A Comparison Of The Porch Index Of Communicative Ability And The Western Aphasia Battery

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Tests for aphasia, like many other tests, may differ in purpose and structure, yet still be measurements of the same disorder. Two such tests were compared in this study to determine if the instruments were comparable measures of the severity of language impairment and to determine if they serve equivalent functions, although they differ in content.

The first of these tests is the Porch Index of Communicative Ability, or PICA (Porch, 1967), with which most aphasiologists are quite familiar. As we know, one of the primary functions of the PICA is to quantify the patient's level or ability on common communication tasks providing an overall performance score. The test is, of course, also an instrument used to measure change and to compare performances, as well as being a means of obtaining information to construct a program of treatment.

The second test to be examined may not be as familiar to you as the PICA. It is the Western Aphasia Battery, developed more recently by Kertesz and Poole (1974) as a modified version of the Boston Diagnostic Aphasia Examination (Goodglass and Kaplan, 1972). The purpose of the Western Aphasia Battery (or WAB), as with the Boston Diagnostic Aphasia Examination, is to provide the examiner with more insight into the patient's speech and language functioning and to relate test scores to common aphasic syndromes. The WAB purports to test the same behaviors and give the same information as the Boston Exam, with the added advantage of providing taxonomic groupings of aphasic syndromes determined by scores based on a hypothetical "100" as being representative of normal. The raw scores are manipulated to derive what is known as the "aphasia quotient", which we have compared to the PICA overall scores.

Martin (1977) recently published an article requesting additional validation data on the PICA, both as a measure of aphasia and as a measure of communicative ability. We know of one previous attempt to compare the PICA with another test for aphasia, in which the PICA was used as the validation criterion for the Aphasia Language Performance Scales (ALPS) developed by Keenan and Brazzell (1975). Though the ALPS takes a very small sample of aphasic behaviors, its overall mean achieved a .93 correlation with the PICA overall mean for 50 aphasics. Usually an aphasia battery is validated by seeing if its scores discriminate between aphasic and nonaphasic groups. The authors of the present study made an assumption that the Boston Diagnostic Aphasia Examination and therefore the Western Aphasia Battery at least reflect a theoretical definition of aphasia and examine behaviors that are critical to defining types of aphasia. Therefore, we considered the WAB to be a satisfactory validation criterion for the PICA.

Neither the Boston Exam nor the WAB claims to test communicative ability, so we could not attempt to respond to that particular part of Martin's (1977) validation request on the basis of the data from this study. To do so, we

might have compared the PICA to Holland's (1977) test, for example. But this study should provide support for the PICA as a valid measure of aphasia, if indeed the two tests are correlated.

Since both these test batteries are designed to assess the patient's "level" of functioning, the overall results obtained on the two tests should be equivalent indices of the severity of speech and language impairment. In addition to examining overall performance levels, we wanted to go further and compare specific subtests which claim to test the same abilities--i.e. spontaneous speech, auditory comprehension, repetition, and naming. Although these behaviors are assessed both by the PICA and the WAB, the content is widely varied. The four sections of the WAB used in the aphasia quotient, along with a brief description of the tasks involved in testing the specific abilities are included in Appendix A. Appendix A also includes for comparison those PICA subtests which are used to assess the same abilities as the WAB. It can be noted that there are major differences in the two tests with regard to specific tasks. We were interested in determining if these differences would influence the resulting correlations or relationships.

Methodology

Subjects

Twenty-four aphasic subjects were tested for this study. These subjects were considered to be representative of an "average" VA hospital clinical population in that etiologies included thrombus, embolus, trauma, aneurysm, hemorrhage, and surgical intervention, as well as being as balanced as possible with regard to variety and degree of impairment. For instance, the mean of the PICA overall percentile scores ranged from 16% to 92%. Twelve were fluent and 12 were nonfluent, although this was not pre-planned. All 12 nonfluent patients had right hemiparesis as did one of the fluent patients.

Procedure

All subjects were tested at least three months following neurological insult to allow for spontaneous recovery. A counterbalanced procedure for test administration resulted in one half of the group being administered the PICA initially, followed by the WAB, and vice-versa for the other half. This procedure was utilized in order to eliminate the possibility that one test might perform a "preparation" function for the other. In order to eliminate a fatigue factor biasing the results of this study, no patient was administered the two tests on the same day, but they were tested within the same week. The same examiner administered all tests.

