Behavioral Assessment of Unilateral Neglect: Study of the Psychometric Properties of the Catherine Bergego Scale

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ABSTRACT. Azouvi P, Olivier S, de Montety G, Samuel C, Louis-Dreyfus A, Tesio L. Behavioral assessment of unilateral neglect: study of the psychometric properties of the Catherine Bergego Scale. Arch Phys Med Rehabil 2003;84:51-7.

Objective: To assess the psychometric properties of a scale for spatial neglect in everyday life.

Design: Validation study.

Setting: A neurologic rehabilitation unit in a university hospital.

Participants: Eighty-three consecutive right-hemisphere stroke patients.

Interventions: Not applicable.

Main Outcome Measures: The Catherine Bergego Scale (CBS) was used to assess neglect behavior and anosognosia. Its sensitivity was compared with that of 3 conventional tests. The inner structure of the scale was studied by principal component analysis. In addition, linearity, unidimensionality, and reliability of the scale were tested through Rasch analysis.

Results: Behavioral assessment correlated significantly to, but was more sensitive than, conventional tests. Anosognosia correlated significantly with neglect severity, although individual dissociations occurred. Factorial analysis disclosed a single underlying factor, explaining 65.8% of total variance. Rasch analysis also revealed that the 10 items defined a common, single ability continuum with widespread measurement range and quite regular item distribution, and showed a satisfactory reliability.

Conclusion: Behavioral assessment proved to be more sensitive than conventional paper and pencil tasks. Both conventional statistics and Rasch analysis suggest that the CBS is reliable and valid, and that the 10 items define a homogeneous construct.

Key Words: Neuropsychology; Psychometrics; Rehabilitation; Spatial behavior; Stroke.

UNILATERAL NEGLECT IS A COMMON deficit in patients with right-hemisphere stroke. It can disrupt many aspects of daily living,[1,2] and neglect has repeatedly been found to be among the strongest predictors of poor functional recovery in stroke patients,[3-5] particularly if associated with anosognosia.[6,7]

Clinical assessment of neglect usually relies on paper and pencil tests, such as cancellation, line bisection, or drawing tasks.[8-12] Although such tests are useful for rapid clinical screening, they have several limitations. They only assess neglect in the near peripersonal space, and do not consider other dimensions, such as personal neglect, motor neglect, neglect for far extrapersonal space, or anosognosia.[13,14] Moreover, conventional tests fail to consider the patients' actual performances in their everyday lives. Some patients obtain a normal performance rating on conventional tests, while showing a directional bias in daily life skills. Such dissociations have been attributed to the relative sparing of voluntary orientation of attention (involved in conventional tests) contrasting with an impairment of automatic orienting that allows attention to be automatically captured by relevant stimuli in everyday life.[15]

There is a need for standardized ecologic measures to quantify the extent of neglect in everyday life, to adapt rehabilitation to the individual patient's limitations, to monitor changes, and to assess the effectiveness of rehabilitation. Several assessment measures have been proposed, based either on the simulation of realistic conditions[16-21] or on a questionnaire that attempts to measure patients' subjective accounts of everyday difficulties.[22]

The Catherine Bergego Scale[23,24] (CBS) is based on a direct observation of the patient's functioning in 10 real-life situations, such as grooming, dressing, or wheelchair driving. The same questions are used for patients and carers, thus allowing an estimate of anosognosia. In previous studies,[23,24] the CBS had good interrater reliability and concurrent validity, and was more sensitive to neglect than any single paper and pencil test. Interrater reliability was assessed in 18 patients who were scored simultaneously by 2 independent raters.[24] The κ coefficient for the scale's 10 items ranged from .59 to .99, showing a fair to high interrater reliability.[24] In addition, the total scores of the 2 examiners correlated strongly (Spearman rank-order correlation coefficient=.96, $P<.0001$). The scale was also useful in monitoring changes in a rehabilitation trial in severe neglect patients.[25] The aim of the present study was to expand the study of the CBS in a larger patient sample, and to assess its psychometric properties with both classical and Rasch analysis. Rasch analysis is specifically designed for evaluating characteristics of rating scales with the expectation of unidimensionality.

