THE FROSTIG AND THE BENDER GESTALT AS PREDICTORS OF READING ACHIEVEMENT

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The Frostig and the Bender Gestalt as Predictors of Reading Achievement[1]

Since their publication, both the Marianne Frostig Developmental Test of Visual Perception (1964) and the Koppitz scoring of the Bender Gestalt (1964) have been widely used by psychologists, remedial reading specialists, and occupational therapists. As the Frostig and Bender are both paper and pencil tests of visual-perceptual and visual-motor development, often a tester must choose between the two tests. This paper will compare the usefulness of the Frostig and the Bender in assessing reading readiness.

The Frostig is a group-administered test consisting of five subtests, each purportedly measuring a different visual-perceptual or visual-motor skill. Subtest I, Eye-Motor Coordination, involves the drawing of continuous straight, curved or angular lines between guide lines of various widths, or from target to target without guides. Subtest II, Figure-Ground Relationships, involves the perception and outlining of figures against increasingly complex grounds. Subtest III, Constancy of Shape, requires the child to outline circles and squares in rotated positions, sometimes enclosed in a complex ground. Subtest IV, Position in Space, involves discrimination of reversals and rotation of figures presented in a series. The child is asked to mark the figures which are the same or different from the model or from other figures in a row.

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Subtest V, Spatial Relations, involves the analysis of simple forms and patterns. These forms consist of lines of various lengths and angles which the child is required to copy using dots as guides.

The Frostig yields a raw score, a perceptual-age score and a scaled score for each of the five subtests. The test also yields a Perceptual Quotient, a deviation measure obtained from the sum of the subtest scale scores after correction for age variation. The data in this paper are derived from perceptual age scores for the subtests and the Perceptual Quotient.

Frostig postulated that the abilities measured by each of the five subtests develop relatively independently of each other, and that there should be specific relationships between these abilities and a child's ability to learn and adjust. Frostig stated she never believed these were the only perceptual abilities involved in the process of visual perception, but that these seemed to have particular relevance to school performance and were therefore studied.

Several factor-analytic studies have attempted to determine if indeed the five subtests are measuring different skills. Corah and Powell (1963), using 40 subjects of five years of age, concluded that the Frostig did not yield factors corresponding to the five areas mentioned above. However, a subsequent factor-analytic study by Silverstein (1965) using the total Frostig standardization sample concluded that his study, "lends support to the premise that a number of relatively distinct areas of perception can be delineated" in the Frostig. Silverstein's findings indicate there is justification for using the subtest scores as well as the total Perceptual Quotient.

The Frostig was standardized on a sample of over 2,100 nursery and public school children between the ages of three and nine. All lived in Southern California and were primarily from middle class backgrounds. Negro children were not included in the standardization sample.

The Bender Gestalt (Bender, 1946) consists of nine designs presented one at a time on cards. This test measures the ability to copy designs and appears to be similar to the task required on Frostig Subtest V. Traditionally the test has been individually administered. More recently Keogh and Smith (1961) developed a procedure for administering the test to small groups of approximately ten children. Their method of group administration involves displaying each card to the group for approximately one minute, or until all children have indicated completion of the design. Each design is copied on a separate page. Keogh and Smith developed their procedure for group administration with kindergarten children from a predominantly Caucasian, middle socio-economic level community.

One of the more widely used methods of scoring the Bender is the Koppitz Developmental Bender Scoring System for Children (Koppitz, 1964). The Koppitz method of scoring the Bender involves counting errors made in reproducing the designs. The kinds of errors scored include distortion in the drawing of a design, perseveration, rotation of a design and failure to integrate the parts of a design into a whole. Because the Koppitz scoring yields error scores, a positive relationship between a high level of performance on the Bender and a high level of success in tests of reading achievement would appear as a negative correlation. The scoring system was standardized on 1,104 public school children from

communities in the midwestern and eastern states. Koppitz did not report the socio-economic level or ethnic distribution of the subjects in the standardization sample except to indicate that no ethnic group was excluded.

