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CORRELATIONS OF THE SCORES OF LOW VISION CHILDREN ON THE PERKINS-BINET TESTS OF INTELLIGENCE FOR THE BLIND, FORM U; THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN - REVISED, VERBAL SCALE; AND THE WIDE RANGE ACHIEVEMENT TEST

The Ohio State University

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CORRELATIONS OF THE SCORES OF LOW VISION CHILDREN
ON THE PERKINS-BINET TESTS OF INTELLIGENCE FOR THE BLIND, FORM U;
THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN-REVISED,
VERBAL SCALE; AND THE WIDE RANGE ACHIEVEMENT TEST

DISSertation

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
Jo Ellin Gutterman, B.A., M.Ed.

* * * * *

The Ohio State University
1983

Reading Committee:
Dr. Judy Genshaft
Dr. James Collins
Dr. Marjorie Ward

Approved By
Advisor
Department of
Human Services Education
To Bob,
without whose love and support
life would not be as wonderful.
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VITA

PERSONAL DATA:

February 6, 1953 ................... Born - Norfolk, Virginia

EDUCATION:

1971 - 1975 ...................... Ohio University
B.A. in Psychology

1975 - 1978 ...................... University of Cincinnati
M.Ed. in School Psychology
State certification in
School Psychology

1980 - 1983 ...................... The Ohio State University
School Psychology
Doctoral Program

WORK EXPERIENCE:

1977 - 1978 ...................... Intern School Psychologist
Hamilton County Schools,
Cincinnati

1978 - 1979 ...................... School Psychologist
Cincinnati Public Schools,
Auxiliary Services

1979 - Present .................. School Psychologist
Columbus Public Schools

1981 - 1982 ...................... Graduate Research
Associate, Faculty for
Exceptional Children,
The Ohio State University

PROFESSIONAL ORGANIZATIONS:

National Association of School Psychologists
School Psychologists of Central Ohio
Association for Education of the Visually Handicapped
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEDICATION</td>
<td>ii</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>iii</td>
</tr>
<tr>
<td>VITA</td>
<td>iv</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vii</td>
</tr>
<tr>
<td><strong>I. INTRODUCTION</strong></td>
<td>1</td>
</tr>
<tr>
<td>Overview</td>
<td>1</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>1</td>
</tr>
<tr>
<td>Operational Definitions of Terms</td>
<td>3</td>
</tr>
<tr>
<td><strong>II. REVIEW OF THE LITERATURE</strong></td>
<td>5</td>
</tr>
<tr>
<td>Intelligence Testing</td>
<td>5</td>
</tr>
<tr>
<td>Verbal Testing of the Visually Handicapped</td>
<td>9</td>
</tr>
<tr>
<td>Performance Testing of the Blind</td>
<td>14</td>
</tr>
<tr>
<td>Reliability of Measurements</td>
<td>16</td>
</tr>
<tr>
<td>Achievement Tests</td>
<td>21</td>
</tr>
<tr>
<td>Prediction of Academic Achievement</td>
<td>25</td>
</tr>
<tr>
<td>Purpose</td>
<td>30</td>
</tr>
<tr>
<td><strong>III. METHODOLOGY</strong></td>
<td>34</td>
</tr>
<tr>
<td>Subjects</td>
<td>34</td>
</tr>
<tr>
<td>Instruments</td>
<td>41</td>
</tr>
<tr>
<td>Examiner</td>
<td>43</td>
</tr>
<tr>
<td>Procedure</td>
<td>43</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>44</td>
</tr>
<tr>
<td><strong>IV. RESULTS</strong></td>
<td>46</td>
</tr>
<tr>
<td>Hypothesis I</td>
<td>46</td>
</tr>
<tr>
<td>Hypothesis II</td>
<td>49</td>
</tr>
<tr>
<td>Hypothesis III</td>
<td>52</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table Page

1. Validity Correlations of Intelligence Tests ................................................ 31
2. Subjects by Grade, Sex, Race and Program Location .................................. 35
3. Demographic Data ................................................................................... 36
4. Means and Standard Deviations of the Perkins-Binet, Form U and the WISC-R, Verbal Scale by Grade Level ........................................................... 47
5. Test of Homogeneity of Variance ................................................ 48
6. Correlations of the Perkins-Binet, Form U and the WISC-R, Verbal Scale by Grade Level ............................................................... 49
7. Means and Standard Deviations of the WRAT by Grade Level ................. 50
8. Correlations of the Perkins-Binet, Form U and the WRAT by Grade Level ............... 51
9. Correlations of the WISC-R, Verbal Scale and the WRAT by Grade Level ................................................................. 53
10. Test for Correlation of Coefficients of Correlation ........................................ 55
11. Predictors, R Squares, and F Values for Regression Models .................. 56
Chapter I

INTRODUCTION

Overview
This study reports the correlations of the scores of low vision children on the Perkins-Binet Tests of Intelligence for the Blind, Form U; the Wechsler Intelligence Scale for Children-Revised, Verbal Scale; and the Wide Range Achievement Test. The introductory chapter contains an overview, a statement of the problem, and operational definitions. Chapter II contains a review of the literature on intelligence testing, verbal testing of the visually handicapped, performance testing of the blind, reliability of measurements, achievement testing, and prediction of academic achievement. The chapter concludes with a statement of purpose and the hypotheses of the study. Chapter III presents the methodology and Chapter IV reports the results of the research. In Chapter V are interpretations of the results of the study, and recommendations for future investigations.

Statement of the Problem
Since the early 1900's psychologists have tested the visually handicapped in order to assess their intellectual potential. Until recently there has been little choice in the selection of test instruments. The most commonly accepted method for evaluating
visually handicapped children employed the Wechsler Verbal Scale (WISC) (Goldman & Duda, 1978). Due to the widespread use among assessors of the visually handicapped the Wechsler Verbal Scales achieved a level of perceived suitability. Wechsler, in the 1939 edition of his scales, reported that the Verbal Scale of the WISC was suitable for use with blind subjects because of the scale's oral presentation. Wechsler's words proved influential. In a 1967 study, Bauman (1968) reported that the verbal scale of the WISC or the WAIS was administered to approximately 9000 visually handicapped children and adults each year. In 1979 Bauman and Kropf surveyed state agencies serving the visually handicapped, residential schools and large private agencies for the blind. Results indicated that the Wechsler Verbal Scales continued in their popularity.

The use of a verbal intelligence scale to test the overall general intelligence of the visually handicapped was open to significant criticism. Cutsforth (1951) wrote extensively about the concept he called verbalism, the belief that many blind persons develop pseudo-verbal skills which can inflate verbal mental measurements. He believed that the visually handicapped person's use of words without adequate experiential referents resulted in spuriously high scores. Other criticism pointed out that norms had never been provided for the visually handicapped (Goldman, 1970; Warren, 1977). There was also concern due to the inappropriateness of particular test items (What should you do if you see thick smoke coming
from the window of your neighbor's house?) as well as the absence of any performance or tactile tasks (Bateman, 1965).

