

**Measuring disabilities in stroke patients
with apraxia: A validation study
of an observational method**

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The objective of the present study was to determine the clinical and construct validity of the assessment of disabilities in stroke patients with apraxia. Disabilities were assessed by means of observation of activities of daily living (ADL), such as washing the face and upper body and putting on a blouse or shirt. The study was carried out at occupational therapy departments in general

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hospitals, rehabilitation centres, and nursing homes. Patients diagnosed to have had a stroke in the left hemisphere and to have apraxia participated in the study ($n = 45$, 21 males, 24 females age 39–91). Guidelines were offered for the ADL observations and the assessment of disabilities in these activities. Clinical validity was investigated by comparing the scores of the patients with those of a group of stroke patients without apraxia ($n = 36$, 14 males, 22 females age 35–88). Construct validity was examined by investigating relationships between several measures of interest: an apraxia test, a motor functioning test, a set of ADL observations, and the Barthel index as a general measure of disability. Comparison of the results of the patients with apraxia with the control group of stroke patients without apraxia showed that the clinical validity of the ADL observations is good: On the basis of the ADL observations, differences between patients with apraxia and patients without apraxia are measured. Correlation analyses of the group of patients with apraxia showed that the ADL observations were highly associated with apraxia, but only to a lesser degree with motor impairments; while motor impairments correlated strongly with the Barthel index (a general measure of physical disability), but only marginally with ADL observations. A LISREL analysis supported these findings. The results indicate that ADL observations have clinical validity and that the construct validity of the observational method is good. ADL observations appear to measure disability ties caused by apraxia in stroke patients.

INTRODUCTION

A considerable number of stroke survivors suffers from persisting neurological impairments and lasting physical disabilities (Brandstater, 1990). In particular, cognitive deficits following stroke result in severe disabilities. When these cognitive impairments cause restrictions in the ability to carry out purposeful activities of daily living (ADL) the patient is considered to have apraxia. Apraxia refers to a spectrum of deficits affecting the meaningful execution of activities, this not being the result of primary motor or sensory impairments, nor of deficits of comprehension, motivation, or memory. Problems of apraxia in ADL functioning are the result of the absence of or a disturbance in the plan of action. Other impairments may be present in the stroke patient, but these deficits are not the cause of the inability to perform purposeful acts (De Renzi, 1989; Geschwind, 1975; Kolb & Whishaw, 1990).

Current testing procedures for apraxia that measure the presence and severity of apraxia mainly involve neuropsychological tests (De Renzi, 1989; Kolb & Whishaw, 1990; Lezak, 1995). The most widely accepted tasks in these tests are the demonstration of object use and imitation of gestures. However, poor test performance does not necessarily indicate that the patient will also experience problems in daily life. In other words, generalising the results of these tests to ADL performance is difficult. Neuropsychological tests measuring apraxia concern performance in a rather artificial setting. Since the absence of or disturbance in a plan of action cannot be assessed directly, assessing apraxia by means of a neuropsychological apraxia test is the best

approach to assessing disturbed function. For the purpose of rehabilitation it is essential to gain an insight into the disabilities in daily life caused by apraxia. Rehabilitation focuses on the consequences of the pathology, rather than on the disease itself. Assessment of the consequences of apraxia in daily functioning is therefore necessary to complement apraxia tests. Currently, several instruments are available for measuring general disabilities as a consequence of stroke (Wade, 1992). These more general disability measures—such as the Barthel index—are primarily intended for measuring disability (Wade & Collin, 1998). Physical disability can be the result of primary motor impairments. The problems experienced by patients with apraxia in the execution of daily activities are, by definition, not the result of primary motor impairments. This implies that there is a need for instruments that specifically measure disabilities caused by apraxia. To our knowledge such instruments are currently not available. Arnadottir (1990) developed an observational instrument for assessing the consequences of cortical dysfunction, but this method is not aimed specifically at apraxia.