The tester may consider several criteria in deciding between the Frostig and the Bender. One criterion would be the amount of time necessary to administer each test and ease of administration. A second criterion would be the degree of correlation between test scores and subsequent measures of reading achievement. A third criterion would be the amount of usable information supplied by each test. In using these three criteria to compare the Frostig and Bender, a tester should consider the socio-economic background of the children to whom the tests will be administered. The time required to administer the tests, the relationship of test scores to subsequent reading achievement and the utility of subtest scores all may differ with different populations. The majority of children studied in this research were from a lower socio-economic Negro neighborhood.

One of the purposes of the present research was to compare time required and ease of test administration for the two tests with children whose ethnic and socio-economic background was considerably different from the standardization samples of the two tests. The Frostig manual states that group administration of the total Frostig test usually requires less than one hour. Test administration requires a separate set of instructions for each of the five subtests and the use of colored as well as black pencils in some of the subtests. For the group administration of the Bender, Keogh and Smith indicated that approximately one

minute was required to administer each of the nine cards. There is only one set of instructions for the total test and only one pencil is needed for each child. Based on the experiences of Frostig and Keogh and Smith, the Bender would appear to be easier to administer and would require considerably less time from the tester.

A second criterion to consider would be the degree to which each test predicts subsequent reading achievement. This investigator could find no references to studies which compared the Frostig and Bender as predictors of reading achievement. Nonetheless, several studies have found significant relationships between the Frostig Perceptual Quotient and overall measures of reading achievement (Bryan, 1964; Maslow et al, 1964; Olson, 1966a, 1966b; Rosen, 1966; and Tauber, 1966). Similarly other studies have found significant relationships between the Koppitz scoring of the Bender, both group and individually administered, and overall measures of reading achievement (Keogh and Smith, 1965, 1967; Koppitz, 1964; Smith and Keogh, 1962).

A third criterion for selecting either the Bender or the Frostig would be the amount of useful information provided by each test. The Bender provides only one score, an error score. The Frostig, however, provides five subtest scores and therefore has the potential to provide information about a child's performance on each of the five skills supposedly measured by the subtests. If it were shown that each of the five skills were important in learning to read, then a child's pattern of functioning on these subtests would be helpful in planning a program of instruction during the first grade. If a child performed poorly on one of the subtests, he could receive special training on the skill

measured by that subtest during the year. The Frostig School (Frostig, 1964) has developed a training program for use in conjunction with the Frostig test which provides lesson material based on the abilities measured by each of the five subtests. On the other hand, if a subtest score does not correlate with subsequent reading achievement, it would not be particularly useful to obtain information about the skill measured by this subtest.

This investigator could find only three studies which investigated the predictive validity of the Frostig subtests. Cohen (1966) studied a sample of 119 Negro, Puerto Rican and Oriental first-graders living in a lower socio-economic area in New York City. Olson studied the relationship of Frostig subtest scores to reading achievement in 71 second-graders (1966a) and 121 third-graders (1966b). Ethnic and socio-economic backgrounds were not specified in either study. In a widely quoted study by Goins (1958) 14 tests of visual-perception, some similar to the Frostig subtests, were administered to 120 first-graders and related to subsequent reading achievement. The first-graders attended two schools in Chicago and were from varied socio-economic backgrounds.

There is considerable discrepancy in the results of these studies. Olson found that Frostig Subtest I, Eye-Motor Coordination, correlated significantly with all of the ten measures of reading achievement obtained from second-graders, but with only two of the reading tests administered to the sample of third-graders. Frostig Subtest II correlated significantly with all but two of the ten reading tests Olson used with second-graders, but did not correlate significantly with any of the reading tests administered to the third-graders.

Cohen found that for first-graders, "The Shape Constancy subtest of the Frostig (Subtest III) may have special significance in relation to reading retardation. In a pilot study recently completed by a Yeshiva University graduate student it correlated most highly with reading in the Negro children amongst all Frostig subtests, Stanford-Binet, Bender Gestalt (Koppitz scoring) and other tests." Cohen did not report the correlation of the other subtests with scores of reading achievement. In Olson's study using second-graders, however, Subtest III did not predict reading achievement as well as the other Frostig subtests and was significantly correlated with only one of the ten reading tests administered. On the other hand, for Olson's third-graders, Frostig Subtest III correlated significantly and to a higher degree than other subtests with all of the various measures of reading achievement.