Carl Davis, author of the Perkins-Binet Tests of Intelligence for the Blind (1980), sought to overcome the weaknesses inherent in the verbal testing of the visually handicapped and to provide a meaningful test of intellectual assessment for the visually handicapped child. Davis (1962, 1970) reported the development of this tool which incorporated items calling for tactual perception and organization. In addition, Davis (1980) developed norms for children with usable vision as well as for those with nonusable vision. Davis's standardization sample included residential and day students and approximately the same number of males and females. This group of 2153 individuals represented 13 percent of the total population of visually handicapped students in the country.

However, previous to the publication of the Perkins-Binet in 1980 and up until the present, virtually no normative data were available. This present study provided normative data for the Perkins-Binet. The research examined the correlations of the scores for low vision children on the Perkins-Binet Tests of Intelligence for the Blind, Form U; the Wechsler Intelligence Scale for Children-Revised, Verbal Scale; and the Wide Range Achievement Test.

**Operational Definitions of Terms**

The definitions which follow were used in this study.

**VISUAL IMPAIRMENT** means any clinically diagnosable deviation in the structure or functioning of the tissues or parts of the eye (Barraga, 1976).
VISUALLY HANDICAPPED means a visual impairment which, even with
correction, adversely affects a child's educational performance.
This term includes both low vision and blind children (Ohio Department
of Education, 1982).

BLIND means only light perception without projection, or
totally without the sense of vision (Faye, 1970).

LOW VISION means a) a visual impairment, not primarily
perceptual in nature, resulting in a measured acuity of 20/70
or poorer in the better eye with correction or b) a physical eye
condition that affects visual functioning to the extent that special
education placement, materials and/or services are required in an
educational setting (Ohio Department of Education, 1982).
Chapter II
REVIEW OF THE LITERATURE

Intelligence Testing

The early experimental psychologists of the nineteenth century applied themselves to the development of a formal generalized description of human behavior (Anastasi, 1976). With a background in physiology and physics these psychologists were primarily concerned with reaction time and sensitivity to sensory stimuli (Cronbach, 1949). Initial studies focused on the simplest elements of human behavior. Wundt, who is credited with establishing the first psychological laboratory, tested elementary reactions that could be precisely defined using accurately controlled stimuli. Wundt was soon followed by Francis Galton of England who developed the first large, systematic body of data on individual differences. As a result of his contributions and his activism many of his contemporaries, working in the area of assessment, followed his scientific approach.

In the United States James Cattell also was involved in the development of psychological testing. He shared Galton's view that a measure of intellectual function could be obtained through tests of sensory discrimination and reaction time. Anastasi (1976)
reported that Cattell was credited with the initial use of the concept
"mental test" as it was applied to the determination of intellectual
level in college students. This mental test would be administered
individually and included measures of muscular strength and weight
discrimination. Studies in human behavior were also being conducted
in France. Approaches included the analysis of handwriting and
the measurement of cranial and facial form (Wolf, 1973).

By 1895 those who had studied human behavior were beginning to
shift their focus from simple to more complex functions. Alfred
Binet, director of the Laboratory of Physiological Psychology at the
Sorbonne, criticized the early tests of mental measurement as being
too largely sensory and placing too much emphasis on simple specialized
abilities. He suggested that tests should instead cover functions
such as memory, imagination, attention, and comprehension. Binet
saw his theories put to the test when he was appointed to direct
a commission to study procedures for the education of retarded
children. He sought to move the least capable children into special
schools in which they could be taught a simplified curriculum.
Binet was asked to produce a test to provide an objective manner by
which to distinguish these children.

In collaboration with Theodore Simon, Binet devised 30
objective tests to differentiate mentally retarded children from
the normal population. The result, published in 1905, was the first
Binet-Simon Scale. The 30 problems were arranged in ascending order
of difficulty. Difficulty level was determined by administering the test to 50 normal children. The test items emphasized judgment, comprehension, and reasoning. The second Binet-Simon Scale followed in 1908. Then the number of tests was increased and all tests were grouped by age level based on the performance of approximately 300 normal children. The retarded child's score on the entire test was then expressed as a "mental level" corresponding to the age of the normal children whose performance they equaled. A third revision of the scale was published in 1911. Refinements were minor but included the extension of the scale to the adult level and the removal of tasks such as reading and writing which were primarily dependent on scholastic abilities.

From their initial publication the Binet-Simon Scales were recognized as being extremely valuable for the diagnosis of mental retardation (Sattler, 1982). The scales became popular in many countries including France, England, Sweden, and the United States. One of the first psychologists in the United States to make use of the Binet-Simon Scales was H. H. Goddard, Director of the Psychological Laboratory at the Vineland Training School. He introduced the 1905 scale to the United States in 1908 and two years later he introduced the 1908 Scale after revising and standardizing it on 2000 American children. At that point the scale was still being used only for the evaluation of retarded children.

Terman (1911) observed that the 1908 scale was of great practical value but he believed that still additional tests were needed to
supplement the results. He also was interested in the applicability of the Binet-Simon Scale to normal school children. After studying revisions by Goddard he collaborated on a tentative revision of the Binet-Simon Scale in 1912 (Terman & Chiles, 1912). This revision was extended, modified, and published in 1916 as the Stanford-Binet. In the 1916 revision Terman included the concept of mental quotient, which was derived by dividing the mental age by the chronological age. He named this ratio the intelligence quotient.

Two other revisions of the Binet-Simon Scales were also published. One was by Yerkes, Bridges, and Hardwick (1915) in which the Binet-Simon scale was rearranged into a point scale format to facilitate the measurement of mental development. The second was by Kuhlman (1922) who standardized the test on children below the age of three. In 1937 another revision added additional items, mostly of a performance nature. This significantly enlarged the pool of items so as to permit the publication of two interchangeable tests. The 1937 revision was supplanted in 1960 when Form L and Form M were combined into one new form. Also at this time, the conventional IQ ratio was replaced by the deviation IQ. This latter IQ score is a normalized standard score based on a mean of 100 and a standard deviation of 16. The deviation IQ was a better control of the variability in IQ distributions that existed in the various levels of the former revisions. The latest revision of the Stanford-Binet, Form L–M was published in 1972. Only minor changes occurred in the
test material, while major changes were made in the standardization population. Thus over the last eighty years our conceptualization of intelligence has been demonstrated through the use of the Binet Scales.

Verbal Testing of the Visually Handicapped

In the early 1900's R. B. Irwin, Supervisor of the Department of the Blind for the Cleveland Public Schools, recognized the problem of the seemingly large numbers of retarded children in programs for the visually handicapped. In 1914 Irwin, who was himself blind, approached H. H. Goddard to discuss adapting Goddard's new test for use with blind children. Irwin used as his base Goddard's translation of the Binet-Simon Scales. Items inappropriate for use with visually handicapped subjects were eliminated and additions were made from other popular tests. Irwin made changes in age levels at which particular items appeared according to his personal judgment. In order to obtain normative data on his adaption of the Goddard-Binet, which Irwin called the Irwin-Binet, he arranged that the test be given to blind children in Toledo, Cleveland, and Pittsburgh during the 1914-1915 school year.

