
<tr>
<td>Wernicke's</td>
<td>Fluent</td>
<td>Impaired</td>
<td>Impaired</td>
<td>Impaired</td>
</tr>
<tr>
<td>Conduction</td>
<td>Fluent</td>
<td>Impaired</td>
<td>Normal</td>
<td>Impaired</td>
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<tr>
<td>Global</td>
<td>Nonfluent</td>
<td>Impaired</td>
<td>Impaired</td>
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<tr>
<td>Anomic</td>
<td>Fluent</td>
<td>Normal</td>
<td>Normal</td>
<td>Impaired</td>
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<tr>
<td>Motor Sensory</td>
<td>Fluent</td>
<td>Normal</td>
<td>Impaired</td>
<td>Impaired</td>
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<tr>
<td>Mixed</td>
<td>Nonfluent</td>
<td>Normal</td>
<td>Impaired</td>
<td>Impaired</td>
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Type | Common lesion locations
--- | ---------------------
Broca's | Left posterior inferior frontal
Wernicke's | Left posterior superior temporal
Conduction | Left parietal
Global | Left frontal temporal parietal
Anomic | Left posterior inferior temporal or temporal occipital
Transcortical | Left medial frontal or anterior border zone
Motor | Sensory | Left medial parietal or posterior border zone
Sensory | Mixed | Left medial frontal parietal or complete border zone

their speech content is inappropriate, and even unintelligible in severe cases, because of difficulty understanding language. Another categorization system that is based on the receptive/expressive dimension classifies the aphasia by the portion of the brain that has been damaged and differentiates between anterior (front) and posterior (back) regions of the brain. Anterior aphasias are usually expressive aphasias, whereas posterior aphasias are usually receptive aphasias.

Aphasias are assessed by both standardized psychometrically based instruments and clinical acumen. Several widely used tests have proven to be reliable and valid. The most commonly used screening test is the Reitan-Indiana Aphasia Screening Test (Reitan and Wolfson 1993). The individual taking this test is asked to copy, name, and spell simple figures, such as a square and a Greek cross. The test also includes a screening of reading skills, calculation ability, and right-left orientation. The test is widely used because it is short, usually taking patients less than 20 minutes to complete. However, it is not sufficiently comprehensive to detect some subtle language disturbances. Once a test such as the Reitan-Indiana Aphasia Screening Test identifies a possible language problem, more in-depth tests such as the Boston Diagnostic Aphasia Examination (Goodglass and Kaplan 1983) or the Western Aphasia Battery (Kertesz 1980) can more accurately determine the nature and extent of the impairment. (See Lezak 1995 for a comprehensive review of language testing.)

**Speech therapy.** Luria (1970) advanced the notion of prescribing specific language rehabilitation treatments based on carefully analyzed functional deficits. Two distinct approaches have evolved that address the rehabilitation of speech disorders: the classical and the neurolinguistic models. Classical approaches typically focus on restoration of speech and language performance. Such approaches use tasks to attempt to restore lost skills. Common treatment techniques include repetition, cueing, and answering dichotomous (yes or no) questions. For example, a common therapy technique of the classical approach is to teach patients to respond to questions by having the therapist repeat the patients' answers. The classical approach to language rehabilitation emphasizes syntax as an important part of therapy. Syntax defines the rules for interrelationship between words in a sentence. For example, the verb in a sentence describes the action of the subject of the sentence. The sentence, "The man is walking the dog," must be analyzed syntactically to understand who is walking whom. Classical approaches use exercises that require a patient to understand the meaning of a sentence and then limit understanding to the literal meaning of the sentence.

Neurolinguistic approaches in aphasia rehabilitation focus on differentiating between comprehension and expression in language. These approaches recognize that comprehension and expression are active processes that need to
be addressed in the development of treatment plans. For example, both comprehension and expression are affected in expressive aphasia, and the rules required to comprehend a sentence are also the rules needed to express it (see Sarno 1992 for a review). Neurolinguistic approaches also address the issue of linguistic competence. Linguistic competence refers to the patient’s ability to decipher meaning beyond the literal interpretation of the words in a sentence. For example, a restaurant patron with disturbances in linguistic competence who hears his or her companion say “pick up the check” will literally reach out and pick up the bill. He or she would not associate the expression with the idea of paying the bill, as is usually intended by the expression. Linguistic competence is critical to conversational language, which requires assumed logical linkages, contextual information, and implied meanings. An impairment in linguistic competence renders most conversational language meaningless to many aphasic patients.

Two models are followed in most neurolinguistic treatments of aphasia: 1) a substitute skill model and 2) a direct treatment model. Substitute skill methods attempt to find other ways to produce the lost skill. An example of this method is teaching a patient to use gestures to augment verbal communication. Direct treatment methods attempt to restore a function by repeated practice. Learning to move the lips to create sounds is an example of this method.

In cases where both comprehension and expression are affected (i.e., global aphasia), rehabilitation should first focus on comprehension as a precursor to performance rehabilitation (Basso 1987). Alternatively, substitute symbols benefit expressive aphasic patients who cannot communicate through natural language. Teaching patients sign language is an example of this method of treatment. One study showed that patients who were unable to effectively communicate orally were able to learn to communicate using American Sign Language (Moody 1982). Other approaches that are similar include Melodic Intonation Therapy (Sparks et al. 1974) and Melodic Rhythm Therapy (Van Eekhout et al. 1983). These methods facilitate speech output using music and rhythm. An example of rhythm therapy is teaching Broca’s aphasics to chant rhythms to facilitate the return of normal speech.