METHODS

Participants

Eighty-three patients (56 men) were included in the study. They were a consecutive sample referred to a rehabilitation unit

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	0	1	2	3
1. Forgets to groom or shave the left part of his/her face	❑	❑	❑	❑
2. Experiences difficulty in adjusting his/her left sleeve or slipper	❑	❑	❑	❑
3. Forgets to eat food on the left side of his/her plate	❑	❑	❑	❑
4. Forgets to clean the left side of his/her mouth after eating	❑	❑	❑	❑
5. Experiences difficulty in looking towards the left	❑	❑	❑	❑
6. Forgets about a left part of his/her body (eg, forgets to put his/her upper limb on the armrest, or his/her left foot on the wheelchair rest, or forgets to use his/her left arm when he/she needs to)	❑	❑	❑	❑
7. Has difficulty in paying attention to noise or people addressing him/her from the left	❑	❑	❑	❑
8. Collides with people or objects on the left side, such as doors or furniture (either while walking or driving a wheelchair)	❑	❑	❑	❑
9. Experiences difficulty in finding his/her way towards the left when traveling in familiar places or in the rehabilitation unit	❑	❑	❑	❑
10. Experiences difficulty finding his/her personal belongings in the room or bathroom when they are on the left side	❑	❑	❑	❑
Total score (/30)				

0=no neglect; 1=mild neglect; 2=moderate neglect; 3=severe neglect

Fig 1. The CBS. Reprinted with permission.[24]

after a first-ever unilateral right-hemisphere stroke, ischemic in 46 cases (55.4%) and hemorrhagic in 35 cases (42.2%) (computed tomography and magnetic resonance imaging were not available in 2 cases). Mean age ± standard deviation (SD) was 54.5±14.1 years, and mean time since stroke onset was 15.9±15.2 weeks (range, 3–64wk).

Procedures

Conventional neuropsychologic assessment. All patients were given 3 paper and pencil tests that were previously found highly sensitive to neglect[23,26]: (1) the Bells test,[27] in which subjects are asked to circle 35 targets (black ink drawings of bells) mixed with 280 distractors on an A4 horizontal piece of paper, the score being the number of omissions; (2) copying a picture,[28] including a house, 2 trees, and a fence, with the score ranging from 0 (normal performance) to 4 (omission of most left-sided items); and (3) reading a short text on an A4 horizontal piece of paper,[29] the score being the number of omitted words.

Behavioral assessment. The CBS was performed within the same week as the conventional assessment by an independent rater who was not aware of the results of paper and pencil tests. The CBS was scored by the patient's occupational therapist, from her observation of the patient's behavior in the ward and during rehabilitation sessions. The CBS includes 10 items that correspond to common everyday life situations (fig 1). For each item, a 4-point scale was used, ranging from 0 (no neglect) to 3 (severe neglect). A score of 0 was given if no spatial bias was observed; a score of 1 was given in case of a mild neglect, with the patient always exploring right hemispace first, going slowly and hesitatingly toward the left, and showing occasional left-sided omissions; a score of 2 (moderate neglect) was given if the patient showed clear and constant left-sided omissions or collisions; and a score of 3 (severe neglect) was given when a patient was totally unable to explore the left hemispace. A total score was calculated (range, 0–30).

Self-assessment and anosognosia score. To assess patients' awareness of neglect-related everyday difficulties, a parallel form of the CBS has been designed as a questionnaire with the same 10 items previously described. For each item, patients were asked to rate their difficulty on a 4-point scale (0=no difficulty, 1=mild difficulty, 2=moderate difficulty, 3=severe difficulty). An anosognosia score was calculated by recording the difference between the observer's assessment scores and the patient's self-assessment scores. Sixty-three patients completed the questionnaire.