Irwin's test was also used at the Ohio State School for the Blind by T. H. Haines. Haines thought that a point scale format would be more efficient and informative than an age scale. He believed that a large standardization sample was necessary to make an accurate determination of the age at which a particular item should appear. Without that large sample the validity of the test
would be in question. On a point scale items of a similar nature are grouped together. The final score represented the sum of correct responses on the entire scale. The Wechsler scales are arranged in this manner. Haines believed, particularly with the population of visually handicapped subjects, that total points on a test were a much fairer measure of intelligence than an age scale comparison. On an age scale one was required to compare the age at which a visually handicapped child performed a task in relationship to a sighted child. Using the Yerkes-Bridges Point Scale as the structured model and the material Irwin adapted for the substantive body of the instrument, Haines introduced the Point Scale for the Blind (1916). The Point Scale for the Blind allowed Haines to identify the mentally deficient child. It also showed that on the average visually handicapped children matched their sighted peers in mental ability.

As a result of this initial research, conferences were held and meetings called in an attempt to learn more about blindness. Interest in psychological testing took concrete form at the Perkins Institution and the Overbrook School in 1916. Samuel P. Hayes, Chief of Psychological Research at both schools, directed the assessment activities. By 1923, testing of visually handicapped children occurred nationwide. As assessment data existed on more than 1200 blind and low vision children Hayes determined that standardization data were sufficient enough to formally issue a test guide. Hayes used Terman's Condensed Guide for the Stanford Revision of the Binet-Simon Intelligence Scale in conjunction with the Irwin-Binet. This
involved adjustments to Terman's Revision in order to meet the particular assessment needs of the visually handicapped. The adjustments themselves came from Irwin's work. Hayes' work is called the "Scissors and Paste Guide" (1923) taking its name from the fact that he used Terman's Condensed Guide for the Stanford Revision of the Binet-Simon Intelligence Scale and the Irwin-Binet to construct this makeshift instrument.

Over the next seven years Hayes collected data from 1100 additional protocols. From an item analysis he was able to adjust the placement of particular items so that a normal distribution of scores that approximated that of the sighted population could be obtained. He also added additional items so that the six subtests as well as alternate items were available at each age level. This allowed for a more substantive instrument in the form of the Condensed Guide, Adapted for Use With the Blind (Hayes, 1930). The 1930 Guide was widely employed but not with complete satisfaction. Standardization was weak and scores were unreliable due to the limited number of available subjects at either end of the intelligence score spectrum. In addition, due to the practice of frequent re-evaluations, test items quickly became memorized and exchanged among the students.

In 1942 Hayes proposed alternative scales for the intellectual assessment of the visually handicapped as a solution to these two problems, as well as to several others he believed were critical. He observed that a considerable number of pupils did not show their real
abilities upon entry into schools for the blind. Teachers frequently reported a "blossoming out" over the course of several years which Hayes attributed to the particular opportunities provided by the school. As well, Hayes believed that the 1916 Stanford Revision suffered from defects removed in the Terman and Merrill revision of 1937 but not yet incorporated in the assessment of the visually handicapped. His proposed solution was to use the Wechsler-Bellvue Intelligence Test (Wechsler, 1946) which, in addition to solving the aforementioned problems, also allowed a direct comparison of visually handicapped to sighted persons. Though no data were presented to support his assertion, Wechsler (1939) himself stated that his verbal scales were suitable for use with the blind.

The Terman-Merrill Revision of the Binet served as the primary source from which Hayes developed the Interim Hayes-Binet (IH-B) (Hayes, 1943). As a result of his extensive work with visually handicapped children, Hayes believed that age of onset as well as degree of impairment had minimal effect on intelligence level (Hayes, 1962). Therefore, in his test development he made no attempt to adjust the norms or the grouping of items with reference to these factors. Hayes suggested that the IH-B be a stepping stone between the 1930 Hayes-Binet and a more refined instrument. Hayes also hoped that the IH-B would be used to compare children in schools for the blind with other blind children. No standardization data have ever been collected, however, to accomplish this. Though interim in
nature, the IH-B for over 40 years served as the primary assessment tool for the visually handicapped.

In December, 1962, Carl Davis, Head of the Department of Psychology and Guidance at the Perkins' School for the Blind reported that he and his associates had developed an adaption of the 1960 Stanford Revision of the Binet-Simon Scales "in which a definite effort has been made to substitute items calling for the use of tactual perception and organization as substitutes for those items in the original test calling for visual perception and organization" (p. 50). He went on to say that "It is our hope that this test will satisfactorily combine verbal intellectual functioning with tactual perception and organization so that a single meaningful test would result" (p. 51).

During the 1968 Conference on New Approaches to the Evaluation of Blind Persons, Davis (1970) reported his completion of the standardization of the Perkins-Binet Tests of Intelligence for the Blind. The tentative form of this test consisted of 135 items selected from the 1937 and 1960 editions of the Stanford-Binet, the Williams Tests (1956), and the Hayes-Binet (1930). Approximately one-fourth of the items were nonverbal. This tentative form was administered to 2187 blind and low vision children in day and residential schools in 14 states. An item analysis of evaluation results culminated in two final age scale forms of the test. Form N, designed for subjects with nonusable vision, contained a total of 94 items from age level IV to XVIII. Form U, for subjects with usable vision, contained 99 items from age level III to XVIII. Also included in the
manual was a comparative analysis of item placement as well as a
cursory explanation of the "best fit" method used in producing
the intelligence quotients. Bauman (1974) predicted that when the
Perkins-Binet came available it would provide an excellent resource
for evaluating both the verbal and performance learning abilities
of the visually handicapped through a single measure.

Performance Testing of the Blind

A consequence of the widespread use of the verbal WISC with the
blind was the absence of any type of nonverbal or performance
assessment. As stated above, Cutsforth (1951) cautioned that many
blind people develop pseudo-verbal skills which may inflate verbal
mental measurements. Davis (1962) warned that use of a solely
verbal scale precludes the opportunity for obtaining an indication
of the subject's tactile perception and organization skills.

It is only within the last 35 years that standardized nonverbal
scales have become available to measure the learning ability of
blind subjects (Bauman, 1974; Dauterman, Shapiro, Suinn, 1967). In
1947 Bauman's Nonlanguage Learning Test (NLL) was published.
Adapted from the Dearborn Formboard, it consisted of a formboard
with four kinds of holes in it, two of each of four shapes. The
subject was required to demonstrate his ability to discriminate
forms and match shapes as he attempted to return the blocks to the
board. After finding a low correlation between this test and the
Wechsler Verbal Scales, Bauman suggested that the NLL be regarded as
a clinical instrument rather than a test in the strict sense (1954).
In the mid-1950's, Shurrager adapted the Wechsler Performance Scale to meet the assessment needs of the blind. This culminated in the publication of the Performance Scale for the Adult Blind. This test was almost immediately replaced by the Haptic Intelligence Scale for Adult Blind (HIS) (1961). The correlation between the HIS and the WAIS verbal subtest IQ score was .65. Directions required that a low vision person be blindfolded to take the test and Shurrager noted that the blindfold clearly created a disadvantage (Shurrager, 1964). Therefore, the HIS needs to be interpreted with caution and its applicability limited if it is used with individuals who have some useful vision.

