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The Efficiency of Verbal & Nonverbal Intellectual Measures as Predictors of Achievement in Culturally Deprived Preschool Children

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THE EFFICIENCY OF VERBAL AND NONVERBAL INTELLECTUAL MEASURES AS PREDICTORS OF ACHIEVEMENT IN CULTURALLY DEPRIVED PRESCHOOL CHILDREN

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The purpose of the study was to investigate the predictive efficiency of verbal and nonverbal measures of intellectual functioning of the disadvantaged child in a preschool setting. The Peabody Individual Achievement Test (PIAT) was used as a measure of the current achievement level, and the Wechsler Preschool and Primary Scale of Intelligence (WPPSI), Goodenough-Harris Drawing Test (GHDT), and the Bender Gestalt as predictors of achievement. The sample included 30 preschool children in an age range from 5 years-0 months to 6 years-7 months who were enrolled in a preschool program for the culturally deprived.

Both the relationships between single variables and combinations of these variables were studied with the Pearson product moment correlation and multiple regressions analyses. The achievement measure, PIAT, was used as the dependent variable, and 15 verbal and nonverbal factors were included as independent variables.

Of the 15 independent variables, only the Bender Gestalt, a nonverbal measure of intelligence, correlated significantly with the criterion dependent variable, PIAT, and accounted for most of the variance in predicting the achievement measure. The Bender Gestalt accounted for 34% of the total variance. The Information subtest of the WPPSI accounted for an additional 10%, the WPPSI Block Design subtest also accounted for an additional 4% of the variance, while other factors including the WPPSI Full Scale were negligible.

Implications for further research included a continuation of this same sample for a period of three to five years in a longitudinal study to determine if the same results with achievement and nonverbal intelligence would occur. Another implication would be to investigate other populations of like programs to determine if the predictors would remain constant with the results of this study. Finally, another area of study could include sex differences and the effect that these differences would have upon these measures in a population different from this one.

Chapter I

Review of the Literature

Introduction

Educators have long been concerned with the prediction of achievement, and a multitude of research programs have focused upon the relationship between various measures of intellectual ability and achievement. The prediction of achievement has become increasingly important as programs have been expanded to include preschool children from culturally deprived backgrounds. Valid predictors of achievement are needed in order to develop an effective educational program. Another focus of research has centered around the question of whether verbal or nonverbal intellectual measures best predict achievement for the disadvantaged preschool child. The most efficient test or battery of tests for the prediction of achievement is yet to be identified.

Many of the problems involved in preschool education of the disadvantaged child have focused upon the child's environment. A child's development is dependent upon the existence of a stimulating environment and appropriate adult models. For the disadvantaged child there seemed, in many instances, that such stimulation was lacking with the result that achievement lags behind that of the child from a middle class background.

Because of the cultural differences found in the deprived preschool child's background assessment techniques developed for the general population may not be appropriate for these children. Assessment media dependent upon language have been frequently used as measures of the intellectual level for many children. Research has indicated that in the lower socio-economic class home a language deficiency exists which could affect the child's overall performance on verbal intelligence tests. Therefore, the efficiency of verbal and nonverbal measures should be examined as achievement predictors for the culturally disadvantaged child.

Many studies have been conducted concerning the education of disadvantaged children during the preschool years. Educational programs for the culturally deprived (Rogers, 1969) have frequently been based upon the goals and practices of the predominant middle class culture. Because of this the deprived preschool child's program in academic areas should be examined in the context of his background rather than the predominant middle class educational system. Disadvantaged children (Lichtenberg and Norton, 1972) frequently experience academic failure and have not shown normal growth and development patterns. In many instances this has occurred because normal growth and development patterns are based on middle class standards. Because of this failure to efficiently match children with programs both cognitive and language development have suffered.

Other negative effects have been cited in studies (Hartup

and Smothergill, 1967) which indicate that socio-economically deprived children have significantly lower intelligence quotients when compared with middle class samples. Their findings further indicated that because of the deficits in both cognition and language development, intelligence test scores were lower for the socio-economically deprived population. Feather and Olson (1969) also found through numerous studies with children from deprived backgrounds, including rural backgrounds, that deprived children were deficient in intelligence when their scores were compared with non-deprived groups. Further evidence of an intelligence score deficit can be found in a study by Datta (1967) in which 956 children in a Head Start program were tested. Datta concluded that preschool children from very low income families suffer from the cultural bias in intelligence tests. She questioned the predictive efficiency of intelligence tests because of the cultural biases of these tests when used with disadvantaged preschool children.