Raw data analysis. As a first step, raw data were analyzed to assess the sensitivity of each item of the scale and of the total CBS score in comparison with conventional paper and pencil tests. Then, the internal structure of the scale was assessed with principal component analysis with varimax rotation.[a]

Rasch analysis. One limitation of ordinal scales, such as the CBS, is the discontinuous nature of the measurements, with unknown distances in between. Such scores may not reliably be treated as linear measures, because they cannot represent the same quantity along the entire scale. In particular, it is unavoidable that much wider levels of ability are compressed around the extremes of the finite raw score scale. The Rasch model has been devised to assess the validity of ordinal scales and to permit the transformation of raw discontinuous scores into an equal interval measure.[30,31] The data were analyzed with the BIGSTEPS[b] Rasch software.[32] The Rasch theory is a statistical model based on item response theory.[33] Sometimes called a 1P (parameter) model, it assumes that the probability of a given subject/item interaction (the score obtained on a given item by 1 subject) is only determined by the item's "difficulty" and the subject's "ability." From the matrix of response raw scores, the model estimates a linear ability for each patient and a linear difficulty for each item (item calibration). These measures are scaled along a unidimensional continuum delineating the variable purported to be measured by the items (here, behavioral neglect). The measures provided by the model are independent of the particular sample of patients and items. Rasch linear measurements are usually expressed in log-odd units (logits) corresponding to the logarithm of the probabilities of obtaining a given score. Conventionally, a zero measure is set as the average item difficulty. Contrary to raw scores of ordinal scales, the logit unit provides a true interval (linear) measure, that is, it represents a fixed increment along the whole scale of the explored variable. Patient measures and item calibrations are accompanied by standard errors describing the range within which true patient abilities and item difficulties are expected to lie, if the data fit the model.

The Rasch analysis provides fit statistics indicating the extent to which the data meet the model specifications. Two fit statistics were computed: (1) the outlier-sensitive fit statistic (outfit), which is sensitive to unexpected behavior affecting responses to items far from a patient's ability level; and (2) the information-weighted fit statistic (infit), which is sensitive to unexpected behavior to items matching the patient's ability, and thus is more informative about the given patient. In addition, the conventional point-biserial correlation coefficients were computed for each item, indicating the extent to which items correlate with the linear measure.

The Rasch model software also provides an assessment of reliability. In the context of the Rasch model, error measure variance is computed from the error accompanying each patient ability and item difficulty estimates.[30] Reliability is defined as the ratio of true score variance to total variance. A useful related index is separation, defined as the ratio between true spread of the measures (as expressed by their SD corrected for measurement error) and measurement error.[30,34] Separation can be used to estimate the number of strata that are significantly distinguished within the range of observed item difficulties (item separation) and patient abilities (patient separation).

BIGSTEPS software also provides a principal component analysis of the residual information after the linear measure is extracted. The residuals between observed and expected scores can be standardized with respect to the modeled SD and then analyzed with respect to their correlations across items. The residuals are not expected to be correlated across items once the linear measure has been extracted; otherwise, an extraneous variable is suspected to "link" (ie, making less stochastic than expected) the responses of persons to a given set of items. Residual factors can be extracted from principal component analysis. These factors differ from factors extracted through conventional principal component analysis. The latter explain the raw score item variance. Residual factors explain the variance remaining after the linear measure (ie, the set of expected scores) has been extracted. The conventional principal component analysis and the fit statistics of the Rasch linear measure both reflect the unidimensionality of the raw scores. Their quantitative relationships, however, are still a matter of debate, so that conventional principal component analysis still represents a useful complement to Rasch analysis. Under the Rasch model, if the scale unidimensionality assumption is met, the variance explained by each of the residual factors and the item loadings on these factors should be low, and the combination of items within each factor should have little clinical meaning.

