Relation of Perceptual and Body Image Dysfunction to Activities of Daily Living of Persons After Stroke

Kerry Brockmann Rubio, Julia Van Deusen

Key Words: cerebrovascular disorders • intervention • self-care

Perceptual and body image disturbances are common sequelae in persons who have had stroke. There is much evidence to substantiate a relationship between impaired perceptual functioning and impaired functioning in activities of daily living (ADL). In regard to body image dysfunction, the linking of unilateral neglect and poor ADL functioning has been widely examined, however, the relationship of other body image disturbances, such as somatognosia, to ADL has received little examination. Research on the above relationships are reviewed in this article. The Behavioural Inattention Test and Amadori OT-ADL Neurobehavioral Evaluation are discussed as tools to assess perceptual and body image dysfunction through ADL. The literature on intervention for perceptual and body image dysfunction in relation to ADL primarily concerns the difference between the restorative and functional retraining approaches and treatment suggestions. Because specific gaps are noted in this area of study, future research ideas are suggested.

Persons who have had stroke are among the patients most commonly treated by occupational therapists (Trombly, 1989). With 350,000 stroke survivors each year, stroke is the major cause of disability in the United States. Eighteen billion dollars were spent in 1993 for stroke-related care and lost productivity (Goldstein & Matchar, 1994). Consequently, there is continued need for occupational therapists to examine the research pertaining to our intervention for persons who have had stroke.

The purpose of this article is to review the research results in two areas of dysfunction that are major concerns for occupational therapists involved in intervention to improve activities of daily living (ADL) of persons after stroke. These two areas involve the performance components of perceptual processing and self-concept (which subsumes body image) as they are defined in the current Uniform Terminology for Occupational Therapy—Third Edition (American Occupational Therapy Association [AOTA], 1994). To conform to current theory and research and to limit our content, we have deviated from the definitions and organization of the Uniform Terminology in a few instances. To clarify our perspective, we have included definitions for terminology used in this article.

After the section on definitions, we have organized the literature on our topic into four categories: (a) documentation of the presence of perceptual and body image dysfunction in stroke, (b) literature relating problems with ADL to perceptual and body image dysfunction, (c) instruments providing information on body image and perceptual dysfunction from ADL assessments, and (d) research and case studies on stroke interventions for body image and perceptual dysfunction, directly or indirectly, related to improved ADL. We conclude with suggestions for research and patient service.

Terminology

In this article, ADL refers to performance of self-maintenance tasks such as feeding, dressing, grooming, bathing, and toilet hygiene, functional mobility, community mobility (driving, map reading), and functional communication (AOTA, 1994). Because few work-related and productive activities were apparent from the literature review, such tasks as use of money have been treated here as ADL tasks despite the deviation from Uniform Terminology. Because many different scales are used to evaluate ADL, operational definitions vary with the particular study reviewed.

Perceptual dysfunction refers to "the inability to perform specified activities relevant to the interpretation and use of sensory stimuli" (Van Deusen, 1993, pp. 244–245). Perceptual dysfunction involves problems with perceptual processing as defined in Uniform Terminology (AOTA, 1994) and includes difficulty with tasks requiring depth
perception, visual figure-ground differentiation, stereognosis, and similar problems. Because AOTA's Terminology Task Force did not include praxis as a part of perceptual processing, we have left it out of our review. We included the literature dealing with constructional praxis because this complex construct includes perception of spatial relation as well as motor planning. Perceptual dysfunction has been operationally defined in the research literature through the use of numerous tests (Foss, 1993).

Body image dysfunction refers to the disturbances in the synthesis of the neural body scheme and its psychological representation that relate to performance problems. Body image dysfunction involves disturbances of the body scheme and aspects of the psychological self-concept as defined in Uniform Terminology (AOTA, 1994). Although body image disturbance may involve perceptual dysfunction, body image problems are not primarily perceptual. Problems can result from neural lesions affecting attention, from physical bodily changes, or from psychosocial disturbances. Typically, body image disturbances have both physical and psychosocial components. In persons who have had stroke, unilateral neglect is an example of a neural-based body image disturbance that can be very disturbing to the person and the family. Unilateral neglect has been operationalized for research purposes in many ways (Van Deusen, 1993).