In contrast to the classic approach, neurolinguistic approaches also focus on helping patients decipher the contextual meaning of language. For example, in the phrase “pick it up” the patient must understand the sentence and the situation in which it is used. The phrase could imply the need to speed up one’s pace (if said by a drill sergeant) or actually to lift an object (if said by an assembly line supervisor at work). The therapeutic approach must be shaped to the particular deficits experienced by each patient to increase his or her understanding of such phrases.
Most experts agree that functional recovery of language is stabilized in the
12- to 18-month period after a CVA. However, some believe that recovery of
function can continue for the rest of the patient’s life on a more subtle basis
(Harrington 1975; Sarno 1992). Also, the effects of retraining may be multi-
sensory, using kinesthetic and tactile input along with the more commonly
used visual and verbal techniques. A study by Loughery (1992) employed mul-
tisensory methods with patients with Broca’s aphasia in which words were
presented orally, visually, and tactually (by tracing them out on the patient’s hand).
Although this form of treatment was not significantly more effective than
a traditional visual-verbal presentation of the words, both forms of presenta-
tion were effective for increasing word knowledge and improving recognition.

The benefits of providing patients with speech therapy are supported in
a few studies (Poeck et al. 1989; Wertz et al. 1986). For example, Poeck et al.
(1989) found significant improvements resulting from intensive language
therapy (450 minutes per week for 6–8 weeks). Furthermore, one recent review
of the CVA rehabilitation literature by de Pedro-Cuesta et al. (1992) concluded
that aphasia rehabilitation is effective.

The results of other outcome studies, however, suggest that speech
therapy typically does not improve the language abilities of aphasic patients,
beyond what would occur with spontaneous recovery. Lincoln et al. (1984)
found no significant differences in language recovery between treatment
and no-treatment groups because spontaneous recovery occurred for a sig-
nificant portion of aphasic patients in the no-treatment group. A study by
Wertz et al. (1986) indicated that the effectiveness of treatment cannot be
demonstrated when variables that influence recovery are tightly controlled
(e.g., age, number and location of CVAs, premorbid psychological condi-
tion, premorbid physiological condition, and social support). Other stud-
ies suggest that treatment by trained speech therapists produces no greater
gains than interventions by volunteer therapists in language retraining with
CVA patients (David et al. 1982; Hartman and Landau 1987; Meikle et al. 1979).

Attention

The most obvious behavioral and cognitive changes after CVA relate to the
individual’s arousal level and his or her ability to attend to and respond to the
environment. For example, CVA patients who have extreme reductions in
arousal do not respond to environmental stimuli regardless of intensity. Addi-
tionally, even mild attention deficits can reduce or impair memory, learning,
perception, communication, and executive functions.

Attentional processes. Posner and Rafal (1987) outlined three basic com-
ponents of attention: alertness, selective attention, and vigilance or sustained
attention. Alertness refers to the individual’s physical and mental arousal level and his or her readiness to respond to environmental or bodily stimuli. Alertness can be further subdivided into tonic arousal and phasic arousal. Tonic arousal refers to the person’s general level of alertness and incorporates normal daily fluctuations associated with sleep and waking patterns. Tonic arousal is relatively stable such that any change from the baseline level of alertness occurs at a slow rate. In contrast, phasic arousal refers to the body’s capacity to quickly increase its level of alertness in response to warning stimuli. Phasic arousal is considered a general alerting mechanism.

Selective attention involves overt and covert orienting processes. Overt orientation refers to observable responses to stimuli that indicate shifts in attention, such as moving the body, head, or eyes. Covert orientation refers to cognitive shifts in attention; for example, shifting the reader’s thoughts away from the abstract definitions previously discussed to think about this example. Both types of orienting can occur together, and these processes frequently are automatic and unconscious. Aspects of orienting responses include disengaging from previous stimuli, shifting to new stimuli, engaging new stimuli, and inhibiting return to old stimuli.

Vigilance or sustained attention refers to a person’s ability to maintain his or her attention on specific stimuli over an extended period of time. Although selective attention often involves automatic and unconscious cognitive processing, sustained attention can be described as “deliberate and effortful attention” (p. 74) and involves conscious and controlled cognitive processing (Weber 1990). Sustained attention is necessary in remembering and learning new information, performing job tasks, playing a game, or driving a car safely.

Attention deficits. The more common impairments in attention associated with CVA can be addressed by using Posner’s concepts of attentional processes. Insufficient general alertness, a common consequence of CVA, can be viewed as an impairment in tonic arousal. As a result of brain stem lesions or compression from edema, the individual may be at the lowest level of tonic arousal and, therefore, be comatose and unable to respond to the environment. The victim may be confused, disoriented, and unable to respond effectively to environmental cues at less severe levels of impairment. Reductions in the CVA patient’s response speed can be interpreted as the behavioral manifestation of deficits in the individual’s phasic arousal. Response rates will be delayed because of decreases in the body’s ability to prepare itself to react despite warning stimuli.

A CVA can affect an individual’s ability to selectively attend or orient to specific stimuli, Posner’s second level of attentional processes. The individual may perseverate in one aspect of the environment or task demand and be unable to disengage to focus on other environmental stimuli. For example, a CVA patient with deficits in selective attention may not be able to shift attention
from the oral message presented by a physician to the written message printed on the instruction sheet. If the patient were writing notes, he or she may repeat the first letter or the first word over and over again and be unaware that he or she is perseverating.

The CVA patient may also be unable to inhibit a return to the old stimuli. For example, the patient may not be able to prevent himself or herself from continually looking back at the written medical instructions (overt orientation) or the patient may not be able to prevent his or her thought processes from continually shifting back to the information first presented by the physician (covert orientation). Because of the unconscious and automatic nature of most orienting processes, these individuals may report difficulties with the different tasks they are trying to perform, without being aware of the nature of their problems.

The CVA patient may also experience a number of deficits that can be described as an inability to sustain attention or maintain vigilance, Posner's third level of attential processes. Impairments in control can result in the inability to focus consciously on a single task, maintain focus on a task, or shift to new tasks on demand. For example, a CVA patient may not be able to direct attention to the physician because he or she may be distracted by the pictures on the wall, the plants in the corner of the room, or the color of the physician's shirt. The individual may also have problems shifting from taking notes to responding to the physician's questions. Although some of the resulting functional impairments are similar to those caused by selective attention deficits (e.g., reduced memory and learning), sustained attention deficits always involve problems with conscious and intentional cognitive processes.