Frostig Subtest IV correlated significantly with all ten reading tests Olson used with second-graders, but with none of the reading tests used with third-graders. In Goins' study, the test of Reversals (similar to Frostig Subtest IV) was one of the two tests which correlated most highly with reading achievement.

Frostig V was significantly related to all but one of the ten reading tests used in Olson's study of second graders, but was significantly related to only one of the reading tests for third-graders. In Goins' study, the test of Pattern Copying (similar to Frostig Subtest V) had a higher correlation with reading achievement than all of the other 14 visual-perceptual tests.

The discrepancies in the results of the studies by Cohen, Olson and Goins may be caused by several factors, one of which could be grade

level of the children studied. Cohen and Goins used first-graders; Olson studied second-graders in one study and third-graders in another. Perhaps different visual-perceptual and visual-motor skills become important in learning to read as children become older. A second factor could be that the children studied by Olson and Goins may be of different socio-economic backgrounds than the children in Cohen's study. The children in the present study appear to be comparable to Cohen's sample in grade level, ethnic background, and socio-economic level. The similarity of the two samples would suggest that Frostig Subtest III would also correlate most highly with reading achievement for the children in the present sample.

Methodology

The subjects of this study were 93 first-graders, the entire first-grade population of the Brentwood School, a K-6 elementary school located in the Ravenswood City School District in East Palo Alto, California. At the beginning of the 1966-67 school year, the children in the sample ranged from 69 to 93 months of age. The mean age was 76 months with a standard deviation of 4.33. There were 49 boys and 44 girls in the sample with no significant differences in the average age of boys and girls. The sample population was approximately 90 percent Negro, six percent Mexican-American, two percent Oriental-American and two percent Caucasian. Brentwood School qualifies for federal aid to impoverished areas under Title III of the Elementary and Secondary Education Act of 1965.

The Frostig was administered to all the children in the sample in the last two weeks of September 1966. Discussions with the Brentwood

first-grade teachers and the school psychologists indicated that many children would find it difficult to maintain sufficient attention to complete the Frostig in one session. Mrs. Phyllis Maslow of the Frostig staff suggested in personal communication that Subtests I and II be administered in a first session and the remaining subtests in a second session. There were approximately eight children in each group. Scoring reliability on a sample of 30 protocols ranged from .90 to .99 for the scores on the various subtests and for the Perceptual Quotient.

The group Bender Gestalt was administered to all children in the sample during the last two weeks of September 1966 using the procedure developed by Keogh and Smith. The test was administered to groups of approximately seven children and scored using the Koppitz scoring system. Scoring reliability for a sample of 30 tests was .96.*

Three tests of reading achievement were administered to the entire sample in May 1967: the Gates-McGinitie Reading Test, Primary A, Form 1, 1964 edition; the California Reading Test, Lower Primary, Form W, 1957 edition with 1963 norms; and the reading sections of the Stanford Achievement Test, Primary I Battery, 1964 edition. Two subscores were obtained from the Gates-McGinitie Reading Test: Vocabulary and Comprehension. Four subtest scores were obtained for the California Reading Test: Word Recognition, Picture Association, Opposites and Comprehension. Four subscores were obtained from the Stanford Achievement Test: Word

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*Permission to reproduce the Bender Gestalt designs for group presentation was obtained from Dr. Lauretta Bender and the American Orthopsychiatric Association.

Study Skills, Word Reading, Vocabulary and Paragraph Meaning. The Gates and the California Reading Test (CRT) were administered by members of the Stanford CAI staff, assisted by graduate students from the School of Education at Stanford University. Each testing team, consisting of a project staff member and a graduate student, administered a given test to all of the students in order to eliminate tester effects. Each test session lasted approximately 30 minutes. The Stanford Achievement Test was administered to each child in the sample by the classroom teacher as part of the testing program of the State of California.