Specific Questions and Method of Analysis

Once the data were collected, Pearson product-moment coefficients of correlation were calculated to investigate the following relationships:

1. The PICA overall percentile scores and the WAB's aphasia quotient
2. The PICA overall mean response levels and the WAB aphasia quotient
3. Subtests VI & X of the PICA and the auditory comprehension section of the WAB
4. Subtest I of the PICA and the spontaneous speech section of the WAB

5. Subtests IV & IX of the PICA and the naming section of the WAB
6. Subtest XII of the PICA and the repetition section of the WAB

These particular relationships were investigated for several reasons. First, a general consideration for the comparison of the two tests is that the PICA includes, in its overall score, responses of verbal output, reading, writing, visual matching, identifying objects, and pantomine. The WAB includes tasks of spontaneous speech, auditory comprehension, repetition, and naming only in the aphasia quotient. Therefore, one of the questions to be answered was, "will the two diversely designed tests be comparable in predicting the severity of language impairment?" We anticipated some differences in overall scores, simply because the WAB excludes reading and writing from the aphasia quotient. I should mention, as a point of interest, that the WAB does include subtests of reading and writing, praxis and rhythm, and construction as supplemental tasks, but does not include these scores in the aphasia quotient used to determine taxonomic groupings.

Second, the PICA overall percentile scores and the PICA mean response levels were both investigated because the two forms of scores are derived from differing bases. The overall percentile scores are based on normative data, and the mean response levels are based on a range of patient behaviors. As the aphasia quotient of the WAB is based on weighting the raw score data, we could possibly find a difference in these relationships.

Specific subtests were looked at, as I previously stated, because they differed in the type of stimulus materials and the complexity of required responses. For instance, Subtest XII of the PICA is a repetition task using single words---names of common objects. The Repetition section of the WAB begins with single words and progresses to more complex sentences. Therefore, we might anticipate a lower correlation between these scores. Also, Subtests VI and X of the PICA utilize the names and functions of common objects in the assessment of auditory comprehension skills, whereas the WAB includes identifying nouns, colors, shapes, numbers, letters, body parts, etc., as assessment of auditory comprehension skills. We were interested in determining if naming ability could be assessed by a more limited number of tasks such as Subtest IV and IX of the PICA as opposed to the Naming section of the WAB or if, here too, we would find a smaller correlation.

Results

The results of this investigation are shown in Table 1 with additional data in Appendix B. Table 1 reports the six correlations resulting from the raw score data found in Appendix B.

As can be noted, the highest correlation using overall performance levels was obtained by using the PICA overall mean response levels instead of the overall percentile scores (a correlation of .95 vs. a correlation of .89). Of the four investigations of the relationships of various subtests, the strongest correlation was found between the naming tasks (.95) and the lowest correlation was between the repetition tasks (.79). You will note that the other two correlations fall somewhere in the middle and are quite close (.86 for auditory comprehension tasks and .88 for spontaneous speech.)

A transformational t test (Weinberg and Schumaker, 1969) was performed to see if these coefficients of correlation were significant. In all instances, the correlations were significant ($p. < .001$), although they varied in magnitude.

TABLE 1
Correlations Between PICA and WAB

Comparisons	r	r^2	p
PICA Overall %/ WAB Aphasia Quotient	.89	.79	<.001 (t = 8.90; df 22)
PICA Overall Mean/ WAB Aphasia Quotient	.95	.90	<.001 (t = 14.10; df 22)
PICA Subtest VI & X/ WAB Auditory Comp.	.86	.74	<.001 (t = 7.91; df 22)
PICA Subtest I/ WAB Spont. Speech	.88	.78	<.001 (t = 8.80; df 22)
PICA Subtest IV & IX/ WAB Naming	.95	.89	<.001 (t = 13.36; df 22)
PICA Subtest XII/ WAB Repetition	.79	.63	<.001 (t = 6.09; df 22)

Conclusions and Discussion

We can conclude from these findings that the two tests are comparable in indicating the severity of language impairment, although they assess speech and language behaviors in different ways. The fact that a higher correlation of overall performance resulted when the PICA mean response levels were used, than when percentile scores were used, is one point of discussion. Mean response levels represent an individual's performance against a predetermined set of criteria, as do the scores used to determine the aphasia quotient of the WAB. On the other hand, the PICA overall percentile scores represent the subject's performance in comparison with a standard population of aphasic persons. For this reason, PICA mean response levels and the WAB aphasia quotient seem to be more closely comparable.

The higher correlation found between the two tests with regard to Subtests IV and IX of the PICA and the WAB's naming tasks indicate that the PICA is a good predictor of a more general word retrieval ability although its tasks are limited to object naming. In contrast, the lower correlation found between Subtest XII of the PICA and the repetition task of the WAB implies that the two subtests may vary slightly in the information they provide for the clinician. We might want to consider using the Repetition section of the WAB or Boston Exam as a supplementary test along with the PICA if we want to determine the point at which a repetition breakdown occurs, or if we want to identify specific types of aphasia.