We have developed an assessment procedure through which the performance of standardised ADL tasks such as washing and dressing) is observed in stroke patients with apraxia (Van Heugten et al., 1999a). Before using this observational method in clinical practice it is important to investigate the clinimetric quality of the instrument. As always, the first step is to test its reliability: The internal consistency and the inter-observer reliability of the observations were tested and proved to be good (Van Heugten et al., 1999a; see also Method section). The next step concerns validity. The present paper reports on a study into the clinical and construct validity of the assessment procedure: Does the instrument discriminate between patients with and patients without apraxia (clinical validity), and to what extent does the assessment procedure measure consequences of stroke that are specific to apraxia (construct validity)? The following expectations were tested. First (clinical validity), patients with apraxia were expected to function less independently than patients without apraxia when assessed on ADL observations. Second (construct validity), a relationship was expected to exist between ADL observations and a neuropsychological apraxia test; this would indicate that the ADL observations are indeed measuring disabilities caused by apraxia. Third (construct validity), it was expected that the ADL observations are not or are only weakly associated with a motor functioning test. However, this motor functioning test was expected to be associated with a general measure of disability (the Barthel index). Fourth (construct validity), ADL observations and the general measure of disability (the Barthel index) were expected to correlate, since these instruments cover comparable domains.

METHOD

Patients

Occupational therapists in general hospitals, rehabilitation centres, and nursing homes in The Netherlands selected the patients on the basis of a set of inclusion and exclusion criteria. Patients with left hemisphere stroke and apraxia were included. A left hemisphere stroke was diagnosed when acute clinical symptoms of a focal dysfunction of the left hemisphere were present for at least 24 hours, and were of vascular origin (Van Crevel, 1991; World Health Organization, 1980). Apraxia was diagnosed on the basis of definition and clinical evaluation, and when the patient was fully or partly unable to carry out purposeful activities, this not being caused by primary motor or sensory impairments, nor to deficits of comprehension, memory, or motivation (De Renzi, 1989; Kolb & Whishaw, 1990). Clinical evaluation was performed either by the referring physician or by the occupational therapist, using methods that were accepted or prevalent in the participating institutions. Exclusion criteria were: age under 25 years or over 95 years; no working knowledge of the Dutch language; and a set of premorbid or present pathologies: psychiatric or psychogeriatric history; addiction to alcohol, medical or other drugs; personality, intellectual or learning disorders; temporary loss of consciousness; or central neurological injuries. A group of stroke patients without apraxia was also selected on the basis of the same criteria, but without a diagnosis of apraxia. All patients entering the study gave their informed consent. The research was approved by the local institutions.

Measurements

Two groups of measurements were used. The first contained measures aimed at neuropsychological functioning, as close to the impairment level as possible and were not intended to measure performance in daily activities. The second group focused on disabilities that appear in the execution of daily activities.

Apraxia. The apraxia test consists of two subtests: demonstration of object use and imitation of gesture (Van Heugten et al., 1999b). The use of objects was tested in three different conditions. All subsets were presented with the same verbal instruction, "show me how you would use . . . (this object)". The objects were presented either verbally, without the object being present; visually, with presentation of the object, accompanied by a verbal command; and by actual use of the object. Each subset contained three objects used in daily activities. The imitation of gestures subtest contained six gestures which had to be imitated by the patient, immediately following demonstration by the researcher. A total score of 90 could be attained. The apraxia test was

developed and validated as part of the present study and could therefore not be used to diagnose apraxia. The internal consistency of the apraxia test proved to be good (Van Heugten et al., 1999b): The items of the test form a strong and consistent scale, as indicated by Cronbach's alpha (.96) and the results of a Mokken scale analysis (Loevingers $H = 0.72$, $\rho = 0.97$). The diagnostic value of the test was also examined. The test appears to have sufficient discriminative capacity to allow a differentiation between stroke patients with apraxia, stroke patients without apraxia, and healthy elderly subjects. Based on a cut-off score of the mean score of normal controls (50 healthy elderly people) minus one standard deviation (86.4) the sensitivity is 91% and the specificity is 90% (Van Heugten et al., 1999b).