Historical and Theoretical Development

There have been numerous studies which have investigated verbal and nonverbal means of assessing intellectual functioning. Ames (1969) in her studies examined perceptual problems and their relationship to developmental lag in children. She indicated that many tests which measure developmental levels depend on perceptual functioning which in itself depends on the child's level of development. She concluded that perceptual training aided in bringing an optimum developmental level. At the same time Ames in her study related that the perceptual

training did not necessarily speed up development. But children with perceptual problems can lag behind in their expected developmental age.

In a study of nonverbal measures of intelligence Hildreth (1944) states that copying designs has proven to be a good mental test. The geometric designs can be arranged in order of difficulty according to average age at which a child can reproduce them. She also found that the test of copying designs gave one an opportunity to measure a child's maturity in perception as well as assimilation and apperception. In contradiction to the success of copying designs reported by Hildreth, Wise (1968) in his study of stick drawings and the Bender Gestalt indicated little discrimination of the Bender Gestalt below the age of five years. In his administration of the Bender Gestalt test to Head Start and upper class children he found that perceptual and motor functioning is related in part to socio-economic class and may also interact to a lesser extent with verbal tasks.

In another study of visual motor perception and coordination Koppitz (1960) sampled 1,055 school children, ages 5 years to 10 years-5 months from different backgrounds using the Bender Gestalt as a developmental test. In using her own scoring system she found that the Bender Gestalt could serve as a very useful tool with young children in evaluating nonverbal intelligence. Her findings indicated a close relationship between the Bender Gestalt and the Wechsler Intelligence Scale for Children (WISC) performance intelligence

quotient (IQ) and the Arithmetic subtest score. She also found that the Bender Gestalt predicted first grade achievement very well and correlated well with readiness tests. Sex was not found to be a statistically significant variable using the Bender Gestalt test.

Another study by Koppitz (1958 a) examined the relationship between the Bender Gestalt and the WISC. Ninty children in the age range of 6 years-7 months to 11 years-7 months were tested with these two measures to ascertain if the performance on the Bender Gestalt is primarily a function of intelligence or if its functions are different from those measured by the WISC. Using the chi square a highly significant relationship was found between the Bender Gestalt and the WISC performance IQ, full scale IQ, verbal IQ, Arithmetic, and all performance subtests except Coding.

Koppitz (1958 b) also used the Bender Gestalt to differentiate between above average and below average children with learning disturbances because of problems in visual motor perception. In the study 128 children, ages 6 years-4 months to 10 years-8 months, who were students in grades one through four participated. Results of the study indicated that the Bender Gestalt test can differentiate significantly between below average students and above average students in the first four grades.

In another study Koppitz (1963) found that in a sample of 145 first grade students the Bender Gestalt scores which were obtained at the beginning of the first grade correlated

significantly with the first grade Reading and Arithmetic Achievement of the Metropolitan Achievement Test. Also a significant correlation between the total Metropolitan Achievement Test and the Bender Gestalt was maintained through the first three grades of school.

Dierks and Cushna (1969) examined sex differences with the use of the Bender Gestalt in which they used 487 children (age range 5 years-0 months to 16 years-7 months) from a clinic population. Each child was given an intelligence test, personality test, and the Bender Gestalt test. It was concluded that within the clinic population significant sex differences occurred on the results of the Bender Gestalt protocols with boys showing faster growth rates in visual motor performance than girls.

Miller, Linder, Loewenfeld, and Turner (1963) studied the reliability of the Bender Gestalt. Thirty Bender Gestalt protocols were scored, and it was concluded that the reliability among clinic raters was at an acceptable level (.88 to .96 correlation) when scoring protocols for these children five to ten years of age using the Koppitz method.

To aid in clarification of the associations between the Bender Gestalt and Wechsler scores Doubros and Mascarenhas (1969) investigated the relationships between these two tests. Seventy one emotionally disturbed children were randomly selected from a clinic listing. The Bender Gestalt was administered, and protocols were scored by two examiners. The WISC had been administered concurrently with the Bender Gestalt.

With a significant correlation of -.43 between the WISC full scale IQ and the Bender Gestalt Errors it was concluded that the more intelligent child will make fewer mistakes on the Bender Gestalt visual motor test than a child with lower intelligence. Another significant relationship was that of age and the Bender Gestalt scores. With a correlation of -.42 it was concluded that a better functioning performance on the Bender Gestalt resulted from increased chronological age. The WISC subtests which did not correlate significantly with the Bender Gestalt were Coding, Information, Comprehension, and Similarities.

