

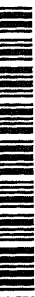
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## Assessment of Unilateral Neglect: A New Reading Test\*

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### ABSTRACT

A new reading test, designed to detect left-sided visual neglect, was administered to 66 patients with unilateral lesions. As expected, the group with right-hemisphere involvement had a considerably higher incidence of impaired performance; only subjects in this group exhibited severe neglect. In general, subjects who showed neglect on the reading test also did so on visual-perceptual tasks. However, in some instances neglect surfaced only on the former. This instrument appears to be a valuable screening measure, and it also has potential as a retraining tool.

The functional consequences of visual neglect are varied and far-reaching. Persistence of neglect has been associated with poor recovery in the spheres of self-care, motor function and social adjustment (Denes, Semenza, Stoppa, & Lis, 1982). Patients with profound degrees of neglect may fail to recognize their own paralyzed limbs, dress only half of their body, or eat only food located on the "good" side. Less florid manifestations of neglect may be observed on tasks such as reading or visual problem-solving where adequate spatial exploration is required (e.g., Raven Matrices).

Patients with neglect commit two basic varieties of reading errors (Kinsbourne & Warrington, 1962): (1) they may omit or misread the first letters of a particular word (e.g., reading "inaccurate" as "accurate" or reading "longer" as "stronger"); (2) because of difficulty refixating from the end of one line to the beginning of the next, they may fail to read the first word(s) on a given line. In both cases, the result is distortion of the text and impaired comprehension. It is of interest that reading difficulty is often not a presenting complaint of neglecting patients (Kinsbourne & Warrington, 1962). If the subject is raised, patients offer a variety of explanations and excuses: they are too fatigued, their eyeglass prescription is no longer correct, manipulation of a newspaper or magazine is too difficult because of a hemiplegia, etc. If the clinician persists, however,

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"neglect dyslexia" is often revealed. This paper describes a novel assessment instrument that is useful for this purpose.

### METHOD

A paragraph-reading test (see Figure 1) was developed to provide an instrument that would: (1) involve an important daily life activity, (2) be sensitive to cases of mild neglect and/or those where compensation for the deficit was not yet well-established, and (3) have some utility as a retraining tool.

Trees brighten the countryside and soften the harsh lines of city streets. Among them are our oldest and largest living things. Trees are the best-known plants in man's experience. They are graceful and a joy to see. So it is no wonder that people want to know how to identify them. A tree is a woody plant with a single stem growing to a height of ten feet or more. Shrubs are also woody, but they are usually smaller than trees and tend to have many stems growing in a clump. Trees are easiest to recognize by their leaves. By studying the leaves of trees it is possible to learn to identify them at a distance. One group of trees has simple leaves while others have compound leaves in which the blade is divided into a number of leaflets. The leaf blade may have a smooth uncut edge or it may be toothed. Not only the leaves but also the flowers, fruit, seeds, bark, buds, and wood are worth studying. When you look at a tree, see it as a whole; see all its many parts; see it as a living being in a community of plants and animals. The oldest trees live for as long as three or four thousand years. Some grow almost as tall as a forty story sky-scraper. The largest trees contain enough wood to build dozens of average size houses. Trees will always be one of the most important natural resources of our country. Their timber, other wood products, turpentine and resins are of great value. They also are valuable because they hold the soil, preventing floods. In addition, the beauty of trees, the majesty of forests, and the quiet of woodlands are everyone's to enjoy. Trees can be studied at every season, and they should be. Each season will show features that cannot be seen at other times. Watch the buds open in spring and the leaves unfold.

Figure 1. Indented Paragraph Reading Test.

The passage (taken from the Reader's Digest) consists of 30 lines with the left-side margin intentionally constructed to be highly variable. The first word of each line was indented between 0 and 25 spaces, with the amount of indentation unpredictable from one line to the next. The right-side margin was as uniform as permitted by the text; indentation ranged from 0 to 6 spaces. The layout of the text thus precludes the possibility that a neglecting subject could form a compensatory "spatial set;" each

refixation from the end of one line to the beginning of the next requires a separate act of controlled scanning. The text was set in bold type and photo-enlarged. For cases of suspected right-side neglect, a mirror-image form could easily be developed according to the same principles.