RESULTS

Comparison Between Conventional and Behavioral Assessment

Performance on paper and pencil tests and on the CBS is shown in table 1. To assess the sensitivity of paper and pencil tests, patients' performance was compared with a previously reported control group (n=456 or 576, depending on the test).[26] The score of the fifth percentile of the control group was chosen as the cutoff score. The percentage of patients who showed neglect ranged from 44.3% to 53.8% on paper and pencil tests. When performance across the 3 tests was considered, 65.4% of patients showed neglect on at least 1 measure, whereas 32.7% showed neglect on all 3 tests. In contrast, the incidence rate of neglect on the 10 items of the behavioral scale ranged from 49.5% to 79.5%. Only 3 patients (3.6%) had a total CBS score of 0 (no neglect on any of the 10 items). Arbitrary cutoff points were drawn in the CBS, to distinguish different levels of impairment. Forty-two patients (50.6%)

Table 1: Performance on Paper and Pencil Tests and on the CBS

Measures	Mean ± SD	% With Neglect
Conventional assessment		
Bells test, omissions (n=78) (cutoff point: >6)	11.19±11.79	53.8
Figure copying (n=70) (cutoff point: >0)	1.51±1.81	44.3
Text reading, omissions (n=53) (cutoff point: >0)	20.24±30.72	64.2
Behavioral assessment		
Grooming (n=82)	0.83±0.93	53.7
Dressing (n=78)	1.52±1.03	79.5
Eating (N=83)	0.89±1.04	50.6
Mouth cleaning (N=83)	0.78±0.94	50.6
Gaze orientation (N=83)	1.02±1.06	57.8
Knowledge of left limbs (N=83)	1.43±1.14	74.5
Auditory attention (N=83)	0.86±1.04	49.5
Moving (collisions) (n=81)	1.33±1.13	69.1
Spatial orientation (n=81)	0.94±1.13	49.5
Finding personal belongings (n=81)	1.13±1.12	58.0
Total score (/30; N=83)	10.86±8.45	96.4

Table 2: Pearson Correlation Coefficients Between CBS Total Score and Conventional Tests

Test Variables	*r*
Bells test (no. of omissions)	.76*
Figure copying	.70*
Text reading (no. of omissions)	.54*

* $P<.0001$.

showed mild behavioral neglect (score range, 1–10), 23 (27.7%) showed moderate neglect (score range, 11–20), and 15 (18.1%) showed severe neglect (score range, 21–30). The 10 items of the CBS did not have the same sensitivity (table 1). The 3 most sensitive items were neglect in dressing, left limb knowledge, and collisions with left-sided obstacles.

The total CBS score correlated significantly with paper and pencil measures (table 2). However, individual analysis revealed dissociations. For example, 3 patients with moderate or severe behavioral neglect performed the Bells test within the normal range. Also, 16 patients with a mild behavioral neglect obtained a normal performance across the 3 paper and pencil tasks.

Anosognosia

The examiner's total CBS score (mean, 10.86±8.45) was significantly higher than the patient's self-assessment score (mean, 4.23±8.43; $t_{59}=3.7$, $P<.001$). The anosognosia score was operationally defined as the difference between the 2 scores. Anosognosia appeared to correlate significantly with neglect severity as assessed with the CBS ($r=.79$, $P<.0001$) or with paper and pencil tests (r range, .43–.72, $P<.01$). Patients with moderate or severe neglect obtained high anosognosia scores (table 3). In contrast, patients with mild or no neglect obtained on average negative scores, indicating that they gave higher ratings of neglect than the examiner (table 3). However, individual dissociations occurred between neglect and anosognosia. Indeed, it can be seen in table 3 that some patients with severe behavioral neglect were aware of their impairments and obtained null or even negative anosognosia scores.

Principal Component Analysis

As a first step, a correlation matrix was computed, which revealed that the 10 items all significantly correlated with each other (correlation coefficients range, .48–.73, all $P<.0001$). The principal component analysis, with varimax rotation, extracted only 1 factor with an eigenvalue higher than 1, which explained 65.8% of total variance. The factor matrix (table 4) showed that all items of the scale obtained a high loading on this factor (range, .77–.84). The residuals between the observed interitem correlations and the reproduced correlations were computed, showing that 51% of the residuals obtained absolute values greater than .05.