Much research has been conducted with the WPPSI. Zimmerman and Woo-Sam (1970) studied the utility of the Wechsler Preschool and Primary Scale of Intelligence (WPPSI) in the public schools. A comparison of the Stanford Binet and the WPPSI was made with two groups of kindergarten and first grade children below superior level. It was stated that because the standardization sample included minority groups and the culturally deprived the WPPSI evolved as one of the better standardized measures available. Correlations between the WPPSI and the Binet were low ($r = .55$), and with the Binet versus either verbal or performance scales a correlation of .46 was obtained. These low correlations were attributed to a restriction of IQ variability.

Herman (1968) studied sex differences of the WPPSI standardization sample. He found a slight elevation of girls above boys in the area of performance IQ. No significant

effects of age, sex, or age X sex interaction were found thus indicating that no important sex differences occurred within the WPPSI. It was further suggested that performance IQ scores are achieved in different ways by boys and girls.

In a study of 32 children between the ages of 4 years-11 months and 5 years-11 months Fagan, Broughton, Allen, Clark, and Emerson (1969) compared the Binet with the WPPSI in a lower class population. The children were equally distributed racially with 16 black and 16 white children. A correlation coefficient of .80 was found between the two tests. Significant differences were found in the IQ scores obtained from the measure with the mean (95.2) of the Binet being eight points higher than the WPPSI. There were no significant differences between sex or race with the IQ scores. Thus, it was concluded that lower class children would appear to earn higher IQ scores on the Binet than with the WPPSI.

In a comparative study of the Binet and the WPPSI using culturally deprived children Barclay and Yates (1969) also indicated that the WPPSI seemed to be the more difficult test. Fifty culturally deprived Head Start children were tested. Correlation coefficients for the Stanford Binet IQ and the WPPSI full scale IQ, verbal IQ, and performance IQ scores were .81, .73, and .74.

McNamara (1969) studied the relationship between the WPPSI, the Bender Gestalt, and the Coloured Progressive Matrices using as subjects 42 black boys and girls who were enrolled

in a Head Start and Day Care Center in the South. Ages ranged from 4 years-8 months to 6 years-6 months. Children came from both rural and urban lower socio-economic homes. He found that the Bender Gestalt was significantly related to the WPPSI performance IQ scores, verbal IQ scores, and full scale IQ scores, as well as all subtests with the exception of Sentences, Comprehension, and Similarities. It was stated that the Bender Gestalt was closely related to the performance segment of the WPPSI and could be substituted for it with a good degree of accuracy for this age group. A higher correlation was found between the Bender Gestalt and the WPPSI full scale, verbal, and performance than was found on the Progressive Matrices. Only 9% of the WPPSI full scale variance was associated with the Progressive Matrices while 39% of the WPPSI full scale variance was in common with the Bender Gestalt. It was concluded that the Bender Gestalt was highly related to the performance scales of the WPPSI and can be more appropriately interchanged with the WPPSI than can the Progressive Matrices.

Human figure drawings as an assessment of intelligence have also been examined. Dunn (1967 b) studied human figure drawings using the Harris revision of the Draw A Person. He stated that as a widely used measure of intelligence the Harris revision is a more objective scoring system, uses deviation scores rather than mental age IQ terms, and provides alternate forms by providing a scoring system for the Draw A Woman. Vane (1967) criticized Harris' scoring system because

of insufficient material relating to the developmental differences at the younger age groups. There was also some disagreement in regard to sex differences found on the tests. Anastasi (1952) found in a study of the Goodenough Test that there were high IQ scores for five year old girls which she attributed to the scoring of items that were selected on an age-grade location favoring girls.

Harris (1963) found in younger children that the Draw A Man correlated higher with numerical aptitude and lower with perceptual speed and accuracy. Because the Draw A Man seemed to tap different skills at different ages it was recommended that measures of aptitude should be included in a testing battery with the Draw A Man.

Datta (1967) reported that when using the Draw A Person Test as a means of assessing intellectual functioning in low income children the Draw A Person was found to be a good indicator of intelligence. In this study 956 Head Start children were tested. It was concluded that ethnic group or sex did not affect the IQ score or the validity scale of the Goodenough-Harris scored figure drawings. Also the Peabody Picture Vocabulary Test (PPVT) was administered, and both the PPVT and the Draw A Person had mean IQ equivalents lower in the Head Start group than in the normative group. The lower standard scores derived from the Draw A Person suggested that it would not provide a culture fair measure of intelligence in a heterogeneous group but was a good indicator of intelligence

and less affected by ethnic background or sex than was the PPVT.