The prognostic implications of attentional problems vary with the different types of deficits. Higher levels of consciousness after CVA are significantly correlated with better rehabilitation outcomes (Henley et al. 1985). Conversely, length of coma, confusion, and perseveration problems are associated with poorer rehabilitation outcomes. Generally, limited attentional processes decrease the individual’s ability to take advantage of rehabilitation efforts.

**Cognitive rehabilitation of attention deficits.** The most comprehensive and systematic method for remediating attention deficits was developed by Ben-Yishay et al. (1987) at the New York University Medical Center Institute of Rehabilitation Medicine. Their Orientation Remedial Model (ORM) was designed to improve deficits at all three levels of attentional processing. The ORM evolved out of years of clinical research and recently was computerized to improve consistency, add graded cues, establish minimum guidelines for training, and make the program available to more patients.

Their ORM consists of five training components or stages that are systematically introduced to the patient. In the first stage, the patient is trained “to
attend and react to environmental 'signals'" (Ben-Yishay et al. 1987, p. 168). This test is a computer program that presents a series of visual stimuli, allows the patient to respond, and then provides feedback on his or her performance. The goal is to engage the patient directly with his or her environment to increase overall arousal, attention, and responsiveness.

In the second stage, the patient is trained "to time his or her responses in relation to changing environmental cues" (Ben-Yishay et al. 1987, p. 168). In this training component, the patient is taught to stop the sweep of the arm of a clocklike device at a specified point. This stage emphasizes phasic arousal through response preparation, overt orientation to external stimuli, and response speed.

The next three stages focus more on controlled attentional processes. The patient is trained "to be actively vigilant" (Ben-Yishay et al. 1987, p. 168) during the third phase. The program teaches the patient to locate, identify, and discriminate among different stimuli that display colors, numbers, or both. The exercise at this level requires scanning, stimulus identification, and discrimination and is intended to improve the patient's concentration and ability to consciously shift attention.

In the fourth stage, the patient is trained "in time estimation" (Ben-Yishay et al. 1987, p. 169). Patients are taught to estimate how much time has passed and then instructed to activate a specially designed stopwatch. Focus is shifted away from the external environment to internal stimuli. Patients are progressively taught to rely on more internalized cues such as timed body movements, counting aloud, and counting silently to predict the passage of time. The goal is to teach the patient to sustain his or her attention on cognitively mediated tasks.

In the final stage of the ORM, the patient is trained "to synchronize responding with complex rhythms" (Ben-Yishay et al. 1987, p. 169). The patient is presented with a series of rhythmic tones that he or she must attend to, learn, internalize, and anticipate so that the proper key can be pressed at the right time and the right duration. This stage requires the integration of previous training, including responding to the environment, orienting to external and internal cues, and actively controlling attentional processes.

The developers of the ORM have attempted to validate their program primarily with traumatic brain injury patients. In a group design study, Ben-Yishay et al. (1987) reported that patients displayed significant improvements on several evaluation measures, including Visual Reaction Time (Ben-Yishay et al. 1987), Wechsler Adult Intelligence Scale (WAIS) (Wechsler 1955), Digit Span and Picture Completion, and Picture Description Test (Ben-Yishay et al. 1987). Although the authors reported improvements in overall patient functioning in case study presentations, no controlled studies were cited regarding generalization beyond the neuropsychological tests listed above. The ORM represents a comprehensive and well-designed rehabilitation technique for attention
deficits. However, further research is needed to validate training effects and to
determine whether generalization occurs. Additionally, future studies should
include CVA patients with attention deficits.

Sohlberg and Mateer (1987) also developed a multilevel system to address
attention deficits that used modified, commercially available computer pro-
grams. Their Attention-Training Program (ATP) primarily addressed aspects
of controlled attention including what they describe as focused, sustained, se-
lective, alternating, and divided attention. Several different training tasks were
selected from commercially available materials and several were designed spe-
cifically for each attentional area. These tasks were introduced in increasing
complexity and difficulty as patients’ training progressed. For a complete de-
scription of their rehabilitation program, refer to Attention Process Training
(Sohlberg and Mateer 1986).

In their single-subject experimental design study, Sohlberg and Mateer
(1987) trained four patients with the ATP. Although they found that their pa-
tients displayed significant improvements in attention processes, they reported
no consistent gains in visual processing. Additionally, although patients achieved
more global rehabilitation goals in vocational and independent living areas,
the experimenters indicated that improvements could not be directly attrib-
uted to the ATP. More studies are needed that include CVA patients, consider-
ing that the Sohlberg and Mateer (1987) study included three traumatic brain
injury patients and one aneurysm patient. Additionally, Sohlberg and Mateer
(1987) indicated that the effects of the treatment levels could not be individu-
ally separated; therefore, studies are needed that isolate and compare the ef-
facts of the different training procedures.

In contrast to the ORM and ATP approaches, Wood (1986) presented sev-
eral single-subject experimental design studies applying behavior modification
techniques to the rehabilitation of attentional deficits. In the first study,
Wood (1986) demonstrated that reinforcement can improve attentional be-
behavior, as measured by head and eye orientation to a visual stimuli presented
by the trainer. Patients in this reinforcement program displayed greater sus-
tained attention compared with baseline.

In the second remediation program, four patients were trained to improve
attending to visual and auditory stimuli as measured by frequency of errors.
The patients were given positive and negative feedback in addition to rewards
or punishments for correct and incorrect responses. Wood (1986) reported
that the number of errors decreased for all patients. However, lack of improve-
ment in performance on memory tasks indicates limited generalizability.

Wood (1986) argued that complex machines, computers, or other technol-
geological devices may not be necessary when reinforcement techniques improve
attention deficits. This idea is important because these devices are often very expensive, which may prohibit their general access by patients who may benefit from treatment. In addition, Wood (1986) stated that the simplicity of the remediation program that uses reinforcement reduces the level of staff skills required to train patients. Because staff members would require less training, more individuals would be qualified and available to train CVA patients.