Motor functioning. An adaptation of the motricity index (Wade, 1992) was used to assess the level of the patients' motor functioning. The test consists of eight simple tasks performed on the side of the body contralateral to that of the brain lesion: trunk balance, shoulder movement, arm movement, grasp and release of a cylinder, grasp and release of dice, and a test of the sensitivity of the back of the hand. The patient could gain a maximum score of 16 in this test; each task was scored 0 if execution was no possible at all, 1 if execution of movement was laborious but possible, and 2 if the patient was able to execute the task correctly. Cronbach's alpha for this test is .94.

The second group of measurements is aimed at ADL performance.

ADL observations. The occupational therapist executed a set of standardised ADL observations, aimed at assessment of the disabilities caused by apraxia (Van Heugten et al., 1999a). Four activities were observed, of which three were prescribed (i.e., washing the face and upper body, putting on a shirt or blouse, and preparing food), and the fourth could be chosen by the occupational therapist. The activities are scored on four aspects: independence, initiation, execution, and control (see Appendix 1). The four measures can then be added to give a total score. Cronbach's alpha for the total scale is .94. The results of a Mokken scale analysis indicated that the ADL observations form a strong homogeneous scale: Loevinger's H-coefficient is 0.58; the rho-value is 0.94. Inter-observer reliability is good, as indicated by an intra-class correlation coefficient of 0.98 for the total score (Van Heugten et al., 1999a).

Barthel index. The Barthel index offers a simple, quick, and clinically relevant way of identifying the most important physical disabilities (Collin, Wade, Davies, & Horne, 1988; Wade & Collin, 1988). It expresses disability on a scale ranging from 0 (totally dependent) to 20 (totally independent). The Barthel index is a reliable instrument. In the current study Cronbach's alpha was .92.

Testing procedure

Once a stroke patient consented to participate in the study, an assessment procedure was started. The measurements were performed at occupational therapy departments in three general hospitals, eight rehabilitation centres, and five nursing homes in The Netherlands. Each patient was tested by the experimenter in a 1-hour testing session, during which the apraxia test and the tests for additional impairments were conducted. The patient sat facing the experimenter in a quiet room suitable for testing. Occupational therapists carried out the ADL observations and the additional measurements of disability, including the Barthel index. The observations were conducted in an appropriate environment for the task at hand, as well as at a relevant time of day for the specific task (e.g., washing in the bathroom after getting out of bed).

Statistical analyses

The results of the assessment procedure are presented by means of descriptive statistics. For all measurements the number of patients is presented. Some patients had severe language comprehension problems which interfered with the instructions; other patients could not finish the tests because of their state of health. Thirty subjects did the full battery of tests.

The clinical validity of the observational method was investigated by comparing the scores of two groups of stroke patients, using the Chi-square statistic and the *t*-test for independent samples.

The construct validity of the ADL observations was investigated using the scores of the stroke patients with apraxia. Bivariate relationships are presented by means of Pearson's product moment correlation coefficients. Multivariate techniques were conducted to test the expected associations between variables using the LISREL-8 computer program (Linear Structural Relationships; Joreskog & Sorbom, 1993). In general LISREL combines the many possibilities of regression analyses, path analyses, and factor analyses. In our study, the analyses using LISREL allow multivariate analyses in which both dependent variables can be jointly taken into account. LISREL permits a decision on whether the hypothesised model fits the data. The estimates for all hypothesised relationships are presented. Statistical significance of the estimates is based on *t*-tests. Evaluation of the fit of the model is based on the Chi-square statistic, the goodness-of-fit index (GFI), and the root mean square error of approximation (RMSEA). A GFI of .90 or more indicates that the specified model represents the data well (Bentler & Bonnet, 1980; Tanaka, 1987). The value of RMSEA should be less than .05 for a model that fits well; values above .10 indicate poor fit (Browne & Cudeck, 1993; MacCallum & Browne, 1993).