Another adaptation of a performance test originally designed for the sighted was Ohwaki's 1960 modification of the Kohs Block Design Test. Various fabrics with different textures were substituted for the original four colors that had been used by Kohs. From the Ohwaki came Suinn and Dauterman's Stanford-Kohs test (1966). Their modifications included enlarging the blocks and use of only two textures, rough and smooth. In both of these tests the subject was asked to copy patterns of various complexities. Wattron (1965) obtained a correlation of .84 between the Stanford-Kohs and the mental age score on the Hayes-Binet among a population of blind children.

Still another attempt to modify performance items designed for the sighted for use with the blind was the Ravens Progressive Matrices as adapted by Anderson in 1961. The Ravens Progressive
Matrices for Presentation to the Blind, or Tactual Progressive Matrices, consists of selected patterns from the ink print version reproduced in three dimensions with a portion "cut out" that the subject is required to complete. Both a children's and an adult's form of the test were published.

The Blind Learning Aptitude Test (BLAT) was authored by Ernest Newland (1969). This tactual test of learning ability developed for the blind was the first such test not adapted from a previously developed test for sighted children. Three-dimensional sheets of molded plastic patterns serve as the stimuli. Behavior sampled, using these patterns, included discovery of identities, progression completion, and pattern completion. Newland (1979) reported Binet-BLAT correlations of .53 and Wechsler-BLAT correlations of .45. Results suggested that the BLAT sampled somewhat different behavior than did these other two intelligence tests.

The intellectual assessment of the visually handicapped was first attempted with the verbal tools of Binet and Hayes. Then, movement toward a strictly tactual measure to assess potential flourished. However, the need for a valid and reliable measure of the intellectual abilities of the visually handicapped continued to stimulate psychologists and educators to look for more improved methods of assessment.

Reliability of Measurements

Due to the limited sample of visually handicapped persons, a dearth of literature exists on the reliability of the WISC and the WISC-R. Upon examination of the limited research it becomes apparent
that the use of the Verbal Scales of the Wechsler have, in part, become justified through the recommendations of Bauman and Hayes (1951) and Scholl (1953), yet sufficient statistical corroboration is lacking.

Researchers who have sought to prove the reliability of the Wechsler scales with visually handicapped children have approached the task in one of two manners. They have either examined the correlation of the Wechsler Verbal Scale with another assessment instrument, most often the IH-B, or they have constructed an item analysis of the Wechsler Verbal subtests to compare response patterns of blind children to those of their sighted peers.

Gilbert and Rubin (1965) administered the WISC Verbal Scale and the Hayes-Binet to 30 children from age 6 to 14. Most of these children were residential school students. The correlation between the two tests was .90 and the 3.1 point difference between the means was not statistically significant. Since the IQ scores were similar they recommended use of the WISC Verbal Scale along with a supplemental test for verbal memory, as the WISC Verbal Scale was shorter and less tiring for the children than was the Hayes-Binet.

A similar examination was conducted by Hopkins and McGuire (1966). The Hayes-Binet and the WISC Verbal Scale were administered to 30 congenitally blind students in two public school systems. A correlation of .86 was obtained. The study also revealed that, despite the fact that the Hayes-Binet and the WISC Verbal Scale measured essentially the same abilities and both yielded normal
distributions of scores, the corresponding IQ scores were not comparable. There was a highly significant trend for WISC Verbal Scale scores to be lower than Hayes-Binet scores. This, of course, is in direct contrast to the conclusions of Gilbert and Rubin. Differences at the extremes of the normal curve were even larger as the standard deviations for these two scales were substantially different (WISC SD = 16.0, Hayes-Binet SD = 22.7). Hopkins and McGuire concluded that a high correlation does not insure comparable normative data. They recommended not using the two tests interchangeably. Tillman (1967a, 1967b) collected WISC Verbal Scale data on 55 sighted and 55 blind children, all of whom attended school in Georgia. He wanted to know whether abilities which underlie the intellectual performance of the blind differed from that of sighted children. He evaluated performance in terms of item difficulty curves and subtest reliabilities. Results indicated that blind children scored about the same as sighted on Arithmetic, Information, and Vocabulary but less well on Comprehension and Similarities and spuriously higher on Digit Span.

Tillman and Bashaw (1968) and Tillman and Osborne (1969) followed this up with an examination of WISC Verbal IQ subtest scores of blind and sighted children. The two groups were distinguished by their performance on three subtests. Blind children scored higher on the Information and Digit Span subtests and lower on the Similarities subtest. Thus, the mean Verbal IQ score for the
blind and sighted did not have the same meaning in terms of subtest
ccontribution for the two groups of children. Weaker correlations
among subtest scores between the blind and the sighted suggested
that the intellectual abilities of the blind had greater
specificity and hence greater intra-individual differences.

Smits and Mommers (1976) administered the WISC to three groups
of children: blind, low vision, and sighted. In agreement with the
previous research, differences in WISC Verbal IQ scores resulted
primarily from the Comprehension and Digit Span subtests. Both the
blind and low vision children scored lower on Comprehension and higher
on Digit Span than did their sighted peers. These authors, in direct
contrast to those previously mentioned, found subtest scores more
scattered for sighted children than for the visually handicapped.
The results of these studies allow one to make at least one
generalization. Whether one studies inter-test variability (Gilbert
& Rubin, 1965; Hopkins & McGuire, 1966) or between-group variability
(Smits & Mommers, 1976; Tillman, 1967a, 1967b; Tillman & Bashaw,
1968; Tillman & Osborne, 1969) profile variability appears with some
degree of consistency.

Though not available for general distribution until 1980,
Thomas Coveny obtained a research copy of the Perkins-Binet in
1971 (1972, 1973). He administered the test to 55 students in
grades three through six at the Tennessee School for the Blind.
Twenty-three of these students were administered Form U, usable
vision and the rest Form N, nonusable vision. An odd-even split-half reliability technique was used to divide the test items at each age level into two groups. Split-half reliability coefficients were .96 for Form N and .94 for Form U. Both of these are significant beyond the .01 level. Fifty-three of the children were also administered the verbal WISC. A comparison of the Perkins-Binet, Form U and the verbal WISC yielded a correlation of .74, significant at the .01 level. The mean difference between IQ scores, though not significant, was 2.8 and favored the Perkins-Binet. A considerable difference was noted between the standard deviations of these two instruments. The standard deviation of the Perkins-Binet was twice that of the WISC. Coveny cautioned that due to the substantial difference in the standard deviations, the two tests should not be used interchangeably. Coveny (1972) concluded that the Perkins-Binet was a "valuable clinical instrument which could give pertinent information as to the degree and quality of residual vision as well as tactual perception" (p. 100).

Coveny's research has thus far only been followed by that done by Teare and Thompson (1982). These researchers collected data from 28 students served by a residential school in Nebraska. Fourteen of the students were administered Form U of the Perkins-Binet and either a WISC-R or a WAIS. A correlation of .93, significant at the .01 level, was obtained. As in the Coveny study, the standard deviation of the Perkins-Binet was considerably higher
(50%) than that for the Wechsler scales. Once again caution was voiced against use of the two tests interchangeably. However, Teare and Thompson recognized the limits of their research. These authors suggested that further studies utilizing larger samples would be needed to properly examine reliability data.

