WHAT ROLE DOES DEPRESSION PLAY ON THE PERFORMANCE OF THE RUFF 2 AND 7 SELECTIVE ATTENTION TEST? ¹,²

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Summary.—Depression is frequently a comorbid symptom in patients suffering from neurological or psychiatric illnesses, and this presents a challenge for the differential diagnosis of neuropsychological functioning, especially in the assessment of concentration. The 2 & 7 test was administered to 27 patients with major depression without other neurological or psychiatric illnesses. The average percentile rankings fell within the unimpaired range, with 42.7% for speed, 36.3% for accuracy, and 44.9% for processing. Only three patients were significantly slowed in performance speed, of whom two also showed deficient motor speed on eye-hand coordination performances. None demonstrated deficient accuracy rates, yet four patients were impaired in parallel processing. Thus, major depression did not for the majority of these patients impair 2 & 7 test performance, particularly if no concurrent motor slowing was present. Four guidelines for differential diagnosis are discussed.

Since the introduction of the normative data for the Ruff 2 and 7 Selective Attention Test (2 & 7 test; Ruff, Evans, & Light, 1986), this measure has been applied to patients with neuropathology including traumatic brain injury (Ruff, Marshall, Crouch, Klauber, Levin, Barth, Kreutzker, Blunt, Foulkes, Eisenberg, Jane, & Marmarou, 1993), AIDS and AIDS-related complex (Schmitt, Bigley, McKinnis, Logue, Evans, Drucker, & the AZT Collaborative Working Group, 1988), and illness from being chronically exposed to polychlorinated biphenyls (PCBs; Troster, Ruff, & Watson, 1991). Studies with psychiatric populations include schizophrenics (Baser & Ruff, 1987) and patients with Borderline Personality Disorder (Judd, 1989).

Depressive symptoms can compound neuropsychological functioning, and clinically it is expected that major depressions particularly can affect concentration and in severe cases psychomotor speed. Since the 2 & 7 test assesses selective attention dependent on motor speed, the present analysis was dedicated to evaluating test performance in a group of patients suffering from major depression without other psychiatric or neurologic disorders.

In a recent comparison of patients with focal cerebral lesions confined to the anterior or posterior region of either hemisphere, the patients with

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right-hemispheric lesions showed a greater over-all reduction in the speed of selecting the 2s and 7s than patients with left-sided lesions (Ruff, Niemann, Allen, Farrow, & Wylie, 1992). Since the 2 & 7 test appears to be sensitive to right-hemispheric dysfunction, this presents another challenge particularly for a neuropsychologically based differential diagnosis. The literature, albeit controversial, suggests that depression can also compromise right-hemispheric functioning (Flor-Henry, 1983; Taylor & Abrams, 1983), so it is particularly important to evaluate in a sample of depressive patients without neurological illness whether the performance on the 2 & 7 test is also negatively affected.

A total of 27 depressed subjects were recruited from an outpatient psychiatric clinic after being diagnosed according to both the DSM-III criteria for major depression and the Beck Depression Inventory (mean depressive group score was 28.93, which indicates severe depression). All 18 women and 9 men were nonmedicated at the time of testing; their mean years of age and education were 34.6 and 14.3, respectively. Laterality studies (Coren, Porac, & Duncan, 1979) showed that all subjects were right handed (for a more detailed description, see Richards & Ruff, 1989).

The specifics of this test have been described elsewhere (Ruff, et al., 1986; Ruff, et al., 1992). In summary, this test is comprised of 20 blocks of three lines, each containing the targets 2 and 7 randomly interspersed among either digit distractors or alphabetical distractors. The subject is asked to cross out the 2s and 7s within a time limit of 15 sec. per block. The two distractor conditions are equally (10 blocks each) but randomly sequenced. The test is scored according to total hits within each block, and errors represent the sum of omissions and commissions. For the purpose of the present study, the following three scores were calculated:

1. Speed: total hits "digit-letter" (DL) and total hits "digit-digit" (DD).

2. Accuracy: \[
\frac{(\text{total hits DL and DD}) - (\text{total errors DL and DD})}{(\text{total hits DL and DD})} \times 100.
\]

3. Processing: \[
\frac{(\text{hits DL} - \text{errors DL})(\text{hits DL})}{(\text{hits DD} - \text{errors DD})(\text{hits DD})}.
\]

For each of the 27 subjects the performance was separately ranked against norms (adjusted for age and education) for speed, accuracy, and processing; see Table 1 for a frequency distribution. The average percentile rankings for the entire sample fell within the unimpaired range, with 42.7% for speed, 36.3% for accuracy, and 44.9% for processing. Thus, the psychodiagnostic assumption that depressive patients are, as a rule, impaired on selective attention was not supported. However, a subsample did show significant deviations. With respect to speed, three patients (11%) performed in the deficient range, and the remaining 24 patients (89%) performed above the 5th percentile rank. Speed was not significantly reduced for a majority of patients. For
of the three subjects with impaired speed scores, the Finger Tapping per­formances (measuring motor speed) or Grooved Pegboard performances (measuring eye-hand coordination) were also significantly slowed, so motor slowing or a psychomotor slowing may have contributed to the reduction in speed in these two cases. Accuracy was not ranked as deficient for any of the 27 subjects, so these data suggest that major depression did not lead to a reduced accuracy rate. Finally, the processing score did indicate a deficiency for four subjects, and this ratio score indicates a relative weakness for parallel processing in 15% of the sample. Reduced parallel processing occurred without an apparent relationship to speed, accuracy, or motor speed.

### TABLE 1

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<th>Measure</th>
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<td>seriously deficient</td>
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<td>borderline</td>
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<td>high</td>
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With respect to the neuropsychological application, four principles are offered. (1) In ruling out cerebral dysfunctioning in a patient who is both depressed and impaired on the 2 & 7 test, avoid the foregone conclusion that the depression per se is responsible. (2) Motor slowing (if bilateral or affecting the dominant hand) must be ruled out as a compounding factor which, according to present data, may affect speed of target selection but neither the accuracy rate nor the ratio of parallel and serial processing. However, in right-handed patients a potential compromise due to right-hemispheric dysfunctioning is not likely compounded by motor slowing, since the unaffected hand (right or ipsilateral hand) is used for the task. (3) Since in 100% of our cases the accuracy score was unimpaired, this particular score appears to be the strongest basis for a differential diagnosis. (4) Given the over-all complexity of determining the effects of depression on test results, other data from the test battery, clinical interview, and medical history must be considered in the final decision making.

### REFERENCES


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