The significance level was set at .05. The correlation analyses were performed using SPSS/-PC+, version 5.0; the LISREL analyses were performed using LISREL, version 8.03.

RESULTS

Characteristics of the patients

Forty five stroke patients with apraxia were included in the study: 21 males and 24 females. The mean age of the patients was 70.4 years. The characteristics of the patients were presented in Table 1.

Thirty six stroke patients without apraxia were included in the control group (Table 1). The groups did not differ significantly with respect to gender (Chi-square = 0.49, $df = 1$, $p = .48$). The age of the patients without apraxia was lower (mean = 59.9 years, $SD = 12.8$, range = 35–88) than the age of the patients with apraxia ($t = 3.97$, $p < .01$). The group of stroke patients without apraxia did not differ significantly from the group of apractic patients in the type of stroke (Chi-square = 4.46, $df = 2$, $p = .11$), or the interval post-stroke ($t = 1.84$, $p = .07$).

Clinical validity

Table 2 presents the results of the impairment tests—the apraxia test and the motor functioning test. The motor functioning test showed no significant difference between the two groups of patients ($t = 1.26$, $p = .21$). The values

TABLE 1
Characteristics of the stroke patients with apraxia

<i>Characteristic</i>	<i>Patients with apraxia</i>	<i>Patients without apraxia</i>
<i>Gender</i>		
Male	21	14
Female	24	22
<i>Age</i>		
Mean	70.4	59.9
SD	10.9	12.8
range	39–91	35–88
<i>Institution</i>		
Hospital	16	10
Rehabilitation centre	16	20
Nursing home	13	6
<i>Cerebrovascular accident</i>		
Cerebral haemorrhage	10	11
Cerebral infarction	31	23
Unknown	4	2
<i>Time since stroke (weeks)</i>		
Mean	8.6	13.5
SD	5.0	15.8
<i>N (total)</i>	45	36

TABLE 2
Scores of the apraxia test and the motor functioning test
for the stroke patients with and without apraxia

Instrument	Patients with apraxia			Patients without apraxia			<i>p</i> (diff)
	<i>N</i>	Mean (<i>SD</i>)	Range	<i>N</i>	Mean (<i>SD</i>)	Range	
Motor functioning	45	8.1 (6.1)	2–16	35	9.8 (6.0)	2–16	.21
Apraxia	44	55.7 (29.0)	0–90	35	88.0 (3.3)	75–90	.00

TABLE 3
Assessments of the level of disabilities: Scores on the ADL-observations
and the Barthel index in patients with and without apraxia

Instrument	Patients with apraxia			Patients without apraxia			<i>p</i> (diff)
	<i>N</i>	Mean (<i>SD</i>)	Range	<i>N</i>	Mean (<i>SD</i>)	Range	
ADL-observations	36	1.0 (0.7)	0.19–2.88	34	0.2 (0.3)	0.00–1.25	.00
Barthel index	37	10.3 (5.6)	2–20	35	14.8 (4.9)	2–20	.00

suggest that patients in both groups suffer from primary motor impairments. However, no scores from normal subjects are available.

As can be seen in Table 2, the total mean score of the apraxia test is much lower for the patients with apraxia than for the patients without apraxia. The difference between the two groups is significant ($t = 7.34$, $p < .001$). Using a cut-off point of the mean score of normal controls (i.e. 50 healthy elderly subjects) minus one standard deviation (86.4; Van Heugten et al., 1999b), 91% of the apraxia patients scored below this value. For the group of patients without apraxia only 20% of the subjects had a score below this cut-off point.

Table 3 gives the results of the disability measures: ADL observations and Barthel index. On both measures the patients in the control group obtained higher scores than the apraxic patients, indicating a higher level of ADL functioning. On ADL observations, the two groups differ significantly ($t = 6.73$, $p < .001$). The patients without apraxia score close to 0, which denotes full independence. The apraxic patients obtained a mean score of 1, which indicates that they need some verbal assistance to perform each activity. Also, on the Barthel index, the patients with apraxia function less independently than the patients without apraxia ($t = 3.67$, $p < .001$).