Presence of Perceptual and Body Image Dysfunction in Stroke

Perceptual and body image dysfunction in patients who have had stroke has been documented by many research studies (Benton, de Hamsher, Varney, & Spreen, 1983; Edmans & Lincoln, 1989; Lorenze & Cancro, 1962; Marsh & Kersel, 1993; Schenkenberg, Bradford, & Ajay, 1980; Sivak, Olson, Kewman, Won, & Henson, 1981; Wilson, Cockburn, & Halligan, 1987b; Zoltan, Siev, & Freishtat, 1986). In an early study about perceptual dysfunction (Lorenze & Cancro, 1962), only 3 of the 35 selected patients with hemiplegia showed no visual-perceptual problems. Sivak et al. (1981) found that subjects with brain injury (n = 23) performed significantly worse than control subjects without brain injury on a number of perceptual tests. Edmans and Lincoln (1989) assessed 75 patients with right hemiplegia and 75 with left hemiplegia with the Rivermead Perceptual Assessment Battery (Whiting, Lincoln, Bhavan, & Cockburn, 1985); 76% of all subjects presented with perceptual problems. No differences were noted between right and left hemisphere damage in relation to perceptual problems. These studies indicate that perceptual dysfunction is a frequent result of both right and left hemisphere stroke.

There is research documentation of body image disturbances such as unilateral neglect and body part agnosia in persons who have had stroke. Schenkenberg et al. (1983) found that out of 61 subjects (41 with brain injury from vascular disease), only 26 showed normal performance on tests of finger localization. Somatoagnosia, the inability to identify one's body parts and their relationship to each other, also has been documented in persons after stroke (Zoltan et al., 1986). Thus research has shown that body image disturbances frequently occur after stroke.

Relation of Perceptual and Body Image Dysfunction to ADL Performance Problems

Many studies have found a relationship between perceptual and body image dysfunction and ADL problems in subjects with CVA. Studies have ranged from those correlating a few perceptual test scores with one self-care activity (such as putting on a shirt) to complex prediction studies involving many perceptual and ADL variables and often other variables as well. In these studies, ADL was measured with tests such as the Modified Barthel Index (Granger, Albrecht, & Hamilton, 1979) and the Klein-Bell ADL Scale (Klein & Bell, 1982). Some of these studies are reviewed below.

The classic study in the rehabilitation literature relating perceptual dysfunction to ADL problems was by Lorenze and Cancro (1962), who studied 41 patients with CVA, 25 of whom had right hemisphere damage. Upper extremity dressing and grooming were evaluated by occupational therapists' ratings, and perception was operationalized by standardized tests. The biserial correlations (r = .82, .98) showed a strong relationship between lack of success in dressing and grooming, respectively, and low perceptual scores. Edmans and Lincoln (1990) showed that patients without perceptual deficits, as measured by the Rivermead Perceptual Assessment Battery, were more independent in ADL than those patients with perceptual
deficits \((p < .01)\). Significant relationships \((p < .001)\) were found between perceptual abilities and 3 ADL scores (self-care and two levels of household ADL tasks). A more recent study showed that 8 of the 16 subtests of the Rivermead Battery were moderately correlated with ADL scores (Matthey, Donnelly, & Hextell, 1993).

In several studies, moderate relationships between perceptual skills and upper extremity dressing skills were found, with coefficients ranging from \(r = .43\) to \(r = .84\) (Bradley, 1982; Kowalski-Lundi & Mitcham, 1984; Mitcham, 1982; Warren, 1981). Walker and Lincoln (1991) noted a significant relationship between overall dressing score and perceptual skills \((p < .05)\). These authors found dressing skills to be most highly associated with spatial abilities, visual matching, and visual inattention.