Webster and Scott (1983) used Meichenbaum’s (Meichenbaum and Cameron 1973) self-instructional training (SIT) in the remediation of attention deficits. This training follows the premise that an individual can provide his or her own attentional controls through verbal self-regulation. Training proceeded from repeating step-by-step instructions aloud, to subvocalizing instructions, to private speech. In the Webster and Scott (1983) single-subject design study, the traumatic brain injury patient displayed great improvement in the amount of information recalled, a measure of attention.

In summary, of the several different approaches to the remediation of attentional deficits, ORM is the most comprehensive and well-researched. However, most research has focused on traumatic brain-injury patients, and there appear to be few attention remediation studies that include CVA patients. In addition, much of the published research in the area is limited to case studies and single-subject experimental design studies. Therefore, although some encouraging signs exist regarding the remediation of attentional deficits, much more research is needed in the area.

Perception

Sensation involves the reception of information by the different senses (sight, taste, and so forth), whereas perception involves the active processing of information received through the senses. Perceptual functions are generally associated with the right hemisphere of the brain; in particular, more complex visual perceptual operations (e.g., visual-spatial integration) are believed to occur in the right parietal lobe (Hier et al. 1983; Vallar and Perrani 1986). As defined here, sensory deficits can impair perceptual functioning, but perceptual deficits cannot be solely the result of sensory deficits. For example, cortical blindness, as a result of bilateral occipital lobe infarcts, is considered a sensory and not a perceptual deficit because of pure dysfunction of the sensory system. In comparison, visual-spatial impairments caused by right parietal lobe lesions are considered perceptual in nature because of the processing problems that arise from distortions in the received information, not from dysfunction of the sensory system.
Perceptual deficits. Impairments in perceptual functioning can be subdivided into three major groups based on their clinical significance: modality-specific perceptual deficits, modality-nonspecific perceptual deficits, and behavioral consequences of perceptual deficits (Bechinger and Tallis 1986). Modality-specific perceptual deficits affect only one sensory system. For example, left visual imperception or neglect involves only the visual system and can lead to the inability to perceive information in the left visual field. An individual with this deficit may have difficulty with reading, writing, scanning, or other tasks that require the visual perception of the whole stimulus field while other systems remain intact.

In contrast, modality-nonspecific perceptual deficits can involve multiple sensory systems including auditory, visual, and somatosensory functions. For example, left hemi-imperception or neglect includes deficits of both the somatosensory and visual systems. Persons with this impairment will have difficulty perceiving physical and visual stimuli on their left side and may not even recognize that the left side is part of their own body. The individual with left hemi-imperception may have difficulty with motor skills such as dressing and walking, as well as with visual skills such as reading, writing, and scanning.

Behavioral consequences of perceptual deficits refer to specific functional impairments that result from one or more perceptual deficits. For example, constructional dyspraxia is a possible behavioral consequence of visual-spatial deficits, visual-perceptual deficits, or visual motor planning and organization deficits, or any combination of the three. A person with constructional dyspraxia may have difficulty manually reproducing visual stimuli, such as a block design or a complex figure, because of problems in the perception of the stimuli, the spatial organization of the information, or the planning of the motor activities necessary to reproduce the stimuli. This category of perceptual deficits represents an attempt to further classify the behavioral consequences that commonly result from one or more perceptual deficits.

The literature indicates that the majority of perceptual recovery occurs within the first 6 months after the CVA (Meerwaldt 1983; Thorgren and Westling 1990). However, many factors can affect the amount and speed of recovery and the patient’s overall prognosis. The size of the lesion and the severity of the CVA influence recovery of perceptual functions. For example, Meerwaldt (1983) found a negative correlation between the size of the lesion and speed of recovery. Hier et al. (1983) found that recovery of some perceptual functions was faster with smaller lesions. Levine et al. (1986) found that the size of the lesion helped determine the severity of neglect and degree of improvement after CVA.

The location of the lesion can also affect recovery. Stone et al. (1991) found that visual imperceptions were common to both left-hemisphere (72%) and
right-hemisphere (62%) damage 3 days after CVA. However, 3 months after the CVA, they reported that 75% of right-hemisphere CVA patients still experienced visual hemi-imperception compared with only 33% of those with left-hemisphere CVAs. Swindell et al. (1988) found that drawing abilities recovered better for left-hemisphere CVA patients compared with right-hemisphere CVA patients. The importance of perceptual operations, especially visual-perceptual functioning, has been well-documented in research. For example, visual-perceptual functioning in CVA patients has been shown to be related closely to the ability to perform activities of daily living (e.g., personal hygiene, cleaning, cooking) and independent living skills (e.g., mobility, shopping, laundry) (Edmans and Lincoln 1990; Edmans et al. 1991; Titus et al. 1991). Similarly, visual-spatial functions were shown to be important predictors of rehabilitation outcome (Jongbloed 1986; Kaplan and Hier 1982; Kotila et al. 1984). More severe visual-perceptual deficits are associated with poorer functioning in activities of daily living (Jeske et al. 1991). Therefore, improving visual-perceptual functioning may lead to a better prognosis and a better overall rehabilitation outcome for CVA patients.

**Cognitive rehabilitation of perceptual deficits.** Because of the strong relationship between visual-perceptual operations and overall functioning, the majority of the studies examining the cognitive rehabilitation of perception have focused on the remediation of visual-perceptual deficits. Initial cognitive rehabilitation studies of visual-perceptual dysfunction focused on the remediation of scanning deficits in patients with right hemisphere lesions (Carter et al. 1983; Webster et al. 1984; Weinberg et al. 1977, 1979; Young et al. 1983). Aspects of scanning training include: 1) compelling the patient to turn his or her head to the neglected side, 2) anchoring the patient’s vision to the neglected side, 3) decreasing the density of stimuli, and 4) pacing the patient’s tracking patterns (Gordon et al. 1985; Weinberg et al. 1977).

In the scanning training studies, the trainers used a scanning machine and graded visual material. The scanning machine was a wooden board with two parallel rows of colored lights. These lights could be lit in any order or pattern the experimenters desired. Additionally, another stimulus or “target” could be moved mechanically to any location around the edge of the board. The graded visual material consisted of letters, words, paragraphs, or arithmetic problems.