The fact that the PICA includes reading and writing as a large portion of the test (eight out of eighteen subtests), did not seem to contribute significantly to the correlation. However, when we begin to look at specific cases, reading and writing may take on more importance. By referring to the raw data in Appendix B, it can be noted that some of the individual PICA scores are starred. These ten subjects had a difference of at least 10 points between the PICA overall percentile score and the aphasia quotient. Of these ten subjects, eight subjects had lower scores on the PICA than on the WAB. In seven of the eight cases, performances on the reading and writing tasks accounted for this difference. As a case in point, observe the scores for Subject #14. This patient is only mildly impaired and derived an aphasia quotient of 96. His PICA overall

performance, however, was 86%. In looking back over the tests, we found that the majority of this patient's errors were misspelled words on the Graphic subtests of the PICA. In observing the scores for Subject #21, a much greater difference in performance on the two tests can be noted. Reading and writing accounted for a large portion of this difference, although this patient also did much better on the spontaneous speech tasks of the WAB than he did describing the functions of objects on Subtest I of the PICA.

Based on these seven specific cases, the WAB may be a better predictor of conversational communicative ability than the PICA because of reading and writing deficits of the patients. On the other hand, if we are interested in overall communicative ability, then we will want to examine every facet of language and speech performance to determine the development of alternative strategies, and then the assessment of reading and writing are more important.

One of the main concerns of every diagnostician should be to determine as much as possible about the test being used and to be knowledgeable about what the test can provide for the examiner. One way that this can be done is to be aware of the reference point from which the test was designed and to compare the results of this test with those obtained from similar tests. In this vein, the results of this study should lend support to the validity of the PICA and the Western Aphasia Battery.

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APPENDIX A

Western Aphasia Battery

I. Spontaneous Speech - Conversational sample including name, address, occupation, and history, as well as picture description. (This task is scored by means of two 10-point rating scales, scoring for both functional content and fluency.)
II. Auditory Comprehension - (a) Yes-No Questions; (b) Word Discrimination (identifying objects, pictures, geometric forms, letters, numbers, colors, body parts, furniture, and left/right discrimination); (c) Following Commands.
III. Repetition - Requires imitative responses on sixteen items increasing in difficulty from single words to more complex sentences.
IV. Naming - (a) Object naming; (b) Word Fluency (subject is asked to name as many animals as possible in one minute); (c) Sentence completion; (d) Responsive speech (answering questions, i.e. "what do you tell time with?").

Porch Index of Communicative Ability (PICA)

I. Spontaneous Speech (Subtest I) - Describing as completely as possible the functions of objects.
II. Auditory Comprehension (Subtests VI and X) - Identifying objects when named and when described according to function.
III. Repetition (Subtest XII) - Imitation of single words.
IV. Naming (Subtests IV and IX) - Spontaneous naming of objects and sentenc completion.

APPENDIX B

Individual Subject scores on the PICA and the WAB.

	PICA Overall	A.Q.	VI-X	IV-IX	I	XII	Aud. Comp.	S.S.	Rep.	Nam.
Subject #1	13.43(86)	81.9	12.3 14.6	13.8 12.8	11.3	14.6	7.85	19	5.6	8.5
Subject #2	* 8.99(35)	22.5	12.0 11.1	6.5 6.0	4.0	5.6	4.35	4	1.2	1.7
Subject #3	13.77(90)	90.0	14.8 15.0	14.8 14.8	13.0	14.4	8.9	18	9.8	8.3
Subject #4	13.98(92)	95.2	15.0 14.8	14.6 14.6	13.7	15.0	9.0	19	10	9.6
Subject #5	11.87(66)	61.6	14.8 15.0	13.4 12.5	11.2	14.2	8.0	12	3.5	7.3
Subject #6	12.61(76)	77.2	15.0 15.0	13.5 14.4	11.0	14.2	9.0	13	8	8.6
Subject #7	*11.76(65)	83.0	15.0 15.0	13.1 13.6	11.5	15.0	9.8	15	8.7	8.0
Subject #8	13.08(82)	84.9	15.0 15.0	13.2 13.3	10.6	14.8	9.75	15	8.7	9.0
Subject #9	10.82(52)	60.0	14.4 13.9	9.1 7.6	8.7	12.6	7.4	14	4.4	4.2
Subject #10	*12.68(76)	86.8	15.0 15.0	14.4 14.2	12.2	15.0	8.1	18	9.6	7.7
Subject #11	11.74(64)	57.3	14.4 15.0	11.1 10.1	10.0	13.9	6.75	10	6.0	5.9
Subject #12	13.22(84)	89.9	14.8 14.6	14.8 13.5	12.9	14.6	8.65	18	9.6	8.7
Subject #13	11.19(56)	53.5	14.2 14.1	12.9 13.1	9.9	14.0	5.65	12	4.4	4.7