A summary of these studies suggests that the Wechsler Verbal Scales are a reliable and consistent measure of intellectual potential of blind children. The Perkins-Binet presumes to be a test for low vision and blind children, yet reliability data are sparse and further research is critical. This latest advance in the assessment of the visually handicapped has of yet not been subject to sufficient evaluation. Furthermore, Form U offers an avenue of research for a previously neglected subgroup of the visually handicapped.

**Achievement Tests**

Achievement tests are tools that directly assess skill development in academic content areas. Achievement tests sample the products of past formal and informal instruction in contrast to aptitude tests which are designed to measure a person's ability to profit from instruction. Numerous achievement tests have been adapted and modified for the visually handicapped (Lowenfeld, 1973). Most of these have not been subjected to sufficient research. As a result, teachers, administrators, and psychologists feel they are of limited value (Ozias, 1975). Standardized achievement tests provide a common frame of reference for evaluating scholastic achievement across an entire population (Nolan, 1962). This is accomplished by
holding constant in the testing situation a number of variables such as the test content, the method by which the test is administered, the length of time allotted for the test, and the method by which the test is scored. Adaptation of standardized tests for use with the visually handicapped almost always involves changes in some, if not all, of these factors. This, of course, results in a loss of validity.

However, modification of tests is still preferred over development of an assessment instrument solely for the visually handicapped due to the complexity and expense involved in item writing and reviewing and test standardization. Because of the low incidence of this population as well as its heterogeneity, development of original tests is costly (Morris, 1974). Hayes, in 1917, (1948) first used an achievement test with the visually handicapped. He administered an unidentified reading test adapted from print to braille. Similar modification of standardized tests in other subject areas quickly followed.

In 1923 the original series of the Stanford Achievement Tests, Form A and B, were published by the World Book Company (Lehmann, 1975). Three of the eight tests in the series were published in braille by the American Printing House in 1926-1927. Maxfield (1927) followed this with a publication which included supplemental directions for administering the entire scale to blind children.

Thirty years passed, however, before the American Printing House, in 1954, published the first large print test. This delay in meeting
the needs of low vision children was due in part to the uncertainty relative to the proper size for print enlargement (Peabody & Birch, 1967). Since then other tests that have been modified for use with low vision children include the Wide Range Achievement Test, the Durrell Listening Reading Series, the Gilmore Oral Reading Series, and the Iowa Test of Basic Skills (Scholl & Schnur, 1976; Swallow, 1979). Measuring the academic aptitude of visually handicapped students continues to be a challenge. Achievement tests such as those listed above were created and normed for the sighted population. Yet they are the primary assessment tools used by those who work with the visually handicapped. As a result of their 1979 survey Bauman and Kropf reported that, among achievement tests, the Wide Range Achievement Test for kindergarten through twelfth grade, in whole or in part, was among the most popular. Bauman and Kropf emphasized the important consideration that when visually handicapped children are mainstreamed the choice of achievement tests for them is affected by the test that is being administered to the sighted children around them.

The Wide Range Achievement Test (WRAT) (Jastak & Jastak, 1978) is widely used for several additional reasons. First, it can be administered in approximately 30 minutes unlike achievement tests such as the Stanford which can take up to three days (Morris, 1974). Second, scores for this instrument can be reported as grade equivalents, percentile ranks or standard scores. Third, the test is
available in both large print and braille format. Finally, the WRAT includes lower grade skills which are an element missing from the Stanford Achievement Test.

In 1967, a comprehensive study of school achievement was completed by the National Center for Health Statistics. The Stanford and Metropolitan Achievement Tests were compared with the Wide Range Reading and Arithmetic subtests. The sample population included approximately 2400 regular education students in grades one through twelve from across the United States. Results indicated that there was sufficient evidence of substantial correlation with the criterion measures at every grade level to consider the WRAT a satisfactory brief estimate of school achievement.

Subsequent to the Public Health Survey which used the 1965 edition of the WRAT two revisions of this instrument have been published, one in 1976 and the next in 1978. While the actual items on all three editions have remained the same, changes have occurred in standard scores and grade equivalents. Silverstein (1980) and Sattler and Feldman (1981) reported, that with the exception of the youngest age levels, the 1978 norms provide lower standard scores on Reading and Spelling subtests than did the 1965 edition. The opposite held true for the Arithmetic subtest. Most of the variation between the 1965 and 1978 editions occurred at the upper and lower portions of the ability range. Few differences were noted between the 1976 and 1978 norms. The authors cautioned against
use of grade equivalents. Instead they stressed the standard scores as reliable estimates of an examinee's performance.

Jastak and Jastak (1978) reported that the correlations between the Verbal subtests of the WISC and the WRAT subtests were higher than those between the Performance subtests and the WRAT. Comprehension and Reasoning tests of the WISC tended to be less highly correlated with the WRAT subtests than other subtests that included Vocabulary, Information, Coding, and Digit Span. Correlations ranged from .75 in Arithmetic to .77 in Spelling and .82 in Reading between the WISC Full Scale IQ and these subtests.

In conclusion, research has shown that the WRAT is a valid estimate of school achievement within the general population. Bauman's survey indicated that the WRAT was the most commonly used assessor of academic achievement with visually handicapped students.

Prediction of Academic Achievement

The results of a psychoeducational evaluation should be practical and lead to a definite action or procedure. Subsequent to the evaluation the teacher, counselor or parent should know more about what to do for the child than he knew before (Bateman, 1965). During an evaluation one uses instruments whose content makes possible reasonable predictions of a child's academic achievement (Hecht & Newland, 1965).

Over the last 40 years considerable empirical support has been gathered regarding the efficacy of the WISC and its subsequent revision, the WISC-R, in the prediction of achievement for a variety
of student populations (Anastasi, 1982; Buros, 1978; Quatrrocchi & Sherrets, 1980). Several conclusions can be drawn concerning the ability of the Wechsler Scales to predict academic achievement in the general population of children referred for psychological service. Research shows that both the WISC-R Full Scale IQ score and the Verbal IQ score are valid predictors of achievement as measured by standard scores on all three WRAT subtests (Covin & Lubimiv, 1976; Hartlage & Boone, 1977; Hartlage & Steele, 1977; Sattler & Ryan, 1981; Schwarting & Schwarting, 1977; Tramill & Tramill, 1977). Correlations not showing significance occurred most often on the Spelling subtest (Hale, 1978). In some recent studies it was determined that the Stanford-Binet correlated significantly with the WISC and the WISC-R. Therefore, the Stanford-Binet also predicted achievement well as measured by the WRAT (Brooks, 1977; Raskin, Bloom, Klee & Reese, 1978; Sewell & Manni, 1977).