Correlation analyses

Bivariate correlations between the measures of interest for the group of patients with apraxia are presented in Table 4. No significant relationship was found

TABLE 4
Bivariate correlations

<i>Instrument</i>	<i>ADL-observations</i>	<i>Apraxia</i>	<i>Motor functioning</i>
ADL-observations			
Apraxia	-0.43**		
Motor functioning	-0.37*	0.30*	
Barthel index	-0.60**	0.07	0.57**

* $p < .05$; ** $p < .01$.

between the apraxia test and the Barthel index ($r = .07$). The strongest significant relationships were found between the apraxia test and ADL observations ($r = .43$), between the motor functioning test and the Barthel index ($r = .57$), and between the disability measures: the ADL observations and the Barthel index ($r = .60$).

LISREL analyses

The results of the LISREL analysis are shown in Figure 1. These analyses involve the group of patients with apraxia. The relationships specified in the analysis are significant: the t -values are higher than 1.96 ($p = .05$). The expected correlation between the apraxia test and the ADL observations is strong ($\gamma = 0.35$). The expected relationship between the motor functioning test and the Barthel index is also prominent ($\gamma = 0.50$). Finally, there appears to be an association between the disability measures as indicated by the ADL observations and the Barthel index, which is only significant in one direction. These results imply that the score on the Barthel index does predict the score on

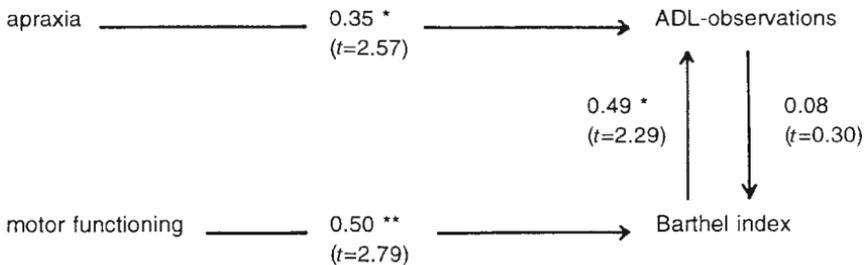


Figure 1. Results of the LISREL analysis. All hypothesised relationships are presented, accompanied by the estimates, based on t -tests. Goodness-of-fit indices: Chi-square (1) = .49, $p = .40$, GFI = .99, Root mean square error of approximation (RMSEA) = 0.0. * $p < .05$; ** $p < .01$.

the ADL observations, but problems in ADL functioning as measured with ADL observations do not indicate the presence of physical disabilities, as measured with Barthel index.

DISCUSSION

The aim of this study was to establish the validity of an observational method for the assessment of disabilities in ADL performance in stroke patients with apraxia. The internal consistency and the inter-observer reliability of the observational method had been investigated earlier and proved to be good. In the present study the clinical validity and three assumptions concerning the construct validity of the method were tested.

The clinical validity of the ADL observations was examined by comparing two groups of stroke patients: one with apraxia and one without. The two groups are comparable in terms of patient characteristics, although there were differences in age with the patients with apraxia being older than the patients without. Cognitive functioning can decline with age, which could influence the data. However, no relationships were found between age on the one hand and the scores of the apraxia test or ADL observations on the other ($r = .16$ and $r = .17$, respectively) in the patient group, nor were there any significant relationships between age and the apraxia test ($r = .17$) or ADL observations ($r = .06$) in the group of patients without apraxia. The absence of such relationships implies that, at least in this sample of patients, age did not influence test scores on the apraxia test or on ADL observations of either patient group. Age is therefore unlikely to be a factor resulting in bias.