(CONTINUED)

	PICA Overall	A.Q.	VI-X	IV-IX	I	XII	Aud. Comp.	S.S.	Rep.	Nam.
Subject #14	*13.42(86)	96.0	15.0 15.0	15.0 14.7	15.0	15.0	8.8	20	10	9.2
Subject #15	12.80(78)	83.8	14.8 15.0	13.8 13.9	12.0	15.0	9.9	14	10	8.0
Subject #16	*10.77(52)	77.6	14.4 15.0	13.8 14.6	12.7	14.7	9.4	13	9.3	7.1
Subject #17	6.74(16)	10.2	9.0 10.4	5.0 3.7	3.0	7.1	4.0	0	.2	0
Subject #18	* 9.14(37)	66.5	11.3 13.4	12.4 6.5	6.7	12.2	7.35	13	7.5	5.4
Subject #19	* 7.34(21)	5.02	6.4 8.0	5.0 5.1	3.0	6.9	2.5	0	0	0
Subject #20	13.78(90)	81.3	14.8 12.9	14.7 14.4	14.0	15.0	8.75	17	6.8	8.1
Subject #21	*10.43(48)	75.4	14.6 14.4	12.6 10.1	11.0	14.4	6.9	17	8.0	5.8
Subject #22	8.63(32)	34.0	7.9 14.3	6.3 6.6	5.1	12.5	4.4	8	1.1	3.5
Subject #23	* 9.54(40)	52.8	9.4 12.3	6.1 6.7	5.4	14.0	6.2	12	5.2	3.0
Subject #24	*10.02(44)	56.3	13.1 12.5	8.3 7.9		14.2	6.25	11	6.4	4.5

* Spread between PICA overall % and A.Q. ≥10 point

Q: My question concerns the subjects you have asterisked, where the agreement was not as high as it was for the other subjects. Was there a tendency for these subjects to be fluent or nonfluent?
A: There appeared to be more nonfluent subjects in that group, but I only looked at this retrospectively and didn't study it closely.

Q: I'm not familiar with the WAB, but it doesn't use the same objects all the way through, does it?
A: It has a much larger number of objects than does the PICA. Some of them are used on more than one subtest, but they are certainly not homogeneous like the PICA.

Q: Well, I was thinking about the repetition correlation, and you commented on it, being lower than the others. On the PICA, patients have already been working with the objects for quite some time, since this is Subtest #12, but that doesn't seem to be the case with the WAB.
A: No, some of the words on the Repetition section of the WAB are new words, and then it branches out into sentences.

Q: Is the aphasia quotient for the WAB a percentile or a percentage?
A: I would have to say neither. You add up a raw scores and then some totals are multiplied by or divided by certain numbers to come up with a possible "100". So based on that, I would say that it's a percentage of 100, but it's really a weighted raw score out of a possible 100.

Q: Did you try omitting Subtests V and VII and the Graphics and using everything else in correlating them? Because that would be more comparable.
A: We considered doing that but decided we couldn't derive percentiles that way. We could have used the mean scores, though.

Q: How did you make a judgement of fluent and nonfluent, and why did you care?
A: First of all, the classification of fluent and nonfluent was based on the Boston rating scale profile of speech characteristics. We did this to show that our group consisted of a variety of types of aphasia---that they were not all fluent or nonfluent.

Q: Did you say that the reading and writing "baddies" on the PICA were nonfluent? That doesn't make sense.
A: There seemed to be more nonfluent subjects among the group that had the largest differences between the two test scores, but this was not all due to reading and writing scores.

Q: I don't know that this is germane to your paper, but isn't the WAB the test used in the Kertesz and McCabe study? It seems as if they're leaving out a lot of data on which they classify syndromes.
A: Well, generally in just classifying aphasia syndromes, only behaviors relative to the classification are used, such as spontaneous speech, auditory comprehension, and repetition.

Q: Have there been any other validation studies on the WAB? If not, I can see how this makes the WAB valid but it's not support for the PICA's validity.

A: To my knowledge there have not been any other validity studies on the WAB. We made an assumption that because both the WAB and the Boston address behaviors that identify aphasia in terms of syndromes, that we could say that if they were correlated it could support the validity of the PICA.

Q: I don't know what the transformational t is, and I don't know what was being compared.

A: It was a significance test on the correlation in terms of a difference from zero.

Q: I have just one more comment. Kertesz does have data correlating the WAB with the Boston, which correlated highly. So whatever they're measuring, they seem to be measuring similar things.