The first step in training required the patient to learn to locate the stationary target on the scanning board. After the patient had acquired this skill, he or she was trained to track the target as it moved around the board. Once this skill had been mastered, the patient was trained to search systematically from left to right by locating lights as they were lit on the board. To assist in this process, the patient was instructed to “anchor” his or her scan to the far left target.
Anchoring taught patients to begin their search pattern from the far left side, which is often not perceived or is neglected by patients with right-hemisphere injuries. As training progressed, the experimenters used increasingly dimmed lights to improve the patient's perceptual skills.

In conjunction with the scanning training described above, patients practiced with 13 types of graded visual-perception tasks such as reading, writing, and performing paper-and-pencil arithmetic (Weinberg et al. 1977). These stimuli varied in density (distance between targets) and complexity (from large trigrams to New York Times print). The number of cues provided in the written materials, such as numbers or anchoring lines, decreased, and the task difficulty increased as training progressed and the patients' abilities improved.

Subjects in an experimental group that involved visual scanning and graded visual materials displayed significantly greater improvements in cancellation tasks and academic skills compared with the improvements of the control group (Weinberg et al. 1977). Furthermore, the largest improvements were observed in the experimental subgroup with the most severe deficits. These results suggested that the cognitive rehabilitation program was better than no treatment or normal recovery and that the largest, treatment-related improvements in scanning abilities occurred with severely impaired individuals with the poorest rehabilitation prognosis.

Weinberg et al. (1979) added somatosensory awareness and size estimation training to their scanning training in another study. To increase the effects of the cognitive remediation program, the experimenters addressed nonvisual awareness issues and visual-spatial functions that were not affected by scanning training alone. Somatosensory training involved the identification of tactile stimulation at various locations on the patient's back. To teach the patient visual-spatial skills, the experimenters had the patient estimate the size of different rods placed on his or her back. To reduce the length of training, letter cancellation tasks were introduced to replace some of the graded visual materials. Cancellation tasks involved locating and crossing out predetermined stimuli (e.g., the letter H) located on a sheet of paper covered with random stimuli. Weinberg et al. (1979) found that their patients showed significantly greater improvements in visual scanning, academic skills, body awareness, and spatial organization than standard rehabilitation control subjects.

Researchers have attempted also to address comprehension problems, disorganization, and visual problem-solving deficits that were still evident in CVA patients after visual scanning training (Weinberg et al. 1982). The treatment program included training patients to impose a system on dispersed meaningful and meaningless stimuli and training patients to systematically appraise visual stimuli. Significant improvements were found in experimental subjects'
performance on complex visual-cognitive tasks, such as the WAIS Block Design and Embedded Figures Test, compared with no-treatment control subjects. Block design augments training for patients with left hemi-imperception problems (Young et al. 1983). This task was believed to improve complex visual integration and to increase visual-motor integration compared with occupational therapy alone or to scanning training, letter cancellation training, and occupational therapy.

Despite the initially positive results of earlier studies, some subsequent studies of the cognitive remediation of perceptual deficits have produced less positive findings, especially regarding generalization. Researchers linked the different treatments outlined here in a logical fashion beginning with scanning training, proceeding to somatosensory and size estimation training, and finishing with training in organization and systematic appraisal (Gordon et al. 1985). However, no significant differences were found between experimental and control groups after treatment. Gordon et al. (1985) hypothesized that the combined and abbreviated treatment programs progressed too rapidly for patients to learn and become adequately skilled at each method. The investigators noted that the duration (4 weeks) of the complete treatment package used in this study was equivalent to that of earlier studies using individual treatments.

Subsequent studies attempted to replicate the visual scanning program using single-subject experimental designs to identify and measure individual changes (Gouvier et al. 1984, 1987; Webster et al. 1984). In addition, these researchers added training in a wheelchair obstacle course to examine generalization of training. The combined results indicated that learning occurred in the scanning tasks but that generalization was less clear for wheelchair navigation. Gouvier et al. (1984) found that two patients improved in wheelchair navigation, although Webster et al. (1984) found only one of their three patients showed dramatic improvement in wheelchair navigation. Additionally, Gouvier et al. (1987) stated that measures of reading, writing, and wheelchair navigation during and after training produced inconsistent results for their five patients.

In an attempt to use technology in rehabilitation, Robertson et al. (1988) developed a computer program to present the scanning training tasks that remediate visual neglect. In their single-subject experimental design study they found that patients improved in computer-trained skills. However, the investigators found little generalization to other untrained tasks, suggesting that generalization was limited by the specificity of training materials.

In contrast to cognitive retraining research, some clinicians have promoted stimulus manipulation, which directly modifies environmental or task stimuli
to improve the patient's perceptual functioning. Heilman and Watson (1978) found that symptoms of neglect in right-hemisphere CVA patients were reduced when using visual-spatial stimuli (e.g., line orientation) as opposed to verbal stimuli (e.g., words) in cancellation tasks. The authors hypothesized that the use of visual stimuli, as opposed to verbal stimuli, increased the general arousal of the damaged right hemisphere, thereby reducing neglect. However, no direct measures of cortical activity were used in the study, and more research is needed to validate this conclusion.

Riddoch and Humphreys (1983) found that visual cuing can also reduce symptoms of neglect in right-hemisphere CVA patients. They found that cues placed on the contralateral side of a line bisection task improved performance more than cues on the ipsilateral side or on both sides. This improvement was observed when patients were forced to report the left cue. In a related study, Nichelli and Rinaldi (1989) found that cues placed on the contralateral side of the lesion reduced line bisection errors. They also showed that line bisecting errors decreased when the task was shifted from the contralateral hemispace to the center and further reduced when the task was shifted to the ipsilateral hemispace. Ishiai et al. (1990) examined the use of numbering during cancellation tasks. They found that when patients were asked to number the lines canceled, the amount of spatial neglect was significantly reduced compared with simply crossing out the lines. These results and the above studies in stimulus manipulation suggest that alterations in task demands and environmental stimuli can reduce visual-perceptual deficits and improve functioning.

