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**ABSTRACT**

The assessment of brain impairment is important in the vocational rehabilitation of persons with neuropsychological dysfunction. To determine the sensitivity of the General Aptitude Test Battery (GATB) to lateralized cerebral dysfunction compared to neuropsychological evaluation, 79 epileptic subjects were assigned to one of three groups (generalized impairment, right hemisphere impairment, or left hemisphere impairment). Subjects had previously been administered neuropsychological evaluations and GATBs. Group status was used as the dependent variable, and GATB-V (verbal aptitude) scores were compared with GATB-S (spatial aptitude) scores as an independent variable. It was found that the derived variable, the GATB-V score minus the GATB-S score, used as an additional independent variable, differentiated the right-impaired from the left-impaired and the generalized groups at statistically significant levels. It was not possible to distinguish the left from the generalized impaired group. No significant findings were observed on the other GATB scales. Results suggest that the comparison of the GATB-V with the GATB-S has some value in identifying persons who have demonstrated a lateralization of neuropsychological difficulties to the right cerebral hemisphere. While the differences between GATB scores for the right and left impaired groups were not statistically significant, the possibility that these groups may respond in a differential manner to the GATB on the whole suggests that vocational aptitude batteries may help rehabilitation counselors identify individuals with possible brain impairment. (JAC)

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Use of an Aptitude Battery for Screening  
Lateralized Cerebral Dysfunction

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## ABSTRACT

The General Aptitude Test Battery, (GATB), a widely used vocational aptitude test battery is examined for its possible utility as a screening device for detecting lateralized impairment of brain function. Seventy-nine brain-impaired epileptics seen for vocational rehabilitation services were assigned to one of three groups, based upon an independent neuropsychological evaluation: Right hemisphere impaired, Left hemisphere impaired, generalized impairment. Subjects' GATB scores were transformed into t scores and an ANOVA was performed, using group status as the dependent variable. A derived variable, GATB-V (verbal aptitude) minus GATB-S (spatial aptitude) was included as an additional independent variable, and was successful at differentiating the Right-impaired group from the Left-impaired and the Generalized groups at statistically significant levels ( $p < .01$ ;  $.05$  respectively). No other statistically significant relationships were observed, although when graphed, the scores for the Left-impaired and Right-impaired groups approximated a mirror image figure, suggesting a differential manner of response across the two groups. Observations regarding the clinical use of the GATB as a rough screening device for brain dysfunction are offered.

## Use of an Aptitude Battery for Screening

### Lateralized Cerebral Dysfunction

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The assessment of brain impairment via neuropsychological evaluation is of fundamental importance in the vocational rehabilitation of persons with neuropsychological dysfunctions. Individuals who are affected by such conditions as head injury, cerebrovascular accident and epilepsy may display a variety of patterns or syndromes well documented in the literature. One such pattern is the lateralization of impairment to one or the other of the cerebral hemispheres. The present paper describes the results of a study designed to determine the sensitivity of a commonly used vocational aptitude battery, the General Aptitude Test Battery (GATB) to lateralized cerebral dysfunction vis a vis the neuropsychological evaluation. This is believed to represent an important area of investigation because the GATB, (United States Department of Labor 1970), is in widespread and general use in the United States, and because little information is available relating performance on neuropsychological batteries to performance on vocational aptitude batteries. In addition to use in state employment office nationwide, the GATB is often used by state vocational rehabilitation agencies with a general vocational rehabilitation caseload which often includes persons who experience problems with brain functions. Previous clinical experience at our Epilepsy Center (Clemmons, 1983) has suggested the possibility of using the GATB as an estimator of lateralized cerebral dysfunction.

While the literature in this area is not definitive, the possible value of using vocational aptitude tests as screening devices for impairment of brain function has been explored by other researchers.

In 1965, Tellegen studied the use of the GATB with chronic seizure patients, both from the standpoint of assessing employability and of possible use as a rough screening device for impairment in brain functions. He found that the GATB motor aptitudes for finger dexterity and manual dexterity showed the greatest mean deficits in performance, and the perceptual aptitudes for clerical and form perception showed the least. More recently, Bielecki & Growick (1984) studied a commercially produced work sample, the Valpar, with respect to its possible use as a screening device for brain damage. This study concluded that the Valpar Independent Problem Solving Work Sample may be used in combination with a cutoff score and a minimum completion time to screen for neurological impairment, and that it may be of use as a part of a larger, more formal, screening battery.