Subjects read the paragraph aloud, and the examiner recorded the first word read on each line, all omissions, and time to completion. The paragraph-reading test was administered primarily to patients with right cerebral lesions, as this group has a higher proportion of left-sided visual neglect. Furthermore, for many subjects with left-hemisphere lesions, it was clear that aphasia would severely compromise their performance.

Sixty-six subjects were assessed, 23 (13 males, 10 females) with left- and 43 (20 males, 23 females) with right-hemisphere damage. Laterality of lesion was determined by clinical neurological examination, corroborated by CT scan in nearly all cases. Two of the LBD subjects had undergone surgery for tumor excision; all remaining subjects had sustained a single cerebrovascular attack. The groups did not differ with respect to education (LBD = 11.8 years,  $SD = 2.4$ ; RBD = 11.8 years,  $SD = 2.7$ ); differences between the groups with respect to age (LBD = 66.6 years,  $SD = 12.9$ ; RBD = 60.7 years,  $SD = 12.4$ ) and time since onset of illness (LBD = 5.6 weeks,  $SD = 2.1$ ; RBD = 6.8 weeks,  $SD = 3.2$ ) were not statistically significant ( $t_{age} = 1.79$ ;  $t_{TSO} = 1.67$ ; both  $t > .05$ , two-tailed test,  $df = 64$ ). All subjects were hospitalized for physical rehabilitation and had been referred for assessment of neuropsychological functioning.

In order to evaluate the sensitivity and specificity of this new instrument, performance on this test was compared with that on two other tests - Raven Colored Progressive Matrices (RCPM; Raven, 1965) and Matching Familiar Figures (MFFT; Kagan, Rosman, Day, Albert, & Phillips, 1964) - with demonstrated utility in the detection of neglect (Caplan, 1982; Costa, Vaughan, Horowitz, & Ritter, 1969). These are visual-perceptual tasks in a multiple-choice format. Response alternatives are arrayed beneath a major figure in two rows of three items each. The attentional bias of neglecting patients is reflected in a preponderance of choices of items from the column ipsilateral to the lesioned hemisphere. This bias has been termed "Position Preference Index" (PPI). Costa et al. (1969) determined that a PPI of +7 on the RCPM was characteristic of patients with neglect. As the MFFT has one-third as many items as the RCPM, Caplan (1982) suggested using a PPI of +3 as a conservative cutoff point on this test. Using these criteria, he found the MFFT to be even more sensitive to neglect than the Raven. For the present study, any subject who achieved the criterion on either of the two tests was considered a "neglector." Sensitivity and specificity of the paragraph reading test were assessed against this standard.

### RESULTS

The number of errors made by subjects in each group is displayed in the Table.

The "time to completion" factor proved to be of little use, as it was, in large measure, a function of the degree of neglect exhibited by the subject; those who "saw" less of the paragraph required less time to finish the task. Errorless performance was achieved by 18 LBD (78.3%) and 23 RBD (53.5%) subjects. The remaining LBD subjects omitted 1 ( $N = 2$ ), 2, 6, and 8 words respectively;

Table 1

Frequency of Errors for Subject Groups on Indented Paragraph Test		
Number of Errors	Left-Brain Damaged <i>n</i> = 23	Right-Brain Damaged <i>n</i> = 43
0	18	23
1	2	2
2	1	1
3	0	1
4	0	1
5	0	1
6-10	2	4
11-25	0	4
26+	0	6

most omissions were located on the right side of the sheet. Nine RBD subjects made 1-9 omissions, 5 failed to read 10-20 words, and the remaining 6 omitted more than 25 words. The great preponderance of RBD errors were left-sided.

Designating as "neglecters" those subjects who omitted at least one word ("mild neglect") yields a 46.5% incidence of neglect among RBD subjects, roughly equivalent to the figures reported by Albert (1973) and Faglioni, Scotti, and Spinnler (1971). A more stringent criterion of 10 or more errors ("moderate-severe neglect") produces an incidence of 25.6%.

A considerable number of subjects (4 LBD, 7 RBD) who had exhibited significant attentional bias on the RCPM or the MFFT were able to perform the reading test without error. However, 5 subjects in each group exhibited the contrary pattern - that is, omissions on the paragraph-reading test in the absence of a significant PPI on either of the visual perceptual tests. Furthermore, these subjects had shown no previous sign of neglect on occupational therapy tasks. For example, a 60 year-old right-handed male, 10 weeks postonset of a right-hemisphere stroke, failed to read 10 words on the indented-paragraph task, despite the virtual absence of manifest neglect on the RCPM and on visual cancellation tasks. A 79 year-old right-handed man, also 10 weeks postonset of a right-hemisphere stroke, omitted 14 words on the paragraph, the only indication of neglect that surfaced on neuropsychological testing. For these patients in particular, there was considerable therapeutic value in reviewing their performance on the paragraph-reading test.