A measure of classroom reading level was also obtained: the level at which the child was reading (e.g., preprimer, primer, first, second) in the basic reader series used in his classroom during the week that the reading tests were administered in May 1967.

Results

Table 1 presents the means, standard deviations and intercorrelations among the five Frostig subtests, the Frostig Perceptual Quotient, and the group-administered Bender Gestalt.

The children in the present study scored lower than the Frostig standardization sample on the Perceptual Quotient as well as on all of the subtests. The mean Perceptual Quotient for the Frostig standardization sample was 100 with the lower quartile at 90. The perceptual quotients for the children in the present study ranged from 65 to 119 with a mean of 91.35, just below the 30th percentile according to Table 4 of the standardization manual. The mean Scaled Score for the children in the standardization sample was ten for each of the subtests. The average scaled score for the children in the present study was under

ten on every subtest. The children performed best on Frostig Subtest I, Eye-Motor Coordination (average scaled score of 9.63) and earned lowest scores on Frostig Subtest III, Constancy of Shape (average scaled score of 8.12).

S. Alan Cohen reported (1966 and also personal communication) the Frostig scores for a group of 119 first-graders from a socially disadvantaged community in New York City including Puerto Rican, Negro and Caucasian children. The findings reported for Negro children in his sample were very similar to those found in the present study. The mean Perceptual Quotient was 92.56 with a standard deviation of 12.35 and scores ranging from 67 to 118. The children in his sample also performed best on Frostig Subtest I and earned lowest scores on Frostig Subtest III.

Koppitz reported that the 153 first-graders in her standardization sample (mean age 77 months) achieved a mean error score of 8.1 with a standard deviation of 4.41. In comparison, the first-graders in the present study (mean age 76 months) achieved a mean error score of 11.9 with a standard deviation of 3.56. This score corresponds to the average error scores earned by five to six year olds in the Koppitz sample. There were no significant sex differences in the mean scores on the Frostig or Bender for the children in this sample.

An inspection of Table 1 indicates that the intercorrelations among the five Frostig subtests were only moderate and ranged from .10 to .56. Subtest I, Eye-Motor Coordination, appeared to be least related to the other tests. The Bender error score was significantly correlated with the Frostig Perceptual Quotient ($p < .001$) and with Frostig Subtests III, IV, and V. With the exception of the correlations of Frostig

subscores with the Frostig total Perceptual Quotient, the highest correlation in Table 1 was between the Bender and Frostig Subtest V. These results are not surprising as the tasks required in the two tests appear to be quite similar.

Table 2 shows the means, standard deviations and intercorrelations among the measures of reading achievement. In designing this study an attempt was made to find reading tests with subtests measuring the specific reading skills taught to first-graders. Table 2 indicates that the subtest scores for the Gates, California and Stanford Reading Tests do not cluster into categories, as would be implied by the name of reading subtests. For example, the intercorrelation among the three comprehension tests is no higher than the correlation with other of the reading tests. Rather it appeared as if the tests were providing an overall measure of reading achievement. A factor analytic study of the reading scores is being undertaken by the CAI staff and will be reported in a future paper.

The first criterion considered in deciding between the Frostig and Bender was the time required to administer each test and the ease of administration. Each of the two Frostig test sessions lasted between 30 and 45 minutes for the groups of children tested in this study. Many of the children seemed to have difficulty holding the pencil firmly and making firm, straight lines on the paper. Many children also had difficulty maintaining consistent attention throughout a single session. Subtest III seemed particularly difficult. A large number of children did not seem to understand the directions when they were given. When the test stimuli were removed from sight, many children couldn't remember

what they were supposed to do. This difficulty with test instructions raises the possibility that Frostig Subtest III may be measuring ability to pay attention to and follow instructions rather than measuring a visual-perceptual or visual-motor skill.