#### Method

Seventy-nine subjects who had been administered neuropsychological evaluations and GATBs between 1977 and 1984 within the University of Washington Medical School system in Seattle, Washington were admitted to the study. The neuropsychological evaluation administered was an expanded Halstead-Reitan battery (Reitan and Davidson, 1974), the Neuropsychological Battery for Epilepsy (Dodrill, 1978). Fifty-two males and 27 females were represented. Mean age was 30.85 (SD = 8.61). Age of onset of seizures was 13.04 (SD = 10.18). Subjects were assigned to one of three groups on the basis of an independent judgment by a neuropsychologist, using available neuropsychological evaluations. The groups formed were: Generalized Impairment (N=37), Right Hemisphere Impairment (N=20), and Left Hemisphere Impairment

(N=22). It is noted that nearly all subjects displayed substantial neuropsychological difficulties and that assignment to the Right or Left-impaired groups did not necessarily preclude some bilateral impairment. No significant differences were observed across the groups with respect to sex, age, or age of seizure onset.

Subjects' mean scores on the nine GATB subscales were transformed into  $t$  scores and an ANOVA with an appropriate post-hoc test (Newman-Keuls) was performed, using group status as the dependent variable. A derived variable, GATB-V (verbal aptitude) minus GATB-S (spatial aptitude) was included as an additional independent variable. It was hypothesized that this variable would be most sensitive to lateralized impairment, as determined by the neuropsychologist's rating, because GATB-V is a language-oriented problem solving test, and GATB-S is a purely visual-spatial problem solving test. It had been our experience working with epilepsy vocational rehabilitation clients that a discrepancy in the range of 1.5 or more standard deviations between GATB-S and V signaled the possibility of a lateralization of impairment to one of the cerebral hemispheres.

## Results

It was found that the derived variable, GATB-V minus S, differentiated the Right-impaired from the Left-impaired and the Generalized groups at statistically significant levels ( $p < .01$ ;  $.05$  respectively). It was not possible to distinguish the Left from the Generalized Impairment group on this variable at a high level of significance. No statistically significant findings were observed on

any of the other GATB scales. Presented graphically (Fig. 1) the plotted mean scores of the Right and Left Impaired groups approximated a mirror image figure, while the scores of the Generalized group tended to fall between the two.

### Discussion

The comparison of GATB-V with GATB-S appears to have some value with respect to identifying persons who have demonstrated a lateralization of neuropsychological difficulties to the right cerebral hemisphere, as measured by a neuropsychological evaluation. Additionally, the Right and Left impaired groups tended to produce distinctly different GATB profiles, as presented in Fig. 1. While the differences between GATB scores for the two groups were not statistically significant, the possibility that these groups may respond in a differential manner to the GATB as a whole is suggested. This is an encouraging trend with respect to the possibility of using this battery to identify persons who may have lateralized cerebral dysfunction.

A confounding factor in this study is the fact that most of the subjects presented neuropsychological difficulties which actually involved both cerebral hemispheres, and the Left and Right Impaired groups had predominately, but not exclusively, lateralized problems. Presumably, this factor acted as a dampening variable on the ability of the GATB to detect lateralization of impaired brain function in the study sample. A study sample with more clearly lateralized problems in brain functions might be expected to accentuate the trend described

by Fig. 1.

Ultimately, the importance of this type of research is dependent on its clinical utility. Two observations from our clinical experience in providing vocational services to an outpatient brain-impaired population are relevant. First, persons who have mild to moderate brain impairment confined to the right cerebral hemisphere may be less obviously impaired than persons with similar difficulties confined to the left cerebral hemisphere, at least upon casual observation. This is because language use, ordinarily a left hemisphere function, is a primary means of communication, and individuals with relatively intact language functions may tend to present themselves adequately both to counseling staff and to potential employers. This makes the apparent lack of GATB sensitivity to the Left Impaired group somewhat less worrisome, as the more subtle problems with visual-spatial and perceptual abilities of the Right Impaired group may be more difficult to detect upon gross confrontation.

Secondly, counseling staff working with a large caseload of individuals seeking rehabilitation services often have to justify the need for providing extended or specialized evaluation or diagnosis. In working with the local state rehabilitation agency, for instance, we have found it helpful to point out specific patterns of an individual client's GATB profile which might be indicative of cerebral dysfunction as a rationale for encouraging the expenditure of monies for neuropsychological evaluations.

