PICA Intrasubtest Variability and Prognosis for Improvement in Aphasia

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There are few prognostic methods in aphasia, but the precision of each of them should be investigated. We elected to test the precision of Porch's (1978) intrasubtest variability or peak-mean difference (PMD) hypothesis. PMD, or peak-mean difference, was devised as a prognostic measure. It is calculated by obtaining the difference between the highest score and the mean for each subtest on the PICA (Porch, 1981). We asked what the relationship is between intrasubtest variability at 1 month post onset and improvement at 6 and 12 months post onset, and whether patients with high intrasubtest variability at 1 month post onset improve more than patients who display low intrasubtest variability at 1 month post onset.

METHODS

Forty-eight patients who were aphasic subsequent to a single, first, left hemisphere thromboembolic infarct were evaluated with the Porch Index of Communicative Abilities (PICA) (Porch, 1981) at 1 month post onset. All 48 patients were treated 6 hours each week for 5 months and reevaluated at 6 months post onset with the PICA. Thirty-four patients continued treatment, 6 hours each week, until 12 months post onset and were given a final evaluation with the PICA. Descriptive data for the aphasic sample are shown in Table 1.

Evaluations at 1, 6, and 12 months post onset determined each patient's intrasubtest variability (PMD) at 1 month post onset and the amount of improvement made on the PICA between 1 and 6 months post onset. For the 34 patients who continued treatment, improvement between 1 and 12 months post onset could be determined.

To test the relationship between intrasubtest variability at 1 month post

TABLE 1. PATIENT DESCRIPTIVE DATA (N = 48) AT 1 MONTH POST ONSET

Variable	$\bar{X}$	*Range*	*SD*
Age in Years	57.38	40–79	9.51
Education In Years	10.62	3–19	3.49
PICA Overall Score	10.06	6.43–12.49	1.67

onset and improvement, correlations between intrasubtest variability at 1 month post onset, and change in the PICA overall score at 6 and 12 months post onset were computed. To determine whether patients with *high* intrasubtest variability improve more than patients with *low* intrasubtest variability, the sample was divided into two groups—patients with intrasubtest variability above 350 at 1 month post onset and patients with intrasubtest variability below 300 at 1 month post onset; *t* tests were then performed on the amount of improvement in the PICA overall score at 6 and 12 months between the *high* and *low* groups.

RESULTS

As shown in Table 2, the aphasic sample improved significantly ($p < .05$) in the PICA overall score between 1–6 and 1–12 months post onset. Mean group performance began at the 41st percentile at 1 month post onset and improved to the 63rd percentile at 6 months post onset and to the 67th percentile at 12 months post onset.

Intrasubtest variability, shown in Table 3, gradually declined over time, from 369 at 1 month post onset to 335 at 6 months post onset and 302 at 12 months post onset. However, considerable range in variability existed at all points in time—119–590 at 1 month, 156–601 at 6 months, and 102–574 at 12 months.

Table 4 indicates correlations between intrasubtest variability at 1 month post onset and change in the PICA overall score at 6 and 12 months post onset were negative and low, and none were significant ($p > .05$). This suggests no strong relationship between intrasubtest variability at 1 month post onset and improvement at 6 or 12 months post onset.

Results of *t* tests, shown in Table 5, between patients with *high* intrasubtest variability (more than 350) and *low* variability (under 300) at 1 month post onset for change in overall PICA performance between 1 and 6 months and 1 and 12 months post onset indicate that the difference in mean improvement between groups was small, less than .40, at both 6 and 12 months, and neither comparison was significant ($p > .05$). Thus, patients with higher variability at 1 month post onset did not make significantly more improvement than patients with lower variability at 1 month post onset.

TABLE 2. PICA OVERALL SCORES AT 1, 6, AND 12 MONTHS POST ONSET

Time Post Onset	*N*	$\bar{X}$	*Range*	*SD*
1 Month	48	10.06	6.43–12.49	1.67
6 Months	48	11.89	6.20–13.95	1.44
12 Months	34	12.28	8.59–14.34	1.32

TABLE 3. INTRASUBTEST VARIABILITY AT 1, 6, AND 12 MONTHS POST ONSET

Time Post Onset	*N*	$\bar{X}$	*Range*	*SD*
1 Month	48	369.73	119–590	94.73
6 Months	48	335.83	156–601	99.70
12 Months	34	302.15	102–574	100.69

TABLE 4. CORRELATIONS BETWEEN INTRASUBTEST VARIABILITY AT 1 MONTH POST ONSET AND CHANGE IN THE PICA OVERALL SCORE AT 6 AND 12 MONTHS POST ONSET (MPO)

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*Number of Patients**	*6 MPO*	*12 MPO*
48	-0.03	—
34	-0.21	-0.14

*48 patients were evaluated at 1 and 6 months post onset, and 34 of these were evaluated at 1, 6, and 12 months post onset.

TABLE 5. PAIRED *T* TESTS BETWEEN HIGH VARIABILITY (MORE THAN 350) AND LOW VARIABILITY (LESS THAN 300) PATIENTS AT 1 MONTH POST ONSET FOR CHANGE IN OVERALL PICA PERFORMANCE BETWEEN 1 AND 6 MONTHS AND 1 AND 12 MONTHS POST ONSET

	Change in PICA Overall Score		
Comparison	*Mean Difference*	*t*	*p*
High (N = 29) vs. Low (N = 13) Variability: Change at 6 months post onset	+0.01	0.036	0.971
High (N = 21) vs. Low (N = 9) Variability: Change at 12 months post onset	-0.34	0.799	0.563

DISCUSSION

Our results do not support intrasubtest variability (PMD) as a means for predicting change in aphasia. Correlations between intrasubtest variability at 1 month post onset and improvement at 6 and 12 months post onset were negative, low, and not significant ($p > .05$). Improvement in patients with high intrasubtest variability (more than 350) at 1 month post onset did not differ significantly ($p < .05$) from improvement in patients with low (less than 300) intrasubtest variability at 1 month post onset.

A literal test of Porch's (1981) contention that high (more than 400) variability indicates "capacity for improvement," and low (less than 200) variability indicates that a "poor capacity for change" did not support the prognostic value of intrasubtest variability. Only two of our patients displayed intrasubtest variability below 200 at 1 month post onset. They improved 27 percentile units by 6 months and 35 percentile units by 12 months post onset. Eighteen patients displayed intrasubtest variability above 400 at 1 month post onset. Their mean change was 25 percentile units at 6 months and 28 percentile units at 12 months post onset. Thus, we observed little difference in improvement between low (less than 200) intrasubtest variability patients and high (more than 400) intrasubtest variability patients.

We support Aten and Lyon's (1978) observation that intrasubtest variability (PMD) does not predict improvement in aphasia. Further, we are not convinced that Porch and Callaghan's (1981) rebuttal refutes Aten and Lyon's results or ours. Their prohibition of "pooling data," need for sorting patients into "recovery patterns," and extreme intrasubtest variability range within each "pattern" make the PMD method cumbersome and questionable.

Finally, all reports on intrasubtest variability, including ours, are incestuous. The data are not independent. Intrasubtest variability (PMD) is derived from a PICA, which is later used to compute improvement. Analysis of dependent data should be avoided. Future efforts to determine the prognostic significance of intrasubtest variability should employ a different aphasia test as an independent measure and a different aphasia test to determine improvement for comparison with PICA intrasubtest variability.

Unquestionably, Porch has made numerous contributions to our understanding and management of aphasia, including prognostic methods. Aten and Lyon's (1978) results and ours, however, suggest that intersubtest variability on the PICA had potential for predicting prognosis but failed to provide what it promised.

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