Based on the group cognitive retraining studies described above, the cognitive remediation of perceptual deficits has had some early successes, and some of these successes have generalized to real-world applications. Generalization has been demonstrated in reading, writing, and paper-and-pencil math (Weinberg et al. 1977), somatosensory and spatial awareness (Weinberg et al. 1979), comprehension, organization, systematic visual appraisal (Weinberg et al. 1982), and wheelchair navigation (Gouvier et al. 1984). However, other research has resulted in less conclusive results. In a combined treatment approach, Gordon et al. (1985) found no treatment effects compared with control subjects.

Cognitive Rehabilitation for Alzheimer's Disease

Alzheimer's disease is currently classified in the DSM-IV (American Psychiatric Association 1994) under the Axis I cognitive disorders subcategory of dementia. The diagnostic criteria for dementia of the Alzheimer's type listed in the DSM-IV are presented in Table 7-2.

The Consortium to Establish a Registry for Alzheimer's Disease (CERAD) was formed to assist in the development of a standard process for diagnosing the illness. CERAD gathered together a number of clinical and neuropsychological
assessment instruments to more reliably diagnose Alzheimer's disease (J. C. Morris et al. 1989). The CERAD battery consists of a dementia rating scale and measures of verbal fluency, naming, mental status, verbal learning, word recall and recognition, and constructional praxis. The purpose of this battery is to give researchers and clinicians around the world the same systematic procedure to diagnose Alzheimer's disease (J. C. Morris et al. 1989).

Table 7–2. Diagnostic criteria for Dementia of the Alzheimer's Type

A. The development of multiple cognitive deficits manifested by both:
   (1) Memory impairment (impaired ability to learn new information or to recall previously learned information)
   (2) One (or more) of the following cognitive disturbances:
      (a) Aphasia (language disturbance)
      (b) Apraxia (impaired ability to carry out motor activities despite intact motor function)
      (c) Agnosia (failure to recognize or identify objects despite intact sensory function)
      (d) Disturbance in executive functioning (e.g., planning, organizing, sequencing, abstracting)

B. The cognitive deficits in Criteria A1 and A2 each cause significant impairment in social or occupational functioning and represent a significant decline from a previous level of functioning.

C. The course is characterized by gradual onset and continuing cognitive decline.

D. The cognitive deficits in Criteria A1 and A2 are not caused by any of the following:
   (1) Other central nervous conditions that cause progressive deficits in memory and cognition (e.g., cerebrovascular disease, Parkinson's disease, Huntington's disease, subdural hematoma, normal-pressure hydrocephalus, brain tumor)
   (2) Systemic conditions that are known to cause dementia (e.g., hypothyroidism, vitamin B₁₂ or folic acid deficiency, niacin deficiency, hypercalcemia, neurosyphilis, HIV infection)
   (3) Substance-induced conditions

E. The deficits do not occur exclusively during the course of a delirium.

F. The disturbance is not better accounted for by another Axis I disorder (e.g., major depressive disorder, schizophrenia).

The growing consensus is that Alzheimer's disease is a heterogeneous group of disorders (Mayeux et al. 1985). The distinct subtypes of this disorder appear to differ in their rate of the deterioration. For example, some individuals show little functional decline for many years, whereas others rapidly progress to a vegetative state in just a few years. Miller et al. (1991) discuss two possible subgroups, those with early age onset and those with extrapyramidal symptoms. Both subtypes are associated with a more severe course, greater intellectual decline, and a larger number of symptoms. Specific subtypes, however, have not yet been established on a histochemical level (Galasko et al. 1990).

Memory

Memory impairment is usually the first observable symptom of Alzheimer's disease (Chui 1989). For example, Alzheimer's patients often misplace items or forget the names of significant others. As the disease progresses, judgment and reasoning deficits emerge, and eventually, language deficits and apraxia appear. The memory is targeted for early intervention because memory deficits are the first to appear and most other cognitive functions remain intact in the early stages of Alzheimer's disease.

Memory processes. Information processing theory proposes that memory is divided into two main components: working memory and remote memory (Salmon and Butters 1987). Working or short-term memory is the hypothetical process in which information is briefly but actively processed or held before encoding. Rehearsing a telephone number before dialing is an example of working memory. Information processing theory also proposes that memory is divided into three primary operations: encoding, storage, and retrieval (Salmon and Butters 1987). For example, if the information is sufficiently rehearsed, it can be encoded or consolidated into remote or long-term memory. In remote memory, the information is believed to be organized, categorized, and stored for later use. For example, the telephone number rehearsed earlier can be organized and then stored by individual called, place called, or strictly as a number. Encoding and storage processes are strongly interrelated and, therefore, are difficult to isolate. Encoding processes also vary with the type of information. Evidence suggests that auditory and visual memories are encoded differently (Wilson 1982) and, therefore, may be affected differently by Alzheimer's disease.

Retrieval is the process by which information previously stored in remote memory is brought forth to working memory on demand. Recalling a telephone number and the person called at a later date is an example of retrieval. Theorists have hypothesized that different types of remote memory exist (Cushman and Caplan 1987) and that these types are accessed through retrieval
processes. *Semantic memory* (also referred to as declarative or explicit memory) involves the storage of factual information and learned knowledge. This type of memory is illustrated by asking the person to answer the question, “Who was President of the United States during the Civil War?” *Episodic memory* is related to semantic memory but involves personal facts or events directly related to the individual. This type of memory is illustrated by asking the person to answer the question, “What did you do on your vacation?” Procedural or implicit memory involves acquired skills or actions. This type of memory can be inferred from the observation of behaviors or activities such as sewing, cooking, or brushing hair.

**Memory deficits.** Every memory component and process can be affected by Alzheimer’s disease. Patients may have reductions in the amount of information they can hold within their working memory. Instead of being able to handle seven bits of information (the memory capacity of the average individual), an Alzheimer’s patient may be able to handle only one or two bits of information. From the example used earlier, an Alzheimer’s patient with working memory deficits may not be able to actively process and remember the seven digits of a telephone number.