In the remaining 45 cases (68.2%), there was agreement between the indented-paragraph and the visual perceptual tests with regard to the presence (*N* = 16) or absence (*N* = 29) of neglect.

## DISCUSSION

The indented-paragraph reading test described in this report permits a rapid assessment of visual neglect with a measure of some "real world" relevance. The task demands are so apparent as to facilitate comprehension and cooperation by most subjects. Although printed material is not generally variably indented on the left, one can argue that this random indentation enhances the sensitivity of the test to neglect. This is supported by the sizable number of subjects (*N* = 10) for whom evidence of neglect was found only on the paragraph-reading task. As noted above, patients with mild degrees of the disorder may compensate adequately when confronted with a familiar and predictable format. The physical layout of the paragraph renders it a more challenging task. Neglecting patients who can compensate sufficiently to read this passage are unlikely to be troubled by more typically arrayed text.

While neglect of greater severity is relatively easily detected with any of several tests with visual-spatial demands (including reading), the indented paragraph permits detection of more subtle degrees of a disorder that, in any magnitude, may impose functional limitations.

Clinicians and families need to know the task and environmental demands that exacerbate or minimize manifest neglect. The vigilance and variable scanning requirements of the indented-paragraph task inhere in many daily life activities. Patients who cannot cope with unpredictable text on a page may well be unsafe in complex and dynamic surroundings. Diller and Weinberg (1970) documented an elevated rate of accident-proneness among brain-damaged patients with visual scanning deficits.

Administration of the paragraph reading task typically requires at most 3 min. It would, therefore, appear to be a useful addition to screening batteries. Indeed, because of the difficulties that attend interpretation of a neglecting subject's performance on visual-spatial tasks, the neuropsychological examiner is well-advised to seek evidence of neglect before administering such tasks.

It should be stressed that the test form described in the present report is best-suited for patients with right-hemisphere lesions. Comparable versions for left-hemisphere patients would, of course, have irregular *right*-sided indentation. Furthermore, in view of the higher incidence of aphasia in this group, material of a less complex linguistic nature ought to be employed. In the present study, errors made by the LBD subjects were almost invariably omissions of right-side words, not paraphasic misreadings. Paraphasias may indeed occur and should be noted by the examiner. However, these do not necessarily affect the utility of the paragraph-reading test in the detection of neglect.

Parallel forms of this instrument could easily be created for the purpose of serial assessment and/or remedial drill using cueing methods similar to those described by Weinberg et al. (1977).

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## Comparative Classification of Aphasic Disorders\*

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## ABSTRACT

This study compares aphasia classification of 20 aphasics who were evaluated with the Western Aphasia Battery (WAB) and the Lisbon Aphasia Examination Battery (LAEB). High correlations were found between tests evaluating the same functions in both batteries. Aphasia types derived from these two batteries showed only a partial overlap. This was due to the use of different numerical diagnostic criteria. When these criteria were used to specify aphasia types of 179 acute and 113 chronic aphasics grouped by cluster analysis, similar discrepancies were noted. Two major differences were found: some LAEB global aphasics turned out to be WAB Broca's and some LAEB anomics were classified as WAB conduction aphasics. These disagreements reflect difficulties in delimiting Broca's and conduction aphasia. The importance of the numerical approach to aphasia classification is stressed, as it is a reliable method to classify aphasic patients in order to allow comparison of data from different centers.

Classification is one of the important tools in biological sciences. Since aphasia has been examined scientifically, most aphasiologists have found that it is not a unitary phenomenon. This led to the several classification systems that have been published since Broca's (1861) report on aphasia (cf. Kertesz, 1979 for review). The different aphasic types derived from such classifications reflect different theoretical concepts of language disturbances and the different methodologies used in patient evaluation. Clinicians also found aphasia types to be a reliable tool in the localization of hemispheric lesions. The regular association between specific sites of lesion and particular types of aphasias described by late-1800 and early-1900 neurologists has been confirmed in the last decade in large series of patients whose lesions were located by isotope or CT scans.

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