Administration of the Bender required between 21 and 64 minutes with an average time of 35 minutes. The hyperactivity of some of the children appeared to have a contaminating effect on the total group and this was one factor accounting for the longer administration time.

In summary, with the sample of children used in this study, less time was required to administer the Bender than the Frostig. The administration of the Bender could be completed in one session as compared with the two sessions required for the Frostig.

The second criterion discussed for comparing the Frostig and Bender was the degree of correlation of scores on each test with scores on tests of reading achievement. Results presented in Table 3 indicate that both the Frostig Perceptual Quotient and the Bender error score were significantly correlated ($p \leq .001$) with all of the measures of reading achievement. The correlations of the Frostig with the measures of reading achievement appeared to be of similar magnitude to the correlations of the Bender with the same measures of reading achievement. As a check on the significance of the differences between the two sets of correlations, the Sign Test (Siegel, 1956) was applied. The Sign Test yielded a significance level of $p = .27$, indicating that the hypothesis that the two sets of correlations are of the same magnitude cannot be rejected. In summary,

the Frostig and Bender appeared to be equally effective as predictors of success in learning to read since scores on both tests correlated significantly with scores on subsequent measures of reading achievement.

The third criterion considered was the amount of useful information provided by the Frostig and the Bender. The Frostig yields five subtests in addition to the total Perceptual Quotient, while the Bender yields only one score. Results presented in Table 3 indicate that some of the Frostig subtests are better predictors of reading achievement than others. The skills measured by Frostig Subtests I and II did not seem to be good predictors of subsequent reading achievement. Only three of the 11 correlations between Frostig Subtest I and the measures of reading achievement were significant ($p < .01$). The highest correlation was .31. Only six of the 11 correlations of Frostig Subtest II with measures of reading achievement were significant. The highest correlation was .37. Frostig Subtests III and IV seemed to serve better as predictors of reading achievement. All of the correlations of Frostig III with measures of reading achievement were significant ($p < .01$), with correlations ranging from .30 to .47. Nine of the 11 correlations between Frostig IV and measures of reading achievement were significant with correlations ranging from .23 to .43. Frostig Subtest V appeared to be the best predictor of reading achievement. All of the 11 correlations of Frostig V with tests of reading achievement were significant, ten of these at the $p < .001$ level. Correlations ranged from .31 to .59. An inspection of Table 3 indicates that Frostig Subtest V, a test of only eight items, predicted reading success as well as either the total Frostig Perceptual Quotient or the group-administered Bender.

Discussion

The children in this study scored considerably lower on the Frostig and the Koppitz scoring of the Bender than the standardization samples. The lower scores point to the need for caution in comparing the score of a child from a population similar to the one used in this study with scores derived from the normative samples of either test. A lower score on these tests may indicate that a child needs special training before he will be able to succeed in learning to read, but a lower than average score may not necessarily mean that a child's performance is below the average for the children in his class.

Considerably more time was required to administer both the Frostig and the Bender to the children in the present sample than was reported in the Frostig standardization manual or by Keogh and Smith. For the children in this study, the group Bender had the advantage of requiring less time to administer than the Frostig, and the group Bender could be administered in one session rather than two. Even with group administration taking as long as 64 minutes with some groups, group administration of the Bender required less time per child than individual administration. When the Bender was administered individually to a number of children in the sample later in the year, it took each child between 10 and 15 minutes to copy the nine designs.

The present study found that the Frostig and Bender were equally effective as predictors of first-grade reading achievement. All of the correlations of the Frostig Perceptual Quotient and the Bender error score with measures of reading achievement were significant and the correlations were of similar magnitude.

The third criterion for comparing the Frostig with the Bender was the amount of information provided by each test. The Frostig subtest scores have the potential of providing useful information to the tester. However, some of the subtest scores did not appear to be valid predictors of subsequent reading achievement. In the present study, using first-graders of predominantly lower socio-economic background, Frostig Subtests I and II were not highly correlated with the measures of subsequent reading achievement. On the basis of this study, it would not seem worthwhile to administer these subtests of the Frostig. However, Olson in his research with second-graders, found that these two subtests did correlate with reading test scores. It is difficult to explain the differing results of the two studies, except that differences in grade level of the two populations and/or possible differences in socio-economic background may have affected the results.