Oliver and Barclay (1967) investigated the characteristics of the Stanford Binet and the Goodenough-Harris tests with a sample of 188 culturally deprived children attending a Head Start program. A correlational study was conducted in order to assess the relationship between these two measures with a sample of children who scored in the "lower normal" level of intelligence. The Stanford Binet and the Goodenough-Harris Drawing Test did not correlate highly. This suggested the possibility that different skills were assessed by the two instruments. Another finding based upon an item analysis of the Stanford Binet was that for this population the Stanford Binet test items were accurately placed with age. The results of this study indicated a need to investigate the types of skills which are necessary for a Goodenough-Harris Drawing Test. For this particular population the Goodenough-Harris Drawing Test was not found to be an adequate measure of intellectual functioning. It was further suggested that the Goodenough-Harris Drawing Test might better correlate with a measure such as the WISC in which more diverse abilities are tapped.

Other investigations of drawing tests as a measure of intelligence have been conducted. A correlational study by Dunn (1967 a) compared the WISC and the Goodenough-Harris Drawing Test in order to study associated areas of intellectual ability on the two tests. The results of this study indicated that performance and spatial perception skills of the

WISC correlated higher with the Draw A Man than did verbal tasks.

Statement of the Problem

Investigators have tested numerous hypotheses concerning the disadvantaged child's potential as well as actual capabilities. Research has also been conducted to ascertain the best means of assessing the disadvantaged child's abilities and capabilities. Past research has investigated the assessment of both verbal and nonverbal abilities. A frequent research goal has been to find the type of battery and/or single measure which most accurately predicted achievement. This is true when working with a preschool child from a disadvantaged background in establishing an accurate battery or single measure for purposes of evaluation. However, such measures can be time consuming and costly. Therefore, the most efficient measure or combination of measures is needed for this type of assessment.

Since previous research has not clearly established the most efficient measure or battery of measures in the assessment of intelligence which can predict achievement for the culturally disadvantaged preschool child, it was felt that further study of the most frequently used measures was necessary. This study investigated the relationship between verbal and nonverbal measures of preschool children's cognitive functioning in order to select the most efficient means of assessing achievement potential in culturally disadvantaged preschool children.

Chapter II

Method

The focus of this study was an investigation of the efficiency of the WPPSI, DAP, and the Bender Gestalt or a combination of these measures as predictors of achievement for preschool children. The following methodology was utilized:

Subjects

The subjects (Ss) were 30 preschool children, 14 girls and 16 boys, who were enrolled in a Head Start program. The children resided in a rural or small town area of northern Kentucky. Each child had been enrolled in a Head Start program for at least eight months prior to this study and had been classified as culturally disadvantaged according to the family's socio-economic status. Ages of the children ranged from 5 years-0 months to 6 years-7 months with the mean age of 5 years-6 months.

The 30 children were selected from two Head Start classes which were divided according to age with one class for four year olds and another for five year olds. All children were included in this study whose chronological age was within the range (5 years-0 months to 6 years-7 months) suitable for the evaluation measures which were investigated.

Instruments

All children in the sample were administered the Peabody Individual Achievement Test (PIAT) developed by Dunn (1970) as a measure of current achievement. The PIAT was selected because it was designed to be more selective and sensitive at the lower levels according to age and grade, and was, therefore, appropriate for this study. Also the PIAT is an untimed power test which is individually administered. Administration and scoring are quick. The test was designed so that no academic skills other than the ones being specifically measured would be required. Optimal test performance is further enhanced because of the minimal demands made upon expressive and language skills. The four skills utilized at the kindergarten level were: mathematics, reading recognition, spelling, and general information. Standard scores were obtained from the test manual based upon the total raw score (Dunn, 1970).

Each child was also administered the Wechsler Preschool and Primary Scale of Intelligence (WPPSI) (Wechsler, 1967). The WPPSI is an intelligence test for the child 3 years-10 months through 6 years-7 months of age. The WPPSI utilized the deviation IQ concept where one can convert subtest raw scores to scale scores. The subtest scale scores are then converted to verbal, performance, and full scale deviation intelligence quotients. The administration of the WPPSI differs from the WISC because the verbal and performance subtests are intermixed in their order of administration on

the WPPSI. Each of the ten subtests were administered to each child. The administration time was approximately one hour per child. Full scale IQ, verbal IQ, and performance IQ scores were derived from the tables found in the test manual (Wechsler, 1967).

The Goodenough-Harris Drawing Test (Harris, 1963) was also administered to each subject. This test was selected because it is a frequently used test which makes minimal demands upon language. Another reason for the selection of the Goodenough-Harris Drawing Test (GHDT) was that it measured the child's ability to form concepts. For the young child these concepts largely consist of directly experienced concrete objects, an ability which is thought to be related to achievement (Harris, 1963). Each subject was seen individually and instructed to draw a man. The drawings were scored by Harris' (1969) revision of the Goodenough IQ scale, and the scores used in all data analyses were standard scores.