The first expectation concerned the level of independence as measured with the ADL observations. The two groups differed significantly as regards the scores obtained with the ADL observations with the patients with apraxia functioning less independently. Moreover, the level of motor functioning was not significantly different for the two groups with both the stroke patients with apraxia and the stroke patients without apraxia displaying motor problems to some degree. This finding justifies the conclusion that the problems in ADL functioning, as measured with the ADL observations, are not the result of primary motor deficits. By definition, apraxia causes restrictions in ADL functioning that do not result from motor impairments. We therefore conclude that by using the ADL observations differences between patients with apraxia and patients without apraxia are assessed.

Three further expectations concerning the construct validity of the ADL observations were examined by means of correlational and LISREL analyses. The results of these analyses corresponded to a large degree to the expectations. The second expectation that there is a relationship between ADL observations and the neuropsychological apraxia test was confirmed by the

results. This suggests that ADL observations indeed measure disabilities that are related to apraxia.

The third assumption concerned the differentiation between disabilities caused by apraxia and physical disabilities caused by impaired motor functioning following stroke. The ADL observations correlate with the motor functioning test, but this association is small in comparison to the other significant relationships. This finding is further supported by the results of the LISREL analysis. The hypothesised model did not address the relationships between apraxia and Barthel index on the one hand, and motor functioning and ADL observations on the other. The fact that the hypothesised model meets the criteria for good fit implies that these latter relationships are not significant compared to the associations between apraxia and ADL observations on the one hand, and motor functioning and Barthel index on the other. The motor functioning test is, however, closely related to the Barthel index, being a measure of physical disability. These results indicate that the ADL observations do not address physical disabilities caused by motor impairment. Moreover, the ADL observations are concerned with disabilities caused by apraxia.

Finally, the association of the ADL observations with general disability measures was considered. Since all disability measures are intended to measure the consequences of stroke at the level of restrictions or lack of ability to perform activities, no great disparity between the ADL observations and the general disability measures was expected. This expectation has been confirmed by our results: the ADL-observations and the Barthel index are closely related. Surprisingly, the relationship between the ADL observations and the Barthel index is significant in only one direction. This finding could be the result of the fact that a general measure of disability (i.e., the Barthel index) can to a certain extent predict the degree to which specific disabilities (as a result of apraxia) occur, but specific disabilities (i.e., the ADL observations) do not necessarily indicate general disabilities (as a result of stroke).

In summary, the ADL observations indeed seem to measure disabilities in ADL performance in stroke patients which are most probably caused by apraxia. This result supports the validity of the observational method. As noted in the introduction, suitable instruments for measuring disabilities caused by apraxia were not available. This deficiency raises problems in clinical practice as well as in research. Since the goal of rehabilitation is to improve the functional status of the patient, it is essential for those who evaluate treatment to have relevant assessment methods at their disposal. The assessment procedure we present offers a reliable and valid observational method for the assessment of disabilities caused by apraxia. An important aspect which will be investigated next is the responsiveness of the procedure: Can the instrument be used for measuring clinically relevant changes over time (sensitivity to change)?