To study more specific relationships, Titus, Gall, Yerxa, Roberson, and Mack (1991) assessed patients who had stroke \((N = 25)\) with the Klein-Bell ADL Scale and a wide array of perceptual tests. According to the report of these authors, ADL function was found to correlate most consistently with agnosia, an impairment in object recognition, \((r = .51, p < .01)\), and three-dimensional apraxia \((r = .41, p < .04)\). Dressing skills related significantly to agnosia; hygiene and feeding were correlated with a wide variety of perceptual skills. The perceptual assessments most consistent in their correlations with ADL were the Test of Three-Dimensional Constructional Praxis (Benton, 1973), the Block Design of the WAIS-R (Wechsler, 1981), the Haptic Visual Discrimination Test (McCarron & Dial, 1979), and the Adult Visual-Perceptual Assessment (Baylor University Medical Center, Occupational Therapy Department, 1980).

Two studies examined the effects of motor versus perceptual dysfunctions on the ability to perform daily tasks. In the earlier study (Eriksson, Bernspang, & Fugl-Meyer, 1988) motor impairments affected ADL performance more than perceptual impairment in a sample of 109 patients within 2 weeks of stroke. In the second study (Bernspang, Vitanen, & Eriksson, 1989), which used the same assessments as the previous study, 75 different subjects were assessed 4 to 6 years after stroke. The results were reversed: perceptual dysfunction, especially visuospatial and visual-motor dysfunction, was more likely than motor dysfunction to impair long-term ADL status.

In summary, studies have indicated that perceptual dysfunction plays a large role in the ADL impairments of persons who have had stroke. These problems may be difficult to overcome, because perceptual impairments affect ADL status for many years after stroke. Perhaps improved occupational therapy intervention with this population can eventually better this situation.

Predicting Self-Care From Perceptual Dysfunction

Attempts to correlate perceptual scores with improvement in ADL for purposes of prediction have not all been positive. One study (Rosenthal, Pearson, Medenica, Manaster, & Smith, 1965) found no significant correlations between scores from standardized visual perceptual tests and self-care improvement in a rehabilitation setting. Other studies have shown different results. Bourestom and Howard (1968) were able to differentiate self-care improvement of persons with CVA by means of three standardized tests requiring perceptual performance.

Carter, Oliveira, Duponte, and Lynch (1988) studied 21 patients after stroke and found that visual-spatial perceptual abilities strongly predicted posttest ADL functioning in areas of dressing, hygiene, and bed mobility. Visual scanning was also found to be significantly predictive of personal hygiene function. Finally, in a study of hundreds of predictor variables, Anderson and colleagues found that subjects who improved least after stroke were distinguished from those who improved most by lack of motivation, emotional disturbances, and gross perceptual dysfunction. The authors believed that these variables could be assessed by clinical observations (Anderson, Bourestom, Greenberg, & Hildyard, 1974).

Predicting Driving Ability From Perceptual Dysfunction

Because driving poses serious safety issues, a number of studies have addressed the predictability of perceptual test scores to driving ability of persons with brain injury, including that from CVA. Sivak et al. (1981) demonstrated that five of the eight perceptual tests used in their study could predict problems with driving. Simans (1985) found perceptual test scores predictive of driving success \((N = 52)\). A 1-year follow-up survey showed that all but two current drivers had been recommended to drive from the assessment results the previous year. Unfortunately, only 23 of the 52 subjects in the follow-up study returned the questionnaire.