A fourth test which was administered was the Bender Gestalt Test for children (Koppitz, 1963). The Bender Gestalt was utilized because it too was a very frequently used nonverbal test which gives a quick estimate of the child's intellectual functioning. The Gestalt drawings are thought to reflect a maturation level of visual-motor perception. Closely associated with this has been language ability as well as other intellectual functions of a young child. Some of the resources which would be tapped included visual perception, memory, motor coordination, spatial concepts, and representation

(Koppitz, 1963). Each child was administered this test individually. The test was scored by the Developmental Bender Scoring System, and number of errors was used in all data analyses.

Procedure

Each of the four tests were individually administered to each child by the same examiner (See Appendix A for obtained scores). Sessions included both a morning and afternoon block of time. The tests were administered at the Head Start center in an unoccupied classroom. The order of administration of tests varied, but only one test was administered at each session. Prior to the beginning of each test a working rapport was established with each child. All of the children seemed to be comfortable and were highly motivated to participate in the testing sessions.

Design and Statistical Analysis

Treatment of the data involved the use of Pearson Product Moment correlations. The data were analyzed by separate Pearson Product Moment correlations between the intelligence measures, subtests, and the criterion measure of achievement. Also the data were analyzed by means of multiple regressions. The PIAT was the dependent variable, and the 15 intellectual factors were the independent predictor variables.

Hypothesis

The null hypothesis associated with each of the 15 correlation coefficients was that no statistically significant correlations would be obtained between the verbal and nonverbal

assessment measures and the measure of achievement. Also in terms of the multiple regressions it is hypothesized that a combination of tests or subtest scores would account for a significantly greater percent of the variance than any single test. The most efficient battery of tests or subtests would be that which is least difficult to administer and score as well as that which accounted for the greatest part of the achievement variance. Correlation coefficients which differed from a zero correlation at or beyond the .05 level were considered significant.

Chapter III

Results

For the purpose of statistical analysis it was hypothesized that none of the 15 correlation coefficients would significantly differ from a zero correlation. In other words the verbal and nonverbal intellectual tests as predictors were not significantly related to the achievement predictor. The obtained correlation coefficients are presented in Table 1.

The obtained correlation coefficient which was significant was that of the Bender Gestalt Errors versus PIAT standard scores. A relationship between it and the criterion measure was -.58. This indicated that of all the verbal and nonverbal measures utilized the Bender Gestalt correlated best with the criterion measure. The Bender Gestalt correlated significantly with the PIAT while nonsignificant correlations were found with the WPPSI and its subtests as presented in Table 1.

Intercorrelations between the verbal and nonverbal measures of assessment are shown in Table 2. Mean scores, standard deviations, and the range of the scores are also presented in Table 2. The differences between the means for the WPPSI full scale, verbal, and performance as well as the Draw A Man do not appear to be great. However, the PIAT mean standard

TABLE 1

Correlation Coefficients Between the PIAT and the Verbal-Nonverbal Measures of Intellectual Functioning (N = 30)

Measure	Pearson r's
Draw A Man	.16
Bender Gestalt Errors	-.58*
WPPSI Full Scale	.01
WPPSI Verbal	.04
WPPSI Performance	-.02
Information	.18
Vocabulary	.14
Arithmetic	-.13
Similarities	-.03
Comprehension	.06
Animal House	.14
Picture Completion	-.12
Mazes	-.14
Geometric Design	-.08
Block Design	.12

*$p < .05$

score appears to be much lower than the other measures. The mean Bender score can not be directly compared since it is not expressed as a standard score but is expressed as an error score. There is also little variation among the WPPSI scales in regard to the mean scores of each.

Only one of the correlations shown in Table 2 was statistically significant. The correlation coefficient of the Draw A Man and the WPPSI verbal IQ was significant.

The results of the multiple regression analysis of the verbal and nonverbal variables on the criterion predictor variable are presented in Table 3. The multiple regression for the total sample accounted for 65% of the variance in predicting achievement as measured by the PIAT leaving 35% unaccounted for. In Table 3 it is indicated that for the combined sample Bender Gestalt Errors accounted for 34% of the variance. The WPPSI Information subtest accounted for 10% of the variance. The addition of the WPPSI Arithmetic subtest accounted for another 7% of the variance, and also 4% more of the variance was accounted for by the WPPSI Block Design subtest. An additional 3% of the variance was added with the WPPSI Picture Completion subtest. The remaining variables contributed negligibly in accounting for the achievement variance. These findings indicated that the Bender Gestalt accounted for the greatest proportion of the variance, while the WPPSI Information and Arithmetic subtests also accounted for additional variance of the WPPSI. The remainder