Unfortunately, a dearth of literature exists on the prediction of academic achievement with visually handicapped children. Though Nicholson (1975) and Scholl and Schnurr (1976) reported use of the WRAT the only published research was conducted by Alford (1979) who sought to examine the validity and usefulness of the WRAT as a teacher aid for IEP development. The test was administered to 21 blind and low vision children in the intermediate grades in a residential school setting. Alford collected subtest scores from the WRAT and mean grade score equivalents in each subject area based on teacher opinion. Results indicated that WRAT grade level scores
and teacher assessment of grade level functioning correlated significantly. Results also indicated a correlation significant at the .01 level between WISC-R Verbal IQ scores and Spelling standard scores. A correlation between the Verbal IQ scores and Arithmetic standard scores was significant at the .05 level. The correlation between WISC-R Verbal IQ scores and Reading standard scores failed to achieve significance. The results of this study suggested concurrent validity as indicated by significant correlations between WRAT grade level scores and teacher ratings and between WRAT standard scores and WISC-R Verbal IQ scores.

Several studies have also examined the predictive validity of a Wechsler scale with other measures of intellectual and academic functioning with the visually handicapped. Again, however, this research has almost exclusively confined itself to studies of blind children, not students with low vision. Hayes (1941) compared IH-B mental age with the Stanford Achievement Test, braille form and obtained correlations of .82 to .93. He also correlated the SAT and the Wechsler-Bellvue and obtained correlations that ranged from .70 to .82. Hayes determined that all correlations were high enough to justify use of all three tests.

Lewis (1957) administered the IH-B and either the Wechsler Adult Intelligence Scale (WAIS) or the WISC to 31 children and adolescents at the Texas School for the Blind. Wechsler scores were converted to IH-B equivalents. Lewis then compared elementary, junior and senior high grade point averages and IH-B IQ scores.
Correlations were .45, .46 and .53 respectively and all were determined significant. Lewis concluded that there was a positive relation between the tests of intelligence adapted for the blind, as well as a positive relationship between mental ability and academic achievement.

Hecht and Newland (1965) asked about the relationship among achievement scores and measures of learning aptitude in blind children. They studied the extent to which several individual measures of learning potential related to measured learning achievement. Additionally, they studied whether a combination of two or more kinds of behavior samples would yield a more complete estimate of learning potential. Sixty-nine blind students enrolled in a residential school were the subjects. All students had been administered the IH-B, the WISC, the Blind Learning Aptitude Test (BLAT) (1969) and the brailed SAT. Hecht and Newland divided the students into three age groups: 9-11, 12-13, and 14-16. WISC Mental Age (MA) correlations with the SAT ranged from .00 on Spelling in the 9-11 year old group to .87 on Paragraph Meaning in the 12-13 year old group. The IH-B and WISC MA correlated at the .90 level for the combined age groups. The BLAT correlated .41, .72, and .16 with WISC MA for the respective age groups. Thus the relationships obtained between the WISC, the brailed SAT and the BLAT were generally moderate to low while the WISC correlated consistently high with the IH-B. The authors recommended that the BLAT only be used as a supplement to established verbal material.
Rich and Anderson (1965) examined the WISC, a tactual adaption of the Ravens Progressive Matrices, and the Children's Tactual Progressive Matrices (CTPM) to predict grade point average for 115 blind children. They obtained correlations of .51 between the Verbal WISC and grade point average and .36 between CTPM and grade point average. Multiple correlations of the Verbal WISC and the CTPM with grade point average yielded a correlation of .55. As a result of these latter two studies Goldman (1970) recommended that verbal and performance criteria may be combined to produce a more efficient technique for predicting grade point average than either of the criteria used alone.

Streitfeld and Avery (1968) administered the WAIS Verbal Scale and the Haptic Intelligence Scale for the Adult Blind (HIS) to 31 residential school students. Twenty students were low vision and 11 were blind. The correlation between the two tests for all subjects was .65, with no difference noted between the low vision and blind students. Correlations between the WAIS and average grades ranged from .74-.81. Again, they noted no difference between the two populations. However, they did note significant differences in the correlations of the HIS and average grades between the two groups. Within the low vision group a correlation of .49 was obtained while a correlation of .73 was obtained for the blind students. The authors suggested that with respect to the blind the WAIS and the HIS were equally good predictors of grades.
Concerning low vision students, the WAIS Verbal Scale was a much better predictor of grades.

Coveny (1973) studied the effectiveness of the Perkins-Binet and the WISC as predictors of academic achievement for visually handicapped children. He examined SAT subtest scores and teacher grades in comparable learning areas. He employed a multiple regression analysis to make predictions for specific subject areas. Coveny found that both the WISC and the Perkins-Binet were highly predictive for nearly all the learning areas (Word Recognition, Arithmetic Computation and Reasoning, Social Studies). Table 1 summarizes the above research covering criterion related validity.

Purpose

It has been commonly thought that this research provides us with the statistical confidence to deem effective the frequently used assessment tools for the visually handicapped. However, with minor exception, the research thus far all possess the following weaknesses.

First, the populations used in the data collection are almost exclusively classified as blind. Very little work has been done with the population of visually handicapped children classified as low vision.

Second, the research is ten to fifteen years old and the assessment instruments used in them have become obsolete, due to the revision of the Wechsler scale and the recent publication of the Perkins-Binet.
<table>
<thead>
<tr>
<th></th>
<th>IH-B</th>
<th>W-B</th>
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<th>CTPM</th>
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<td>.70-.82</td>
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<td>Hayes</td>
<td>Hecht &amp; Newland</td>
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<td>.51**</td>
<td>.36</td>
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<td>Rich &amp; Anderson</td>
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<td>.90*</td>
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<td>Hecht &amp; Newland</td>
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<tr>
<td>BLAT</td>
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<td>.16, .42, .72*</td>
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<td>.65</td>
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<td>AVERAGE GRADES</td>
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<td>Streitfeld &amp; Avery</td>
<td>Streitfeld &amp; Avery</td>
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</table>
Third, little documented normative data exist for the Wechsler Verbal Scales as adapted for use with the visually handicapped. No technical data have been published for the Perkins-Binet. *Standards for Educational and Psychological Tests* (1974) states that the "test manual should present evidence of reliability and validity that allows the user to judge whether scores are sufficiently dependable for the intended use of the test" (p. 25). These data are conspicuously absent from the Perkins-Binet manual.

Lastly, previous research has not fully addressed the issue of the merits of standardized testing applied to a low incidence population. David Warren (1977) speculates that the need for separate norming for blind samples has to do with the validity of the test, not with the type of environment that has to be met. The use of sighted test norms will not allow adequate prediction of the blind child's success if that child's tested IQ is not a valid estimate of his potential (p. 134).

In direct contrast VanderKolk (1981) opined that "intelligence and achievement tests rely on adequate test construction." He felt that "as long as the test instrument was designed so that the visually handicapped person could understand and respond to it, separate norms were not needed" (p. 48). This study reported the correlations of scores of low vision children on the Perkins-Binet Tests of Intelligence for the Blind, Form U; the Wechsler Intelligence Scale for Children-Revised, Verbal Scale; and the
Wide Range Achievement Test. The hypotheses of this study were:

I. There will be high positive correlations significant at the .05 level between the Perkins-Binet Tests of Intelligence for the Blind, Form U IQ scores and the Wechsler Intelligence Scale for Children-Revised, Verbal Scale IQ scores for children in grade levels three, five, seven, and nine.