REFERENCES

- Arnadottir, G. (1990). *The brain and behaviour*. St. Louis: Mosby.
- Bentler, P.M., & Bonnet, D.G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, 88, 588–606.
- Brandstater, M.E. (1990). An overview of stroke rehabilitation. *Stroke*, 213 (suppl. II), 40–42.
- Browne, M.W. & Cudeck, R. (1993). Alternative ways of assessing model fit. In K.A. Bollen & J.S. Long (Eds.), *Testing structural equation models*. Newbury Park, CA: Sage.
- Collin, C., Wade, D.T., Davies, S., & Horne, V. (1988). The Barthel-index: A reliability study. *International Disability Studies*, 10(2), 61–63.
- De Renzi, E. (1989). Apraxia. In F. Boller & J. Grafman (Eds.), *Handbook of neuropsychology*, Vol 2. Amsterdam: Elsevier.
- Geschwind, N. (1975). The apraxias: Neural mechanisms of disorders of learned movement. *American Scientist*, 63, 188–195.
- Joreskog K.G., & Sorbom, D. (1993). *LISREL-8 structural equation modelling with the SIMPLIS command language*. Chicago, IL: Scientific Software.
- Kolb, B. & Whishaw, I.Q. (1990). *Fundamentals of human neuropsychology (3rd edn.)*. New York: Freeman.
- Lezak, M.D. (1995). *Neuropsychological assessment*. New York: Oxford University Press.
- MacCallum, R.C., & Browne, M.W. (1993). The use of causal indicators in covariance structure models. Some practical issues. *Psychological Bulletin*, 114, 533–541.
- Tanaka, J.S. (1987). How big is big enough? Sample size and goodness of fit in structural equation models with latent variables. *Child Development*, 58, 135–146.
- van Crevel, H. (1991). Consensus cerebrovascular accident. *Nederlands Tijdschrift voor Geneeskunde*, 135(48), 2280–2288.
- van Heugten, C.M., Dekker, J., Deelman, B.G., Stehmann-Saris, J.C., & Kinebanian, A. (1999a). Assessment of disabilities in stroke patients with apraxia: Internal consistency and inter-observer reliability. *Occupational Therapy Journal of Research*, 19(1), 55–73.
- van Heugten, C.M., Dekker, J., Deelman, B.G., Stehmann-Saris, J.C., & Kinebanian, A. (1999b). A diagnostic test for apraxia in stroke patients: Internal consistency and diagnostic value. *Clinical Neuropsychologist*, 13(2), 182–192.
- Wade, D.T. (1992). *Measurement in neurological rehabilitation*. Oxford: Oxford University Press.
- Wade, D.T., & Collin, C. (1988). The Barthel-index: A standard measure of physical disability? *International Disability Studies*, 10(2), 64–67.
- World Health Organization (1980). *International Classification of impairments, disabilities and handicaps*. Geneva: WHO.

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APPENDIX

OBSERVATION AND SCORING OF ADL-ACTIVITIES

Purpose

- To assess the presence of disabilities resulting from apraxia
- To gain an insight in the style of action of the patient and the sort of errors made
- To prepare treatment goals for specific training

Method

The therapist observes the following activities and scores the findings for each activity and each aspect.

1. Personal hygiene: washing the face and upper body
2. Dressing: putting on a shirt or blouse
3. Feeding: preparing and eating a sandwich
4. An activity is chosen by the therapist which is relevant for the patient or standard at the department

Score of independence

- 0 The patient is totally independent, can function without any help in any situation
- 1 The patient is able to perform the activity but needs some supervision
The patient needs minimal verbal assistance to perform adequately
The patient needs maximal verbal assistance to perform adequately
- 2 The patient needs minimal physical assistance to perform adequately
The patient needs maximal physical assistance to perform adequately
- 3 The patient cannot perform the task despite full assistance

The course of an activity

In every aspect the patient can encounter problems, however for each aspect only one score can be entered.

A. Initiation

- 0 There are no observable problems: the patient understands the instruction and initiates the activity
- 1 The verbal instruction has to be adapted/extended
The therapist has to demonstrate the activity

It is necessary to show pictures or write down the instruction
The objects needed to perform the task have to be given to the patient

- 2 The therapist has to initiate the activity together with the patient
The activity has to be modified in order to be performed adequately
- 3 The therapist has to take over

B. Execution

- 0 There are no observable problems: the activity is performed correctly
- 1 The patient needs verbal guidance
Verbal guidance has to be combined with gestures, pantomime, and intonation
Pictures of the proper sequence of action have to be shown
- 2 The patient needs physical guidance
- 3 The therapist has to take over

C. Control

- 0 There are no observable problems: the patient does not need feedback
- 1 The patient needs verbal feedback about the result of the performance
The patient needs physical feedback about the result of the performance
- 2 The patient needs verbal feedback about the execution
The patient needs physical feedback about the execution
It is necessary to use mirrors or video recordings
- 3 The therapist has to take over

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