TABLE 2

Mean, Standard Deviation, Range, and Pearson Product Moment Correlation of the scaled scores of the WPPSI with the Draw A Man and the Bender Gestalt
(N = 30)

	WPPSI			D.A.M.	Bender
Test	Mean	SD	Range	r	r
Information	8.73	2.16	5-14	-.18	.22
Vocabulary	7.70	2.42	4-15	-.17	.01
Arithmetic	9.33	2.44	5-14	-.13	.15
Similarities	8.30	3.71	3-18	-.42	.21
Comprehension	8.07	2.42	4-13	-.26	.17
Animal House	8.37	3.22	4-19	.03	-.06
Picture Completion	9.00	3.12	4-16	-.13	.19
Mazes	9.57	3.32	3-17	.16	.03
Geometric Design	10.27	2.45	7-16	.23	-.04
Block Design	8.03	2.89	2-14	-.18	.02
Verbal IQ	90.00	13.44	74-126	-.31*	.19
Performance IQ	93.53	17.14	66-138	.02	.04
Full Scale IQ	90.87	15.20	70-123	-.15	.12
Mean				90.80	14.27
SD				15.86	3.16
Range				65-130	8-20

PIAT Mean SS = 79.43

*$p < .05$

TABLE 3

Prediction of Achievement as measured by the PIAT
Using Multiple Regression Analysis

Total Sample
(N = 30)

Test	r	R	Increase in R^2	Total R^2
Bender Errors	-.58*	.58	.34	.34
WPPSI Information	.18	.66	.10	.44
Arithmetic	-.13	.71	.07	.51
WPPSI Block Design	.12	.74	.04	.55
Picture Completion	-.12	.76	.03	.58
Mazes	-.14	.77	.01	.59
Draw A Man	.16	.78	.02	.61
Vocabulary	.14	.79	.01	.62
Comprehension	.06	.80	.01	.63
Geometric Design	-.08	.80	.01	.64
Similarities	-.03	.81	.01	.65
Animal House	.14	.81	.00	.65

*$p<.05$

of the variables accounted for only a very small portion of the variance.

Chapter IV

Discussion

In this study the only single measure which predicted achievement at a statistically significant level was the Bender Gestalt. While previous research has reported findings of significant relationships between the WPPSI, WISC, and the Bender Gestalt the present study does not support those findings.

The results of the present study were contradictory with the findings of McNamara (1969) in which he stated that the Bender Gestalt correlated significantly with the WPPSI. McNamara found that 39% of the WPPSI full scale variance was common with that of the Bender Gestalt. Also the Bender Gestalt significantly correlated with the WPPSI verbal, performance, and the full scale IQ scores as well as WPPSI subtests except Comprehension and Similarities in McNamara's study. Contrary to McNamara's findings (1969) the Bender Gestalt did not correlate significantly with the verbal, performance, or full scale IQ of the WPPSI in the present study.

Koppitz's study (1960) indicated a significant relationship between general intelligence as measured by the WISC and the Bender Gestalt in young children which is not consistent

with the findings of this study which found no relationship between general intelligence measured by the WPPSI and the Bender Gestalt.

The finding that the Draw A Man test correlated significantly with the verbal IQ of the WPPSI supported Dunn's (1967) conclusion that the Draw A Man taps only limited areas of intellectual functioning. These results would suggest that the Draw A Man should be thought of as a verbal rather than nonverbal test although it makes minimal demands upon verbal expression.

The multiple regression analyses performed on the data in this study indicated that the Bender Gestalt could be utilized or even substituted for the WPPSI and the DAP to obtain a moderate degree of prediction for this age level. In agreement with McNamara's study (1969) the Bender Gestalt does provide a reasonable estimate of intellectual functioning. These results are also in agreement with Koppitz's findings (1960) that the Bender Gestalt for young children is a very appropriate and useful tool for evaluating nonverbal intelligence.

Chapter V

Summary and Implications

This study attempted to examine the relationship between measures of intelligence and achievement to find the most efficient means of predicting current achievement in culturally deprived preschool children. Three frequently used intelligence tests were utilized to examine this relationship.

Of the 15 correlations between measures of intelligence and achievement obtained for this study only one was significant ($p<.05$). This correlation indicated that there was a relationship between the Bender Gestalt and current achievement. Both the Bender Gestalt and the PIAT tap tasks of perception. The Bender Gestalt as a predictor emphasizes traits of perception and integration, and it shows strength as an achievement predictor.