In 1990, reports on driving studies began appearing from a Kessler Institute research group (Galski, Bruno, & Ehle, 1992, 1993; Galski, Ehle, & Brunö, 1990). In the initial study, only 4 of 21 variables were found to predict results of the driver assessment, none of which involved perception. These authors then developed a Cybernetic Model of Driving (1992); the resulting test battery was used to predict driving in 35 subjects with CVA and brain injury. Visual-perceptual test scores explained 64% of the variance in the driving assessment. The tests of visuospatial analysis and synthesis, visual-motor coordination, and constructive abilities were predictive of driving performance of persons with cerebral damage. Behavioral observations, especially attentional ones, were also important in prediction. This research group noted that use of the perceptual tests identified performance deficits that could be amenable to remediation or compensation for driving skill.
In conclusion, much evidence shows perceptual dysfunction to be predictive of poor ADL performance, including that of driving performance. Other variables besides perceptual status also contribute to the potential for ADL independence of persons after stroke.

Relation Between Body Image Dysfunction and ADL

In persons with CVA, body image problems are fundamentally due to injury affecting the neural foundation, that is, to body scheme disturbances. Somatoagnosia and finger agnosia were related to the ADL performance of 85 persons with CVA in Warren's (1981) study, which significantly correlated scores on a body scheme measure to their scores on an upper extremity dressing performance scale \( r = .67 \). However, much of the literature dealing with body image disturbances in stroke as they relate to ADL is concerned with the problem of unilateral neglect, which involves attentional deficits such that the body side contralateral to the cerebral lesion is ignored. Movement of limbs in relation to objects in space contralateral to lesion site may also be affected (Heilman, Valenstein, & Watson, 1985).

Many studies have addressed the relation of unilateral neglect to ADL. Forty-eight patients with CVA were administered various motor and neuropsychological assessments, a 51-point ADL scale, and a test of unilateral neglect involving copying crosses (Denes, Semenza, Stoppa, & Lis, 1982). The authors concluded that the test of unilateral neglect was the only variable related to the 6-month improvement found in ADL, but cautioned that this association did not necessarily mean that unilateral neglect was responsible for the poor ADL improvement. Marsh and Kersel (1993) found a correlation between scores of the unilateral neglect subscore, Star Cancellation, and the Modified Barthel \( r = .55 \) for 27 subjects from a New Zealand stroke unit. In their studies of Australian subjects after stroke, researchers (Kinsella & Ford, 1980; Kinsella, Olver, Ng, Packer, & Stark, 1993) found that poor ADL outcome was not associated with right side cerebral lesions unless subjects had unilateral neglect. After their research identified two unilateral neglect factors, they found that both were strongly related to ADL for their subjects at 6 months after stroke. In a study that analyzed three components of the unilateral neglect syndrome (hemispatial neglect, inability to recognize the limb, and unawareness of the disease or anosognosia), Gialanella and Mattioli (1992) concluded that the kind of unilateral neglect associated with lack of ADL improvement was anosognosia. However, only 10 points on the 140-point ADL assessment related to areas other than ambulation, so relevance to self-care tasks is unclear.

Chen-Sea, Henderson, and Carmak (1993) investigated the relationship of lateralized and nonlateralized inattention to ADL in 64 Chinese patients with right lesions by using the Random Chinese Word Cancellation Test (Weintraub & Mesulam, 1985) and the Klein-Bell ADL Scale. The group with hemi-inattention demonstrated significantly poorer ADL performance than did both the group with nonlateralized inattention and the group with normal attention. There were no differences in ADL measures between the groups with nonlateralized inattention and the group with normal attention. After the effects of physical variables were partialled out, moderate correlations were still found between hemi-inattention and ADL performance \( r = .48 \), with sub scores from the dressing and mobility tasks being strongest \( r = -.48; -.52 \), respectively.

In a study of subjects with CVA, 12 persons without unilateral neglect were compared to 12 with unilateral neglect on their wheelchair performance on an obstacle course (Webster, Cottam, Gouvier, & Blanton, 1989). Although the group with unilateral neglect struck more left-side obstacles than did the control group, both groups struck more left-side than right-side obstacles. There was a significant difference in type of left-side errors by the two groups: the subjects with unilateral neglect more often struck the obstacles by direct frontal contact.