Encoding and storage processes can also be disrupted by Alzheimer’s disease. Patients may have trouble categorizing and organizing information, or they may have difficulty transferring information from working memory to remote memory. A patient who cannot remember new information regardless of the number of rehearsals may be experiencing either encoding or storage problems, or both. For example, a patient may be able to remember a telephone number while he or she is actively processing it, but once rehearsal stops, the information is lost.

Alzheimer’s disease may also result in impairments in retrieval from remote memory. In this situation, information can be encoded and stored, but patients have difficulty accessing that information. For example, a patient is said to be experiencing a retrieval problem when he or she cannot remember a specified word in free recall, but can recognize it when presented with a multiple choice format. The fact that he or she can recognize the information demonstrates that the information was stored somewhere within remote memory.

The extent and severity of memory deficits vary with each individual, and not every memory area is impaired. For example, patients with early Alzheimer’s disease often have intact working memory but have problems encoding information into remote memory. Thus, the patient may be able to state his or her physician’s name after introduction as long as the patient is rehearsing it. This information will be lost, however, if the patient stops rehearsing or is distracted. Alzheimer’s patients also have retrieval problems with information from se-
mantic and episodic stores but commonly have intact procedural memory. They may be unable to recall factual information or personal events, but perform overlearned tasks such as walking, combing hair, or brushing teeth.

As with other cognitive functions, memory operations depend on adequate attentional processes. Often attention deficits appear as memory problems. For example, not being able to attend to stimuli may lead to inadequate or incomplete encoding and storage of information. Therefore, before attempting to remediate apparent memory impairments, trainers should carefully assess the patient neuropsychologically to ensure that the patient’s memory problems are not solely the result of attentional disruption.

**Cognitive rehabilitation of memory deficits.** A variety of interventions for the remediation of memory impairments have been attempted, including repetition and practice (e.g., rehearsal), strategy learning (e.g., mnemonics and paired associate learning), and external aids (e.g., memory books) (Glisky and Schacter 1986). Although these interventions have been used to treat memory problems resulting from other neurological disorders, the majority of the published research with clinical populations in this area has used Alzheimer’s patients.

Repetition and practice techniques are based on the premise that “exercising” a person’s memory will improve memory functioning overall. These techniques have received a large amount of research attention and, generally, the results have not been positive. Weingartner et al. (1993) found that repetition exercises did not enhance the memory of words for Alzheimer’s patients. Beck et al. (1988) found that memory training improved patients’ recall of numbers but not their recall of a story. Little et al. (1987) found that unsystematic rehearsal alone is ineffective in the treatment of memory deficits for Alzheimer’s patients. Goldstein et al. (1985) found that rehearsal improved memory for training lists of words and numbers, although generalization did not occur and overall memory function did not improve. The results of these studies suggest that repetition and practice generally do not improve memory. However, on occasions where some minimal improvement is evident, these improvements do not generalize to information other than that specifically used in the training materials.

A notable exception to the findings cited above is a series of studies conducted by Glisky and Schacter (1986, 1987) and Glisky et al. (1986a, 1986b). Although their research does not directly address patients with Alzheimer’s disease, their findings are important regarding memory rehabilitation. Glisky and Schacter (1986) acknowledged that repetition and practice is effective only for improving memory of the actual tasks involved in training. They proposed that remediation should focus on the “acquisition of domain-specific
knowledge" (p. 58) that is relevant to the patient's impairments (Glisky and Schacter 1986). Instead of teaching random lists of information, they taught memory-impaired patients information that may improve their functioning in particular deficit areas.

In their studies, Glisky et al. demonstrated that patients could learn both simple and complex information related to computer operations, such as computer-related vocabulary and basic computer operations (e.g., running programs, manipulating disk information, and simple programming). Because patients are learning the specific tasks required of them, generalization and overall memory improvements are not required. Applying this concept to Alzheimer's patients, training could involve tasks related to individual deficits rather than abstract and meaningless information such as number lists, stories, or words. Additionally, the acquisition of domain-specific knowledge involves teaching at two levels of processing, semantic and procedural memory. Training at multiple memory levels is believed to enhance encoding and retrieval processes and forms the basis of some of the strategy-learning techniques (e.g., pairing visual images with verbal information).

Strategy learning involves the use of different techniques to improve the encoding and retrieval of information. Some evidence suggests that the encoding and retrieval of information is a greater problem than storage in Alzheimer's disease (Zandi and Woods 1988). For example, memory accuracy is enhanced in Alzheimer's patients when researchers test recognition as opposed to recall of information (Finley et al. 1990; Kopelman 1991; Zandi and Woods 1988). In addition, it is apparent that the different aspects of memory function are affected to varying degrees by Alzheimer's disease. Therefore, a great amount of emphasis has been given to the study of strategy learning and the maximization of intact memory functions.

Mnemonics are memory strategies that encompass a variety of techniques. Mnemonics provide patients with a fixed method of categorizing and organizing new information on more than one cognitive level to assist in the encoding and retrieval of that information. The most common mnemonic technique used with Alzheimer's patients involves the pairing of visual imagery or mental images with other information that is intended to be remembered. For example, name-face associations involve the pairing of names with faces to improve a patient's recall (Backman et al. 1991; Byrd 1990; Hill et al. 1987; Zandi and Woods 1988). These studies found that pairing visual images with other forms of information can improve the patient's recall. In addition to visual imagery, verbal associations were found to improve Alzheimer's patients' recall of object locations (Camp and Stevens 1990).
Other memory improvement strategies include embedded sentences, verbal labeling, and "chunking" information (Parenté and DiCesare 1991). In embedded sentences, seemingly unrelated words are strung together to integrate them into a functional unit, making them easier to remember. For example, *pencil, computer, door, hand, lightbulb, statue,* and *dog* could form the sentence, "When the lightbulb over the computer broke, the dog took the pencil out of the statue's hand and ran out the door." Verbal labeling involves associating the unfamiliar with something familiar. For example, the operating instructions of a facsimile machine may become easier to learn if they are associated with the operations of a photocopier and a telephone. Chunking is a commonly used mnemonic that groups information into a smaller number of bits that are easier to remember. Telephone numbers represent a chunking process in which 10 individual numbers are chunked into two groups of three and one group of four (e.g., 123-456-7890) to improve recall. It is important to note that the acquisition of any of the mnemonic techniques cited above requires repetition and practice.