It can be concluded that the Bender Gestalt is a better predictor of achievement for a sample of culturally deprived preschool children than any of the other intelligence tests used in this study. The most efficient battery of tests would be made up of the Bender Gestalt plus the WPPSI Information, Block Design, and Arithmetic subtests which accounted for 55% of the variance in achievement. The Bender Gestalt, scored

by errors, takes approximately 15 minutes to administer and two minutes to score; and it becomes a quick predictor of achievement potential. The Draw A Man test did correlate significantly with two subtests of the WPPSI, but does not account for enough unique variance to justify its inclusion in an achievement predictor battery. In this study the Bender Gestalt correlated significantly as a predictor while the WPPSI did not.

The Geometric Design subtest of the WPPSI did not correlate significantly with the Bender Gestalt in this sample. While the Bender Gestalt and the WPPSI apparently measure some of the same skills these two measures did not correlate significantly. Further research is needed to determine reasons for the nonsignificant relationship between the Bender Gestalt and the Geometric Design subtest of the WPPSI with a sample such as the one used in this study.

While the Draw A Man test is quick to administer and score it did not correlate significantly with the PIAT as a nonverbal predictor of academic functioning. Therefore, for an efficient battery of tests one would conclude from this study that the Draw A Person would be omitted if there were an interest in achievement.

With a Head Start program such as this sample a battery consisting of these four measures, the WPPSI Information, Block Design, and Arithmetic Subtests, with the Bender Gestalt should be administered for the most efficient battery to predict the level of academic functioning.

This study was but one in a long series of correlational research studies which found significant relationships among intelligence tests. This study investigated only the relationships without attempting to determine cause and effect. Therefore, further research is needed to investigate the cause and effect for a high risk sample such as the one used in this study.

Further research should involve longitudinal study with the sample of children used in the present study for approximately three to five years to determine if the same results would be obtained as the children progressed into public schools. It would be important to determine if the current measures of ability as assessed by the Bender Gestalt in this study would correlate with achievement over a longer time period. This type of study is needed to determine whether or not the Bender Gestalt is a good and valid predictor of achievement for school age as well as preschool children. It would also be important to study other samples to determine if there is a relationship between training and treatment programs and achievement. The results obtained in this study could be a function of the particular Head Start training which is being experienced by the children. One possibility would be to sample kindergarten students who have not had previous enrichment programs and determine if the relationship would be the same and which measures of intelligence are the most accurate indicators of present achievement.

Further research with these tests is needed with similar high risk populations such as the one used in this study to determine if the obtained results would remain constant. Another area of research with larger samples could be one which examines the possibility of the sex differences which might affect the choice of tests which make up the most efficient achievement prediction battery.

One limitation in this study was the possible restriction of sample variance because of the homogeneous nature of the population and intact sample. It is possible that these obtained relationships were underestimates of the variance for a more general population.

Since, at best, only 65% of the achievement variance is accounted for in the results of this study, it is possible that the PIAT could in itself be the best single predictor of future achievement. This would involve a longitudinal study with the present sample.

APPENDIX A

SUBJECT'S RAW SCORES, STANDARD SCORES, SCALED SCORES, AND ERRORS

Ss	PIAT RS	PIAT SS	DAP SS	BG ERRORS	WPPSI FS SS	WPPSI VERBAL SS	WPPSI PERFORMANCE SS
1	52	89	130	10	79	80	82
2	39	77	73	16	122	126	112
3	26	69	93	12	108	107	107
4	52	89	107	8	109	91	127
5	34	72	70	17	97	92	103
6	29	69	96	14	81	75	91
7	45	86	93	13	81	79	88
8	33	72	98	13	109	100	118
9	32	72	110	16	81	77	89
10	46	86	65	13	105	115	93
11	33	72	65	18	106	97	114
12	28	69	83	20	86	82	93
13	24	65	86	17	84	82	89
14	38	77	110	14	81	81	85
15	35	77	96	16	90	82	100
16	25	69	86	19	85	84	89
17	18	65	86	18	90	95	86
18	41	86	93	19	101	105	96
19	51	89	98	13	123	105	138
20	47	86	72	9	70	76	69
21	54	89	87	13	72	77	72
22	54	89	77	13	81	87	78
23	35	77	82	15	73	85	66
24	44	82	115	17	88	95	84
25	48	86	104	13	78	81	78
26	47	86	75	14	79	84	78
27	53	89	112	11	97	92	101
28	37	77	99	14	82	80	88
29	47	86	86	8	73	74	78
30	49	86	77	15	115	114	114
Mean	40.13	79.43	90.80	14.27	90.87	90.00	93.53
SD	10.35	8.31	15.86	3.16	15.20	13.44	17.14

References

Ames, L. Children with perceptual problems may also lag developmentally. Journal of Learning Disabilities, 1969, 2, 205-208.