In the present study Frostig Subtests III, IV and V were found to be good predictors of reading achievement, with Subtest V being the best predictor. These findings are in agreement with the results of Goins' study and Olson's research on second-graders. Cohen's conclusion that Frostig Subtest III was the best predictor of reading achievement for first-graders did not hold for the children in the present sample, although Subtest III was significantly correlated with all of the measures of reading achievement.

During the administration of the Frostig and Bender it appeared to the investigator that performance on these tests depended on more than simple perceptual-motor skills and that the Frostig and Bender scores may also have been influenced by a child's overall intellectual functioning,

including ability to understand instructions and ability to reason abstractly. It may be these aspects of the tests which accounted for their ability to predict reading achievement as well as their measurement of perceptual and motor skills. To explore this possibility, scores on the Frostig and Bender were correlated with scores on the short form of the Stanford-Binet Intelligence Scale, Form LM, which had been administered to the children in the sample either at the end of their kindergarten year or during the first several months of first grade. Results are presented in Table 1. The Stanford-Binet did not correlate significantly with Frostig Subtests I and II. Correlations of Stanford-Binet IQ with Frostig Subtests III, IV and V were all significant, with the correlations for Subtests III and V being significant at $p < .001$. Thus, the three Frostig subtests which were most highly correlated with subsequent reading achievement were also the subtests which were most highly correlated with overall intellectual functioning in this sample of children. The group Bender was also significantly correlated with intellectual functioning.

The results of this study suggest the need for further research on the relationship of the Frostig subtests to subsequent reading achievement, considering grade level and socio-economic level of the children in the sample, in addition to exploring the nature of the skills measured by each of the subtests. Such research might determine to what degree aspects of intellectual functioning other than perceptual skills enter into test performance. Until it is clearly determined that all of the subtests are significantly related to reading achievement it is difficult to justify the time required to administer the total Frostig test to first-graders.

Another direction for future research would be to study the relationship of each of the five subtests to specific reading behaviors. Frostig indicated that performance on each of the five subtests would be related to achievement in specific reading skills. For example, she predicted that Figure Ground perception would relate to recognizing words, and Position in Space to reversals or rotations in reading. In this study, the tests chosen to measure specific areas of reading achievement were highly interrelated so that it was not possible to consider the relationship of subtests to specific reading skills. Future research of this type would require development of reading tests which measured specific skills and were not highly interrelated.

The finding that Frostig Subtest V, a test of only eight items, predicted reading achievement as well as the total Frostig Perceptual Quotient or the Koppitz scoring of the Bender points to the value of further research on this particular subtest with the possibility that, if it were expanded to include more items, it might require less time to administer than either the total Frostig or the Bender and at the same time be a better predictor of reading achievement than either test.

Summary

The purpose of this paper was to compare the usefulness of the Frostig and the group-administered Bender Gestalt in assessing reading readiness. Scores on the Frostig and Bender were obtained from 93 children, predominantly Negro and from a lower socio-economic level community. These scores, obtained at the beginning of the first grade, were correlated with scores on tests of reading achievement and a measure of classroom reading level obtained at the end of the first-grade year.

Three criteria were stated for comparing the tests: the amount of time necessary to administer each test and the ease of administration, the degree of correlation between test scores and subsequent measures of reading achievement, and the amount of usable information supplied by each test.

Considering the criterion of administration time, the Bender Gestalt appeared to have some advantage over the Frostig. However, for the children in this study, it took a longer time to administer both the Frostig and the Bender than was indicated by the authors of the tests. When the criterion of degree of correlation between test scores and subsequent measures of reading achievement is considered, the Frostig Perceptual Quotient and the Bender error score were both significantly correlated with the measures of reading achievement. Both measures appeared equally effective as predictors of reading achievement. There was no significant difference in the degree of correlation of either test with measures of reading achievement.