In a London hospital follow-up study, Stone, Patel, and Greenwood (1993) found that severity of unilateral neglect, severity of motor weakness, and age predicted 90% of subjects who were independent in ADL and 80% of subjects who were moderately or severely dependent at 3-month follow-up \( N = 89 \). At 6 months, 91% of subjects who were independent in ADL and 71% of subjects who were moderately or severely dependent were correctly predicted \( N = 84 \). Prediction for mildly dependent subjects lacked accuracy.

Several other researchers (Fullerton, McSherry, & Stout, 1986; Jesshope, Clark, & Smith, 1991; Kotila, Niemi, & Laaksonen, 1986) also showed relationships between ADL and measures of unilateral neglect. Although an occasional report suggested little relationship (Edmans & Lincoln, 1990), there is clear evidence to substantiate an association between unilateral neglect of persons with stroke and poor prognosis for ADL recovery. Because similar results have been obtained with subjects from different countries, evidence is strong that the observed relationship is not a cultural artifact.

Assessments

Although there are numerous tests for perceptual and body image dysfunction and for ADL being used in clinical intervention as well as in research, we have found only two batteries that directly assess perceptual and body image dysfunction from ADL performance. Such tests are particularly valuable for occupational therapists because they provide a direct guide to the patient's treatment needs.
**Behavioural Inattention Test**

Behavioral ADL items designed for a test of unilateral visual neglect were reported by Wilson et al. (1987b). This test has changed through the usual development process involved in test construction, and the current version, the Behavioural Inattention Test, (Wilson, Cockburn, & Halligan, 1987a) is distributed in the United States. The test manual provides normative data on only 80 adults who have had stroke and 50 control subjects, but the test is short, practical, and easy to administer. Initially, the ADL items were validated by relating scores to those of six conventional tests of unilateral neglect obtained from previously published studies. Except for a line bisection test, correlation coefficients ranged from $r = 0.59$ to $r = 0.87$. Interrater reliability for the ADL items was excellent with 100% agreement between two raters. Alternate form reliability was $r = 0.83$. The current names of the ADL items are: Picture Scanning, Telephone Dialing, Menu Reading, Article Reading, Telling and Setting the Time, Coin Sorting, Address and Sentence Copying, Map Navigation, and Card Sorting (Wilson et al., 1987a) and vary somewhat from those originally reported (Wilson et al., 1987b). Six conventional unilateral neglect subtests were added to make up the current battery: Line Crossing, Letter Cancellation, Star Cancellation, Figure and Shape Copying, Line Bisection, and Representational Drawing. Research has shown these conventional subtests to have construct validity as measures of visual neglect, with the Star Cancellation subtest being the single most sensitive instrument (Halligan, Marshall, & Wade, 1989; Marsh & Kersel, 1993). Because the ADL items on the Behavioural Inattention Test do not include the typical self-care items (e.g., dressing, grooming), the fact that the Star Cancellation subtest is related to these skills (Marsh & Kersel, 1993) is important to the use of this test in occupational therapy. The only test we have located that actually assesses unilateral neglect from such self-care observations is the Arnadottir OT-ADL Neurobehavioral Evaluation (A-ONE) (Arnadottir, 1990; G. Arnadottir, personal communication, March, 1995, July 1994).