Anastasi, A., and D'Angelo, R. A comparison of Negro and white preschool children in language development and Goodenough Draw-A-Man IQ. Journal of Genetic Psychology, 1952, 81, 147-65.

Barclay, A., and Yater, A. Comparative study of the Wechsler Preschool and Primary Scale of Intelligence and the Stanford-Binet Intelligence Scale, Form L-M, among culturally deprived children. Journal of Counseling and Clinical Psychology, 1969, 33, 257.

Datta, L. Draw-A-Person Test as a measure of intelligence in preschool children from very low income families. Journal of Consulting Psychology, 1967, 31, 626-630.

Dierks, D., and Cushna, B. Sex differences in the Bender Gestalt performance of children. Perceptual and Motor Skills, 1969, 28, 19-22.

Doubros, S., and Mascarenhas, J. Relations among Wechsler full-scale scores, organicity-sensitive subtest scores and Bender-Gestalt errors scores. Perceptual and Motor Skills, 1969, 29, 719-722.

Dunn, J. Inter and intra-reliability of the new Harris-Goodenough Draw-A-Man Test. Perceptual and Motor Skills, 1967, 24, 269-270. (a)

Dunn, J. Manual for the Peabody Individual Achievement Test. Nashville, Tennessee: Peabody, 1970.

Dunn, J. Validity coefficients for the new Harris-Goodenough Draw-A-Man test. Perceptual and Motor Skills, 1967, 24, 299-301. (b)

Fagen, J. and Broughton, E., Allen, M., Clark, E., and Emerson, P. Comparison of the Binet and WPPSI with lower-class five-year olds. Journal of Counseling and Clinical Psychology, 1969, 33, 607-609.

Feather, B. and Olson, W. Children, psychology, and the schools. Glenview, Illinois: Scott, Foresman, and Company, 1969.

Harris, D. Manual for the Goodenough-Harris Drawing Test. New York: Harcourt, Brace, and World, Inc., 1963.

Hartup, W. and Smothergill, N. The young child. Washington D.C.: National Association for the Education of Young Children, 1967.

Herman, D. A study of sex differences on the Wechsler Preschool and Primary Scale of Intelligence. American Psychological Association Proceedings, 1968, 3, 455-456.

Hildreth, G. The simplification tendency in reproducing designs. Journal of Genetic Psychology. 1944, 64, 329-333.

Koppitz, E. Relationships between the Bender Gestalt Test and the Wechsler Intelligence Test for Children. Journal of Clinical Psychology, 1958, 14, 413-416. (a)

Koppitz, E. The Bender Gestalt and learning disturbances in young children. Journal of Clinical Psychology. 1958, 14, 292-295. (b)

Koppitz, E. The Bender Gestalt test for children: A normative study. Journal of Clinical Psychology. 1960, 16, 432-435.

Koppitz, E. The Bender Gestalt Test for young children. New York: Grune and Stratton, Inc., 1963.

Lichtenberg, P. and Norton, D. Cognitive and mental development in the first five years of life. Maryland: National Institute of Mental Health, 1972.

McNamara, J. and Porterfield, C. and Miller, L. The relationship of the Wechsler Preschool and Primary Scale for Children with the Coloured Progressive Matrices (1956) and the Bender Gestalt Test. Journal of Clinical Psychology, 1969, 25, 65-68.

Miller, L., Linder, R., Loewenfeld, R., and Turner, J. Reliability of Koppitz scoring system for the Bender Gestalt. Journal of Clinical Psychology. 1963, 19, 211.

Oliver, K. and Barclay, A. Stanford-Binet and Goodenough-Harris Test performances of Head Start children. Psychological Reports. 1967, 20, 1175-1179.

Rogers, D. Readings in child psychology. Belmont, California: Brooks/Cole Publishing Company, 1969.

Vane, J. An evaluation of the Harris revision of the Goodenough Draw-A-Man Test. Journal of Clinical Psychology. 1967, 23, 375-377.

Wechsler, D. Manual for the Wechsler Preschool and Primary Scale of Intelligence. New York: Psychological Corporation, 1967.

Wise, J. Stick copying of designs by preschool and young school-age children. Perceptual and Motor Skills. 1968, 27, 1159-1168.

Zimmerman, I. and Woo-Sam, J. The utility of the Wechsler Preschool and Primary Scale of Intelligence in the public school. Journal of Clinical Psychology. 1970, 26, 472.