Based on the amount of information provided by each test, the Frostig would have an advantage over the Bender because it yields five subtest scores in addition to the total score. However, results of the present study indicated that Frostig Subtests I and II were not good predictors of reading achievement, and therefore it would be of little value to administer these subtests to first-graders. Frostig Subtests III, IV and V were good predictors of subsequent reading achievement, with Subtest V predicting as well as the total Frostig or the Bender Gestalt. One of the reasons that Subtests III, IV and V were good predictors of reading achievement may be that performance on these tests appeared to depend on a child's overall level of intellectual functioning.

The results of this study suggest the need for further research on the relationship of the Frostig Subtests to subsequent reading achievement. This research should consider the grade level and socio-economic background of the children being studied. Future research might also further explore the nature of the skills required on each of the subtests, as well as the relationship of the Frostig subtests to specific reading skills.

Table 1

Means, Standard Deviations and Intercorrelations

Among the Frostig Subtests, the Bender Gestalt and the Stanford-Binet IQ N=93

	Frostig Tests					Perceptual Quotient	Group Bender Gestalt	Stanford-Binet IQ	Means (Scaled Scores)	Standard Deviations
	I	II	III	IV	V					
Frostig I		28*	10	24	33*	45**	-26	15	9.63	1.85
II			35**	44**	54**	66**	-37	26	9.45	2.45
III				48**	45**	61**	-48*	53**	8.12	2.17
IV					56**	74**	-48*	33*	9.31	2.06
V						78**	-62**	52**	9.15	2.12
Perceptual Quotient							-56**	59**	91.35	13.89
Group Bender Gestalt								-38*	11.9	3.56
Stanford-Binet									92.15	15.10

* $p < .01$, 2 tailed test

** $p < .001$, 2 tailed test

Note: Correlations of .21 are significant at $p < .05$.

Table 2

Intercorrelations Among Measures of Reading Achievement N=93

		1	2	3	4	5	6	7	8	9	10	11
1.	Gates Vocabulary		83	77	78	53	44	82	85	59	84	65
2.	Gates Comprehension			63	70	51	53	65	76	54	84	60
3.	CRT Word Recognition				67	41	39	73	71	54	65	54
4.	CRT Picture Association					45	41	67	71	56	68	49
5.	CRT Opposites						33	46	55	37	51	35
6.	CRT Comprehension							33	43	22	55	45
7.	Stanford Word Study Skills								79	61	69	48
8.	Stanford Word Reading									56	76	55
9.	Stanford Vocabulary										49	32
10.	Stanford Paragraph Meaning											71
11.	Classroom Reading Level											

Note: Correlations of .21 are significant at $p < .05$, 2 tailed test

" " .27 " " " $p < .01$, " " "

" " .35 " " " $p < .001$, " " "

Table 3

Relationship of Frostig and Bender Gestalt to

Classroom Reading Level and Tests of Reading Achievement N=93

	Frostig Tests					Perceptual	Group
Reading Achievement	I	II	III	IV	V	Quotient	Bender Gestalt
Gates Vocabulary	27*	35**	47**	43**	59**	58**	-57**
Gates Comprehension	25	37**	41**	35**	58**	55**	-51**
CRT Word Recognition	18	21	34*	38**	47**	49**	-48**
CRT Picture Association	27*	30*	39**	38**	54**	53**	-54**
CRT Opposites	21	19	30*	38**	31*	36**	-29*
CRT Comprehension	14	15	47**	24	36**	41**	-44**
Stanford Word Study Skills	14	16	35**	40**	52**	49**	-53**
Stanford Word Reading	21	31*	33*	33*	49**	50**	-45**
Stanford Vocabulary	20	18	34*	37**	47**	41**	-44**
Stanford Paragraph Meaning	21	32*	46**	37**	51**	54**	-48**
Classroom Reading Level	31*	28*	43**	23	43**	49**	-38**

* $p \leq .01$, 2 tailed test

** $p \leq .001$, 2 tailed test

Note: Correlations of .21 are significant at $p < .05$.

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