**A-ONE**

The A-ONE is an assessment tool that links functional performance in daily activities to neurobehavioral deficits (Arnadottir, 1990). The tool includes (a) a Functional Independence Scale, which determines the level of assistance needed on five ADL domains: dressing, grooming and hygiene, mobility, feeding, and communication, with each one of these domains having subcomponents that are separately assessed; (b) a Specific Neurobehavioral Scale, which assesses the type and amount of interference of 10 specific neurobehavioral impairments on each of the subcategories within each ADL domain; and (c) a Pervasive Neurobehavioral Scale, which determines the presence or absence of other neurobehavioral impairments throughout the assessment. Assessment of neurobehavioral impairments is done through analysis of the ADL tasks that a patient performs; the severity of the neurobehavioral impairment depends on the extent to which it affects ADL task completion. Some of the perceptual and body image impairments that the A-ONE assesses include spatial relations dysfunction, unilateral body neglect, unilateral spatial neglect, somatognosia, topographical disorientation, anosognosia, visual object agnosia, and right-left disorientation. The A-ONE also allows for the ability to localize possible lesion sites by comparing the information from both the Specific and Pervasive Neurobehavioral Scales to an available chart; however, more research is needed to use this part of the A-ONE with confidence.

Studies have established good interrater reliability (kappa = .84) for the A-ONE. Content validity has been established through literature review and expert opinion, and concurrent validity has been established on populations with CVA and with dementia. Contribution to construct validity has been initiated through exploratory factor analysis. Multiple studies are currently being conducted to further establish reliability and validity of the A-ONE (Arnadottir, 1990; G. Arnadottir, personal communication, March, 1995, July 1994).

**Intervention by Occupational Therapy**

Because we found little literature dealing specifically with ADL intervention for persons with perceptual or body image dysfunction, some of the following studies have indirect rather than direct implications for ADL functioning. Edmans and Lincoln (1991) used a multiple-baseline, single-case experimental design to evaluate the effectiveness of the transfer of training (restorative) approach to perceptual treatment. The transfer of training approach assumes that practice of perceptual tasks (three-dimensional copying, using sequencing cards, placing objects in size order) will carry over into ADL skill improvement. Analysis using this transfer of training approach revealed no evidence of improved ADL status in four patients with right hemiplegia from stroke.

Carter, Howard, and O'Neal (1983) sought to determine the effects of a cognitive-perceptual skill remediation program for 33 patients who had had acute stroke. Three areas were addressed in this study: visual scanning, visual-spatial orientation, and time judgment. The experimental group received routine stroke program intervention plus one-on-one remedial treatment for deficits in the above-mentioned areas, and the control group received only the routine stroke program intervention. Results revealed significantly higher overall improvement (in the three specific areas) in the experimental group ($p < .005$) than in the control group. In a post hoc analysis of these data (Carter et al., 1988), the change in Barthel scores between experimental and control groups was ex-
amined. No significant differences were found between groups in overall improvement scores of the Barthel. Significantly greater improvements ($p < .05$) were noted in areas of personal hygiene, bathing, and toileting for the experimental group.

Sivak et al. (1984) studied whether therapy aimed at improving perceptual skills of subjects with brain damage ($N = 8$) would result in improved driving performance without driver's training. Individualized perceptual training was provided on tasks requiring scanning, figure-ground differentiation, spatial perception, attention, and visual imagery. Significant improvements were found for both perception and driving. A significant coefficient of $r = .73$ was obtained for the relationship between perceptual and driving changes. Lack of a control group makes interpretation of results difficult.

A pilot study (Kumar, Powell, Tani, Naliboff, & Metter, 1991) was conducted to determine whether persons who have had stroke can be trained to return to limited safe driving despite perceptual deficits. Standardized perceptual tests were administered and patients entered a driver program with the instructor blind to test results. The program was graded from a simulator to three levels of in-traffic training. At the 6-month follow-up, 13 of the 16 had passed the state motor vehicle license test. From follow-up information, the subjects were divided into three driving groups: (a) drove anywhere at any time, (b) drove on familiar surface roads in good driving conditions, and (c) did not receive license. By the 2-year follow-up, only one person reported an accident and one had changed from group 1 to group 2. Analysis of the perceptual test results showed that test scores were significantly better for group 1 but were not different between groups 2 and 3. The researchers concluded that some persons who have received a rehabilitation driver's training program can return to safe but limited driving despite perceptual deficits.