Table 3: Anosognosia as a Function of Behavioral Neglect Severity

	Anosognosia Score	
Behavioral Neglect Severity	Mean ± SD	Range
No neglect (n=2)	−2.00±0.00	
Mild neglect (n=34)	−0.83±3.44	−9.00 to 6.00
Moderate neglect (n=15)	7.38±7.04	−10.00 to 18.00
Severe neglect (n=12)	15.68±7.69	−1.00 to 26.00

Table 4: Principal Component Analysis of the CBS

	Loading
Grooming	.81
Dressing	.84
Eating	.80
Mouth cleaning	.78
Gaze orientation	.79
Knowledge of left limbs	.80
Auditory attention	.82
Moving (collisions)	.77
Spatial orientation	.83
Finding personal belongings	.85

Rasch Analysis

The analysis of the 10 CBS items, in order of decreasing difficulty, is presented in table 5. The table shows the estimated Rasch measures and standard error (in logits), and the infit and outfit statistics (mean squares). Fit statistics are expected to approach 1, and are usually considered as acceptable between 0.6 and 1.4. Higher mean squares indicate noisy response patterns, suggesting that the corresponding items do not pertain to the same underlying domain as the others, whereas lower values indicate potentially redundant items, with too little variance (ie, subjects' responses to this item are too predictable). Only 1 item (neglect in dressing) obtained fit values lower than 0.6. Globally, the mean fit scores of the scale were very close to the expected value of 1, suggesting that the data fit the model unidimensionality specification. This is again supported by the high positive-point biserial correlation coefficients between each item score and the cumulative score obtained across the whole sample of subjects (table 5).

Patient abilities and item difficulties are mapped in figure 2. They are both calibrated along the same scale, which is assumed to represent the underlying ability in linear units (logits). More able patients are on top, less able patients at the bottom. Similarly, more difficult items are on top and easier items are at the bottom. Zero is conventionally the mean item difficulty. Only 2 items (grooming, auditory attention) shared the same level of difficulty, suggesting potential redundancy. On the figure, each item is plotted at its mean difficulty level. However, the items of the CBS use a 4-level scale, thus defining a range of ability, not only a 0/1 cutoff. The extreme

Table 5: Rasch Analysis, Rating Scale Model, Bigsteps Software

Item	Difficulty (logits)	SE (logits)	Infit (mnsq)	Outfit (mnsq)	Pt-Bis Correl
Dressing	1.20	.17	0.60	0.58	.86
Left limbs knowledge	0.84	.17	1.15	1.02	.78
Moving (collisions)	0.66	.17	1.14	1.06	.77
Personal belongings	0.15	.18	0.80	0.72	.85
Gaze orientation	−0.15	.17	1.05	0.93	.77
Spatial orientation	−0.27	.18	0.95	0.78	.81
Eating	−0.49	.18	0.94	1.25	.76
Auditory attention	−0.55	.18	1.14	1.35	.74
Grooming	−0.61	.18	1.09	1.21	.71
Mouth cleaning	−0.78	.18	1.12	1.16	.71
Mean	0.00	.18	1.00	1.01	
SD	0.65	.00	0.17	0.24	

NOTE: The items are presented in order of decreasing difficulty. Abbreviations: SE, standard error; mnsq, mean square; Pt-Bis Correl, point-biserial correlation.