II. There will be high positive correlations significant at the .05 level between the Perkins-Binet Tests of Intelligence for the Blind, Form U IQ scores and the Wide Range Achievement Test Reading, Spelling, and Arithmetic standard scores in grade levels three, five, seven, and nine.

III. There will be high positive correlations significant at the .05 level between the Wechsler Intelligence Scale for Children-Revised, Verbal Scale IQ scores and the Wide Range Achievement Test Reading, Spelling, and Arithmetic standard scores in grade levels three, five, seven, and nine.
Chapter III
METHODOLOGY

Subjects

Fifty-two low vision children were evaluated from the third, fifth, seventh, and ninth grades in residential and public school programs in Ohio. These programs were located in the Columbus, Cleveland, and Cincinnati Public School Systems and at The Ohio State School for the Blind (OSSB). The programs were selected from a list provided by the Ohio Department of Education, Division of Special Education because they provided service to the largest number and concentration of visually handicapped students in the state. Services provided by these programs included at least one of the following: itinerant tutor, resource room, full time class, day school class, and residential class placement.

All children were included in the study if they were in one of these four grades and if they used print as their primary reading mode. Parental permission to evaluate was also obtained.

Table 2 contains the grade level breakdown of subjects by sex, race, and program location. Demographic data were collected only for the purpose of sample description. Table 3 lists each child by grade, sex, chronological age, uncorrected and corrected visual acuity, and existence of any other handicapping condition.
Table 2
Subjects by Grade, Sex, Race and Program Location

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<th>Grade 3 (N=14)</th>
<th>Grade 5 (N=14)</th>
<th>Grade 7 (N=12)</th>
<th>Grade 9 (N=12)</th>
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<tr>
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<td>5</td>
<td>M</td>
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<td>20/100</td>
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<tr>
<td>6</td>
<td>5</td>
<td>M</td>
<td>12-0-0</td>
<td>20/400</td>
<td>20/40</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Etiology: nystagmus, color defect-red, macular degeneration, abnormal foveal light reflex, cataracts, secondary glaucoma, aphakia, hereditary, albinism, hereditary, nystagmus, albinism, optic macular nerve hypoplasia, hyperopia, ambyopla, hereditary, myopia, oblique discs of early myopic degeneration, myopia, disc with lattice changes, lateral strabismus nystagmus, cataract, nystagmus, hereditary, optic atrophy--meningitis, abnormal macular.
<table>
<thead>
<tr>
<th>Child</th>
<th>Grade</th>
<th>Sex</th>
<th>Chronological Age (Years-Months-Days)</th>
<th>Uncorrected</th>
<th>Corrected</th>
<th>Etiology</th>
<th>Other Handicapping Conditions</th>
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<td>O.D.</td>
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<tr>
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<td>F</td>
<td>12-10-0</td>
<td>20/200</td>
<td>20/200</td>
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</tr>
<tr>
<td>3</td>
<td>5</td>
<td>F</td>
<td>11-8-4</td>
<td>20/400</td>
<td>20/400</td>
<td></td>
<td></td>
</tr>
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<td>5</td>
<td>F</td>
<td>10-8-3</td>
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<td>20/30</td>
<td>myopia, amblyopia</td>
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<td>5</td>
<td>F</td>
<td>11-10-5</td>
<td>20/60</td>
<td>20/30</td>
<td>myopia</td>
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<td>11-8-8</td>
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<td>7</td>
<td>M</td>
<td>13-0-2</td>
<td>20/200</td>
<td>20/200</td>
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<td>7</td>
<td>M</td>
<td>15-4-15</td>
<td>20/30</td>
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<td>albinism, myopia</td>
<td>moderate bilateral hearing loss</td>
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<td>7</td>
<td>M</td>
<td>12-5-19</td>
<td>20/100</td>
<td>20/100</td>
<td>nystagmus, myopia</td>
<td></td>
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<tr>
<td>15</td>
<td>7</td>
<td>M</td>
<td>12-10-7</td>
<td>20/200</td>
<td>20/200</td>
<td>nystagmus, color blind</td>
<td></td>
</tr>
<tr>
<td>Child</td>
<td>Grade</td>
<td>Sex</td>
<td>Chronological Age (Years-Months-Days)</td>
<td>Uncorrected</td>
<td>Corrected</td>
<td>Etiology</td>
<td>Other Handicapping Conditions</td>
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<td>39</td>
<td>7</td>
<td>F</td>
<td>13-11-23</td>
<td>20/125</td>
<td>2/200</td>
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<tr>
<td>34</td>
<td>7</td>
<td>M</td>
<td>12-11-9</td>
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<td>cataracts, nystagmus</td>
<td>prothesis on left leg</td>
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<td>7</td>
<td>F</td>
<td>14-3-17</td>
<td>20/400</td>
<td>20/400</td>
<td></td>
<td></td>
</tr>
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<td>22</td>
<td>7</td>
<td>M</td>
<td>13-1-6</td>
<td>20/400</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>7</td>
<td>F</td>
<td>13-11-4</td>
<td>20/240</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>7</td>
<td>M</td>
<td>12-4-8</td>
<td>20/800</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>7</td>
<td>M</td>
<td>15-4-8</td>
<td>20/240</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>9</td>
<td>M</td>
<td>15-3-25</td>
<td>20/240</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>9</td>
<td>M</td>
<td>14-6-22</td>
<td>10/200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>M</td>
<td>16-2-0</td>
<td>20/200</td>
<td>20/200</td>
<td>3/18</td>
<td>1/18</td>
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<td>Sex</td>
<td>Chronological Age (Years-Months-Days)</td>
<td>Uncorrected Acuity</td>
<td>Corrected Acuity</td>
<td>Etiology</td>
<td>Other Handicapping Conditions</td>
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<td>----------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>11</td>
<td>9</td>
<td>M</td>
<td>16-11-22</td>
<td>18/300</td>
<td>18/300</td>
<td>bilateral optic nerve, glaucoma, optic nerve tumor, optic atrophy</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>9</td>
<td>M</td>
<td>15-9-25</td>
<td>15/80</td>
<td>15/80</td>
<td>glaucoma</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>9</td>
<td>F</td>
<td>15-0-2</td>
<td>20/100</td>
<td>20/100</td>
<td>myopia</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>9</td>
<td>F</td>
<td>16-4-20</td>
<td>20/100</td>
<td>20/100</td>
<td>myopia, astigmatism</td>
<td></td>
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<tr>
<td>35</td>
<td>9</td>
<td>F</td>
<td>14-9-8</td>
<td>10/200</td>
<td>10/125</td>
<td>cataracts, myopia</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>9</td>
<td>F</td>
<td>15-8-4</td>
<td>8/200</td>
<td>8/100</td>
<td>myopia, astigmatism, retinal degeneration</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>9</td>
<td>M</td>
<td>16-3-17</td>
<td>20/300</td>
<td>20/300</td>
<td>color blind (red/green, yellow/blue), optic atrophy, macular aphakia</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>9</td>
<td>M</td>
<td>16-9-1</td>
<td>20/150</td>
<td></td>
<td>nystagmus, myopia</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>9</td>
<td>M</td>
<td>15-5-0</td>
<td>totally blind</td>
<td>20/300</td>
<td>optic neuritis</td>
<td></td>
</tr>
</tbody>
</table>

shunt, tendon and muscle transplants in legs, open spine at birth
A sample demographic data form is located in Appendix A. These data were obtained from the child's cumulative record or health card.