Several studies investigated the effects of treatment for unilateral neglect. Webster et al. (1984, 1989) and King (1993) were concerned with scanning training to improve ADL of persons with unilateral neglect after stroke. Webster et al. (1984) obtained positive results in a single-subject design study. The three subjects improved on a wheelchair obstacle course assessment after participating in a scanning program involving colored light anchors and in-wheelchair movement. In a scanning training study with 13 subjects with CVA, Webster et al. (1989) found that, although frontal contact with obstacles on the wheelchair obstacle course declined, sidestep errors did not. King (1993) believed that scanning training often fails to improve ADL because the size of the visual field used is not adequate for ADL. He evaluated the use of a computer-projected image on a 5-ft wide screen for scanning practice of 21 persons with unilateral neglect with what he considered positive results. There was no control group.

Encouraged by positive results from their single-subject design studies, Robertson, Gray, Pentland, and Waite (1990) evaluated the effects of computerized scanning and attention training with programs based in learning theory. Sixteen control subjects used motivating computer games screened to rule out scanning activity. Because of its ADL items, the Behavioural Inattention Test was the principal outcome measure, but no differences were observed between experimental and control subjects; neither group improved. When results were analyzed for only subjects with severe unilateral neglect, there were still no significant group differences.

The role of motivation to assist with lessening the effect of unilateral neglect was studied by Ishiai, Sugishita, Odajima, and Yaginuma (1990). Eight subjects with right CVA, serving as their own control subjects, were twice assessed on a line cancellation task using Albert's test. During the second assessment, the subjects were instructed to number the lines found (motivating factor) instead of crossing them out. Results revealed improved left spatial neglect for the second trial, which the authors attributed to increased subject motivation during the task. These authors further stated that lack of motivation may be a contributing factor in unilateral neglect. Although not directly related to ADL, the implications of this study are relevant to occupational therapy and could lead to an interesting project if related to ADL improvement.

Literature is available that compared the use of different treatment approaches to intervene for perceptual and body image dysfunction. The two most common approaches are the functional training approach and the specific skill retraining (restorative) approach (Abreu, Duval, Gerber, & Wood, 1994). The functional training (or adaptive) approach uses functional or occupational tasks as treatment modalities to maximize patients' independence. This approach can include the use of environmental or task modification and practice of specific functional activities to increase a person's independence in his occupations. The restorative approach emphasizes specific perceptual skill retraining (including pen-and-paper, card, and computer activities) to improve deficits in specific skills. This approach assumes that improvement in specific perceptual skills will generalize to improved performance in functional activities (Abreu et al.).

Jongbloed, Stacey, and Brighton (1989) investigated these two treatment approaches in stroke rehabilitation, including perceptual cognitive intervention. Ninety patients who had had stroke were randomly assigned to treatment groups, each group receiving treatment related to either the functional or restorative approach. No control group was used. No significant differences were noted between groups on self-care or sensorimotor integration measures. Pedro-Cuesta, Widen-Holmqvist, and
Bach-y-Rita (1992) reviewed 20 controlled, randomized studies of rehabilitation after stroke. Their analyses revealed that rehabilitation for perceptual deficits appeared to be effective for several months after stroke, but no difference was noted between programs emphasizing retraining of specific perceptual deficits (such as use of computers or biofeedback) versus the traditional functional retraining approach.

Two case studies illustrated the relationship in occupational therapy intervention between perceptual dysfunction and ADL performance. Cook, Luschen, and Sikes (1991) were concerned with the dressing problem of a woman with visual-perceptual impairment as well as other cognitive dysfunction. A compensatory program was developed so that this elderly patient could dress by cues from an audiotape. Discharge to her son’s home was made possible because her dressing assistance meant only that he needed to prearrange clothing and turn on the audiotape. Borst and Peterson (1993) worked with a woman who showed a severe spatial relations perceptual deficit and topographical disorientation after stroke. Intervention dealt with these problems through practice with various tasks involving mazes, maps, and parquetry blocks as well as practice following actual routes. Her clinical evaluation showed substantial improvement.