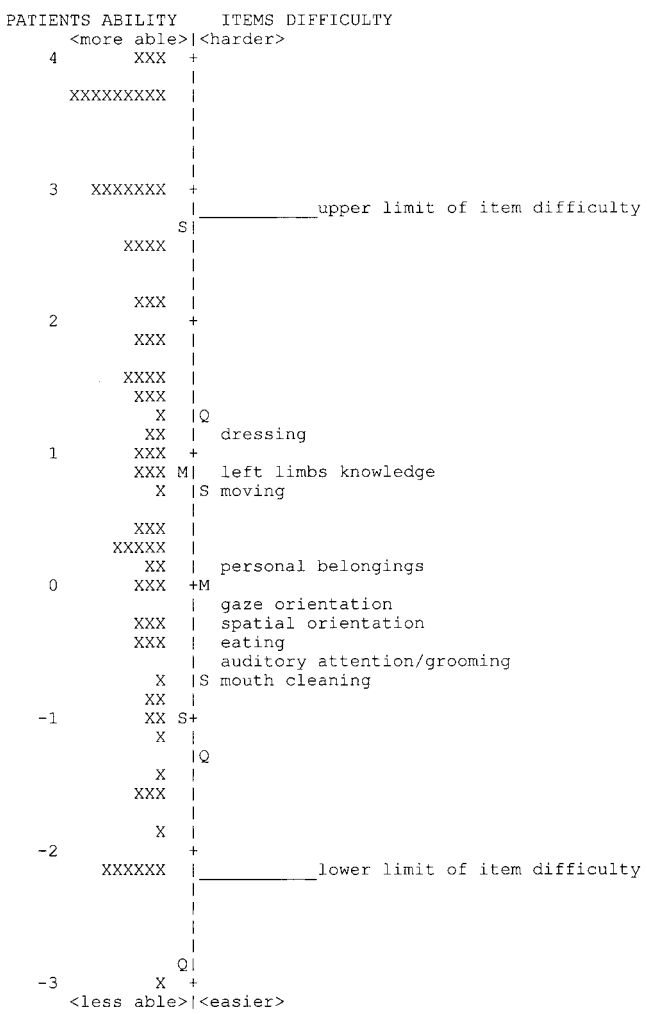

Fig 2. Map of patient abilities and item difficulties along the Rasch-derived scale. The items are aligned on the right, from bottom to top in order of increasing difficulty. Patients are represented on the left (X symbols) in order of increasing ability from bottom to top. Labels M, S, and Q refer to the mean, 1 SD, and 2 SD of the item or patient measures, respectively. Each item is plotted at its mean difficulty level. However, the actual upper and lower limits of difficulty reached by the scale, due to the 4-level range of ability for each item, were 2.8 and −2.2, respectively (horizontal lines). Subjects above and below these limits are expected to score above 29 or below 1, respectively (see Methods and Results).

items therefore can reach more subjects than their mean level suggests. The actual upper and lower limits of difficulty reached by the scale are indicated by the horizontal lines on the figure. In BIGSTEPS output, these give the ability levels, making equally probable (so-called thresholds or steps) getting an overall score of 0 or 1 (−2.2 logits), and an overall score of 29 or 30 (2.8 logits). A few patients were above this upper limit, suggesting that the ceiling effect was mild in the sample tested.

Both the scale and patients' reliability were assessed. The item reliability index was very satisfactory (.93). This gave rise to 3.5 strata of significantly different difficulty (at $P<.05$). The reliability of patients' measures was also good (.88), corresponding to their distribution along 2.7 statistically different levels of ability.

A principal component analysis was computed on standardized residuals after the linear measure was extracted (see Methods). It must be recalled that this analysis complements that provided by table 5 (fit statistics), rather than that shown in table 4 (conventional principal component analysis on raw scores). This analysis showed that no strong factors remained hidden in the residuals. Indeed, the 2 largest residual factors were quite weak (explaining, respectively, 21% and 14% of the residual variance), and so were the item loading coefficients (range, −.65 to .67). In addition, no particular clinically meaningful construct was suggested by the item combinations. In fact, these included either personal or peripersonal items, and either mostly attentional or mostly motor performances.

DISCUSSION

This study assessed the psychometric properties of a standardized assessment scale of behavioral neglect. This study confirms and extends previous findings,[23,24] suggesting that the CBS has good psychometric properties and can be used to assess behavioral neglect in stroke patients. Conventional statistics showed that the scale was well correlated to, but more sensitive than, the conventional and more widely used paper and pencil tests of spatial neglect. The 3 paper and pencil measures in combination revealed neglect in 65.4% of patients, whereas more than 96% of patients showed some degree of behavioral neglect on the CBS. This incidence rate of neglect is higher than that reported in previous studies of unselected stroke patients.[8,10,35] This could be related to a selection criteria, because only patients with severe strokes were referred to a specialized stroke rehabilitation unit.