Although mnemonic techniques have met with some initial success (Byrd 1990; Hill et al. 1987; Zandi and Woods 1988), some criticisms have been raised (Glisky and Schacter 1986; Goldstein et al. 1985). None of the studies described above have demonstrated any generalization of memory improvements to other areas. Similar to the more direct repetition and practice studies, the effects of mnemonic training appear to be specific to the area trained. Mnemonic techniques also require effort by the individual; the strategy has to be remembered and then applied in the appropriate situation. Learning the mnemonic technique can be a difficult process. This effort, which is inconsequential for a healthy individual, is taxing for someone who is cognitively impaired. Additionally, as the disease process progresses, patients will experience further losses in executive function or will be unable to recognize their memory deficits, both of which can impair their ability to use these effortful techniques in appropriate situations. These demands may limit the usefulness of this technique for patients with dementia (Glisky and Schacter 1986).

Retrieval practice, another memory improvement strategy, is based on the premise that repeatedly recalling recently learned material will improve overall retrieval functioning. Along with practice, researchers have employed spaced retrieval, or increasing intervals between recall, to improve long-term retention (Camp and Stevens 1990) and the pairing of multiple forms of information (similar to mnemonics) to improve encoding and retrieval. This combined strategy has met with some success with Alzheimer's patients (Camp 1989; Camp and Stevens 1990). Camp (1989) found that two patients were able to learn the associations between the names and photographs of staff persons. In another
study, patient memory was improved by verbally associating the name of objects with the names of different locations (Camp and Stevens 1990). The primary limitations of retrieval practice is that treatment generalization and improvement in overall retrieval processes have yet to be demonstrated.

External aids have been proposed as a method for improving the memory of Alzheimer’s patients. This approach acknowledges that memory deficits cannot be directly remediated and, therefore, require external compensatory interventions. Bourgeois (1990) found that conversation skills of Alzheimer’s patients could be improved with external memory aids. Hanley (1981) placed signs around a nursing home ward to prompt the patients’ memory of objects and locations. These prompts proved successful in decreasing disorientation on the ward. Glisky et al. (1986a, 1986b) have proposed that computers serve as external memory aids. In previous research, they have demonstrated that some memory-impaired patients can learn the skills necessary to operate computers. Sohlberg and Mateer (1989) hypothesized that memory books in conjunction with behavioral training could improve adaptive skills. A memory book contains information pertinent to the individual. Sohlberg and Mateer (1989) presented a case study in which a head injury patient with severe memory and other cognitive impairments could increase his independence and work-related skills through behavioral training and use of a memory book.

Although relatively simple compared with other memory training programs, these external memory aids are useful because they target behaviors that may improve patients’ adaptive functioning. For example, a memory book can remind a person of any number of critical details including his or her daily activities, work tasks and responsibilities, or medication schedule. Unfortunately, only case studies have been presented, and more research is needed to demonstrate the effectiveness of these aids. In addition, because of the severe impairments that Alzheimer’s patients experience in other cognitive areas, their ability to learn and appropriately use this strategy is questionable. This strategy, described as “remembering to remember,” or metamemory, is an important prerequisite for using an external memory aid, and metamemory has been shown to be impaired in Alzheimer’s patients (R. G. Morris and Kopelman 1986).

**Summary**

The development of cognitive rehabilitation strategies geared toward the adaptation and remediation of disorders affecting cognitive function in older adults is extremely critical. Much of the research in this area has been devoted to the rehabilitation of specific postCVA deficits, including language, attention, perceptual functioning, and memory.
Two distinct approaches are currently used in language rehabilitation: the classical and the neurolinguistic models. The classical approach focuses on restoring language expression using techniques such as repetition, cueing, or answering dichotomous questions. The neurolinguistic model addresses the important issue of language comprehension by helping patients decipher the contextual meaning of language. However, the effectiveness of speech therapy in language rehabilitation has not yet been conclusively established. Future studies must use larger and more homogenous groups of patients with clearly defined lesions and well-characterized language deficits that have been determined during a formal assessment.

Disorders affecting attentional processes are a major rehabilitation concern because of the secondary deficits that can be produced in memory, learning, and problem solving. Impairments in alertness, selective attention, and vigilance are commonly seen in CVA and the latter stages of Alzheimer’s disease. Among the different approaches reviewed in this chapter, ORM seems to be the most comprehensive and promising, although much of the research in this area has been limited to case studies and single-subject experimental design studies with traumatic brain injury patients. Further controlled research with other clinical populations, such as CVA and Alzheimer’s patients, will be needed before the usefulness of cognitive rehabilitation techniques for attentional disorders can be established.

The majority of studies examining the cognitive rehabilitation of perceptual deficits in CVA patients has focused on the remediation of problems regarding visual scanning, somatosensory awareness, comprehension, disorganization, and visual problem solving. Despite initially positive results, subsequent controlled studies have produced equivocal results, especially regarding generalization of improvement outside of the laboratory.

Studies in rehabilitation of patients with Alzheimer’s disease have emphasized the remediation of memory impairment through the use of rehearsal techniques, strategy learning (mnemonics), and external aids. However, consistent improvement in overall memory function beyond the specific domain being addressed has not been demonstrated. Considering the fact that rehabilitation strategies will not be able to reverse the neuronal damage that underlies degenerative disorders in older adults, external memory aids may ultimately prove to be the most effective of the rehabilitation aids used in treating Alzheimer’s patients.

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Cognitive Rehabilitation for Neuropsychiatric Disorders

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