**Treatment Recommendations**

Treatment recommendations for perceptual and body image dysfunction are frequent in the literature. Unfortunately, little research is available to substantiate many of these recommendations. Most of the authors have supported the use of the functional training approach (Butler & Namcow, 1988; Neistadt, 1992; Neistadt, 1988; Robertson et al., 1990), or a combination of functional and specific perceptual remediation (Edmans & Lincoln, 1991; Lin & Cermak, 1991) to improve overall function in daily tasks.

When offering recommendations, authors often focused on treatment of neglect (Cooke, 1992; Ishiai et al., 1990; Lin & Cermak, 1991; Olson, 1991; Robertson, North, & Geggie, 1992). They supported (a) visual scanning training and verbal cuing for visual anchoring, (b) increasing patients’ awareness of neglect to foster compensation mechanisms, (c) increased stimulation to the affected side, (d) using visual markers, and (e) activating of the affected extremity in the affected hemispace to decrease the effects of neglect. As previously reported, Ishiai et al. (1990) also noted that motivating activities tended to lessen the effects of neglect more than nonmotivating activities.

Olson (1991) has suggested treatment techniques for some specific perceptual impairments. For spatial impairments, Olson recommended encouraging patients to touch objects, teaching patients to move slowly during tasks and handle objects at their base, and talking patients through activities instead of using gestures. For treatment of agnosias, training the patient to use the intact sensory modalities is recommended.

We have concluded from the current evidence that the functional training approach will best facilitate improved self-care of patients with unilateral neglect or perceptual dysfunction resulting from stroke. However, there is evidence that a combined restorative-functional approach may be the most effective means when wheelchair mobility or driving skill is the ADL task of interest.

**Research Recommendations**

Although much research has examined perceptual and body image dysfunction in relation to ADL, there is much more to be learned. Few studies examined the relation of body scheme impairments, other than unilateral neglect, to ADL function. Greater understanding about these relationships and the impact of treatment programs for these impairments could improve our effectiveness of intervention. Studies are needed that also examine the impact of the psychological disturbances of body image on the ADL of persons after stroke.

Little information is available regarding the long-term effects of perceptual deficits on ADL performance or long-term effects of intervention for perceptual and body image dysfunction (either by functional or restorative approaches). Although Bernsipang et al. (1989) did reveal that perceptual deficits remain many years after stroke and appear to significantly impair ADL functioning, more information is needed from longitudinal studies. It is important to find out the type of perceptual deficits that impair ADL, most notably over time, and what type and length of interventions might be effectively applied even months and years after stroke.

Another area of research interest is contextual. What kinds of home and community modifications best serve the perceptually dysfunctional person after stroke? How can environments be adapted to ensure the safety of persons with perceptual problems or to increase their independence in ADL?

Although little evidence supports use of only the restorative approach for perceptual and body image dysfunction to improve functional status, insufficient information is available on actual time guidelines for optimal treatment for using either the functional or restorative approaches. Neither is research available about which perceptual or body image deficits may be more or less influenced by different treatment approaches. Continued study of the A-ONE and of the Behavioural Inattention Test is necessary, along with work on innovative research methods that allow rigor in design without compromising our ethical stance.

Because of the complexity of body image and perceptual dysfunction as they relate to ADL performance,
interdisciplinary research is mandated. Collaborative research with neuropsychologists, physical therapists, speech pathologists, and others who have relevant expertise can add both breadth and depth to our research efforts. Major changes in health care will require us to work efficiently with others as we continue to document the effectiveness of occupational therapy interventions for body image and perceptual dysfunction as they affect the ADL status of persons after stroke.

References