The 3 most sensitive items of the scale (neglect in dressing, knowledge of left limbs, collisions while moving) are related to aspects of neglect that are not readily addressed by conventional paper and pencil tasks. Indeed, neglect in dressing and knowledge of left limbs are related to personal neglect, whereas collisions may be assumed to reflect an impairment of automatic orienting of attention toward the extrapersonal space.

Although unawareness of neurologic impairments is a major predictor of poor outcome after right-hemisphere stroke,[6,7] there is still no consensus on how to measure anosognosia.[36] Perhaps the most widely used method is the 4-level scale proposed by Bisiach et al[37] to assess anosognosia for motor and visual impairments. However, patients may be aware of hemiplegia but lack awareness of cognitive and behavioral impairments. Anosognosia of behavioral neglect was assessed by comparing self-assessment to the observer's rating of the CBS. Although anosognosia strongly correlated with neglect severity, individual dissociations were found. This is in accord with previous findings[37] that suggest neglect and anosognosia reflect, at least in part, different mechanisms.

The inner structure of the scale was assessed first by means of a conventional factorial analysis on raw scores, which revealed a single underlying factor, suggesting a homogeneous construct. In addition, Rasch analysis was used to further assess the psychometric properties of the scale. Rasch analysis is a powerful tool for scale validation that has been used in various medical domains.[38-40] The Rasch fit statistics, specifically designed to test the construct homogeneity, showed that the 10 items define a homogeneous construct. The most difficult item, neglect in dressing, was also the most overfitting of the 10 items. Although it offers relatively little unique information, it does best represent the construct underlying the measure. Factor analysis of residuals between observed and expected scores revealed no additional constructs contained in the subjects' responses. The scale structure (fig 2) shows that the items are

not redundant (except for grooming or auditory attention), and are well centered on the mean ability of the subjects. Only a few patients were at floor or ceiling levels, suggesting that the scale covered well the range of abilities found in our patient sample. This is also in accord with a previous study[25] that reported the scale was sensitive to change and could be used to monitor the effectiveness of a therapeutic intervention. In summary, these results suggest that the 10 items define a common, single ability continuum with widespread measurement range and regular item distribution. Rasch analysis also gives an estimate of reliability, which comes from the model, and is different from the traditional inter- or intrarater reliability measures obtained with repeated measurements. The Rasch-computed reliability was satisfactory, suggesting that the items are able to spread the patients across a wide range of ability.

There are, however, some limitations to this study. All patients were recruited from 1 facility in which the examiners were familiar with the scale. A lower reliability could have been found with multiple raters from different units who may have drifted from the original instructions on rating scale use. In addition, the patient sample is not representative of all stroke patients, but only of patients referred to a specialized stroke rehabilitation unit (ie, patients were younger and had more severe impairments than the entire stroke population).

Nevertheless, the data presented here should encourage the clinical use of the scale to assess neglect-related disability. Contrary to most assessment instruments, the CBS does not rely on artificial testing conditions, but on the direct observation of patients' behavior in their everyday environment. The scale is easily and rapidly scored in a clinical setting by an experienced occupational therapist. It may be useful to assess the consequences of spatial neglect in the patient's everyday life, to adapt the rehabilitation to the individual patient's difficulties, and to monitor recovery. The self-assessment version of the scale may also be used to help patients obtain a better awareness of their neurologic impairments.

Future research should look at the psychometric properties of the scale that have not yet been assessed, such as test-retest reliability. Cross-cultural validation in different countries and languages should also be conducted. The scale may be used in therapeutic or rehabilitation trials, in addition to conventional paper and pencil tests, to assess generalization to everyday life skills, which is a major issue in neglect rehabilitation.[15]

CONCLUSION

Both conventional and Rasch statistics suggest that the CBS is reliable and valid, and that the 10 items define a homogeneous construct. Behavioral assessment again proved to be more sensitive than conventional paper and pencil tasks. The scale may be useful in clinical practice, to focus the rehabilitation program on the patient's actual disability and to monitor changes. It may also be useful in clinical research to assess the generalization of a therapeutic intervention to daily living skills.

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Suppliers

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