It is clear that it is inappropriate to use the GATB in place of a neuropsychological evaluation, and the point is stressed here that

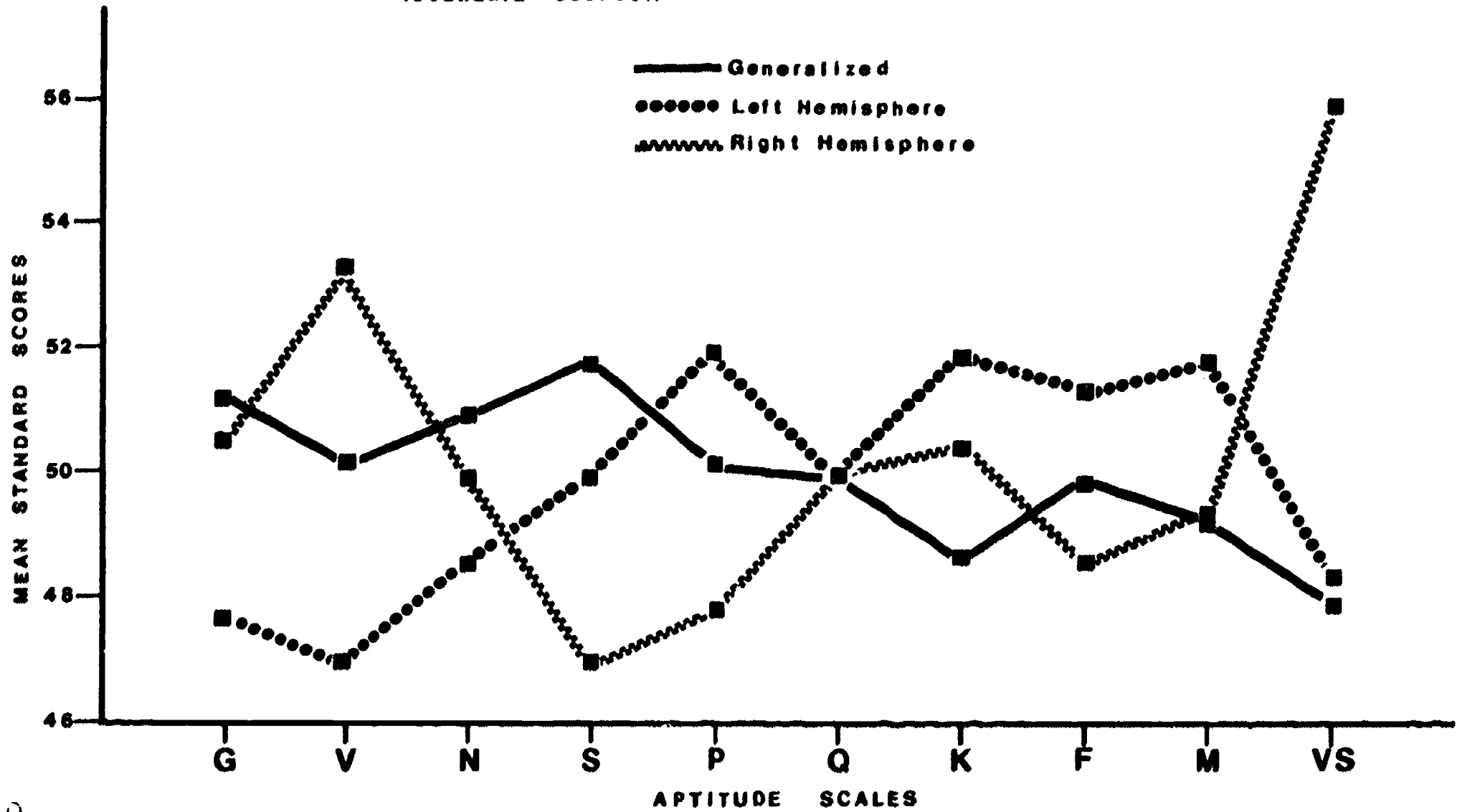


its use even as a screening device is not yet firmly established. The likelihood that different rehabilitation populations may tend to have differential profiles on aptitude test batteries, however, is an area of interest to persons supplying vocational rehabilitation services. Research which may give the rehabilitation counselor tools to identify individuals with possible impairment in brain functions provides an important service to the rehabilitation community. It is hoped that this article has called attention to the possibility that vocational aptitude batteries, which do measure areas of brain function, may be of use in this manner, and it is hoped that further research in this area is encouraged.

Consistent and methodologically sound research efforts on commonly used aptitude batteries and established measures of brain impairment can do much to raise the sophistication of rehabilitation personnel in assessing the capabilities of the rehabilitation client and suggesting avenues to remediation or accommodation.

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FIG.1. Mean GATB aptitude scores for right hemisphere impaired, left hemisphere impaired, and generalized impairment groups (standard scores).



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