**Instruments**

Instruments used in this study were the Perkins-Binet Tests of Intelligence for the Blind, Form U; the Wechsler Intelligence Scale for Children-Revised, Verbal Scale; and the Wide Range Achievement Test. Details on each instrument are as follows.

The Perkins-Binet Tests of Intelligence for the Blind (Davis, 1980) is an individually administered scale designed to measure the intellectual potential of visually handicapped persons. It attempts to overcome the weaknesses of standardized tests designed for sighted persons but modified for use with the visually handicapped. The instrument has two forms: Form U for subjects with usable vision and Form N for subjects with nonusable vision. Both forms are designed on an age level format. The evaluation manual lists no reliability or validity data.

The Wechsler Intelligence Test for Children-Revised (Wechsler, 1974) is a test of general intelligence. Three separate IQ scores can be obtained. The IQ scores are calculated on the basis of five Verbal (Information, Similarities, Arithmetic, Vocabulary, Comprehension) and five Performance (Picture Completion, Picture Arrangement, Block Design, Object Assembly, Coding) subtests. The WISC-R manual presents norms derived from groups aged 6-16 1/2 years which are representative of the U.S. population of children. The reliability coefficients of the individual subtests, as well as for the Verbal,
Performance, and Full Scale IQs are presented for each of eleven age groups. Across the entire age range the average coefficients are .94 (V), .90 (P), and .96 (FS) respectively. Correlations with other tests—WIPPSI, WAIS, Stanford-Binet—are also highlighted in the manual.

The Wide Range Achievement Test (Jastak & Jastak, 1978) was standardized as a convenient tool for the study of the basic school subjects of Reading (word recognition and pronunciation), Spelling, and Arithmetic Computation. The test is designed for persons aged five to adult. It is divided into two levels, one for students aged 5 through 11-11 and the other for students aged 12-0 through adult. Significant levels of reliability and validity data are listed in the manual. Reliability coefficients established on the sighted population range from .92 to .98 for the Reading and Spelling subtests and from .85 to .92 for Arithmetic. Validity data is reported in terms of internal consistency, other achievement tests, and intelligence tests.

Large print copies of the WRAT were obtained from the American Printing House for the Blind and from ORCLISH at the Central Ohio Special Education Regional Resource Center. Variations in administration, as suggested in the APH guidelines, included elimination of time limits for the Reading and Arithmetic subtests. Norms for the sighted were used to score both the WRAT and the WISC-R.
Examiner

A school psychologist certified in the State of Ohio served as the examiner. This person had attended the inservice workshop entitled Assessment of Visually Handicapped offered by the American Foundation for the Blind in Louisville, Kentucky in May, 1982.

Procedure

Testing began after permission was received from the central office, the special education administrative personnel, and the coordinators of the programs for the visually handicapped in each school system. Either the school psychologist in charge of evaluating visually handicapped children or the program coordinator served as liaison to the project. The liaison distributed the parent information letters (Appendix B) and permission slips (Appendix C). Both school psychologist and liaison followed up unreturned forms with a telephone call.

Students were evaluated over a five month period from October 6, 1982 through March 3, 1983. All four sites were visited throughout the testing period.

Participation was voluntary. Each child's written agreement to be evaluated was secured. At the beginning of the initial session the Introduction/Child Permission (Appendix D) was read verbatim to the child and his signature requested and obtained.

The two intelligence tests were administered in a counterbalanced order. When feasible, this occurred in a single session. If not, then on two consecutive days. It required from one to two
hours to administer the two tests. The administration of the WRAT always followed and required between 20 and 50 minutes. When more than one child attended a single school the WRAT was administered in a group setting which did not exceed six children. No scoring of material occurred until all evaluation data had been collected.

Data Analysis

Means and standard deviations for the Perkins-Binet, Form U and the WISC-R, Verbal Scale IQ scores were computed at each grade level and for the total group. This was followed by a series of $t$ tests to determine the significance of the difference between mean IQ scores. An $F_{\text{max}}$ test for homogeneity of variance was used to examine the difference between the standard deviations of the two intelligence tests. The correlations between the two intelligence tests were computed using a Pearson Product Moment Correlation.

Means and standard deviations for the Reading, Spelling, and Arithmetic subtests of the WRAT were computed at each grade level and for the total group. Mean achievement scores were, in turn, correlated with mean IQ scores on the Perkins-Binet, Form U and the WISC-R, Verbal Scale at each grade level and for the total group. This was followed by a $t$ test for correlated coefficients of correlation.

Finally, a stepwise multiple regression analysis was conducted to determine the relationship between the predictor variables and the criteria variables. Predictor variables included the Perkins-Binet, Form U mean IQ score for the total group; the WISC-R, Verbal
Scale mean IQ score for the total group; and the six individual sub-tests of the WISC-R, Verbal Scale (Information, Similarities, Arithmetic, Vocabulary, Comprehension, and Digit Span). Criteria variables were the Reading, Spelling, and Arithmetic subtests of the WRAT. On all analyses the probability level of $p < .05$ was chosen for establishing statistical significance.
Chapter IV

RESULTS

Hypothesis I: There will be high positive correlations significant at the .05 level between the Perkins-Binet Tests of Intelligence for the Blind, Form U IQ scores and the Wechsler Intelligence Scale for Children-Revised, Verbal Scale IQ scores for children in grade levels three, five, seven, and nine.

Means and standard deviations of the Perkins-Binet, Form U IQ scores and the WISC-R, Verbal Scale IQ scores at each grade level and for the total group are shown in Table 4. The difference between mean IQ scores ranged from 10.66 to 17.43 points and always favored the Perkins-Binet, Form U. A \( t \) test for correlated measures was calculated at each grade level and for the total group. At the third grade level the 17.43 point difference between mean IQ scores was significant at \( p < .001 \) level. For the fifth and seventh grade groups the 15.57 and 15.92 point differences between mean IQ scores were significant at \( p < .01 \) level. The 10.66 point difference between mean IQ scores at the ninth grade level did not reach significance. When IQ scores were pooled (N=52) the 15.02 point difference between mean IQ scores was significant (\( p < .001 \)).

A difference was noted throughout between the standard deviations of the two intelligence tests. The SD of the Perkins-Binet, Form U
Table 4
Means and Standard Deviations of the Perkins-Binet, Form U and the WISC-R, Verbal Scale by Grade Level

<table>
<thead>
<tr>
<th>Grade</th>
<th>N=14</th>
<th>Perkins-Binet, Form U</th>
<th>WISC-R, Verbal Scale</th>
<th>Mean</th>
<th>Mean Difference</th>
<th>SD</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 3</td>
<td>102.00</td>
<td>17.43</td>
<td>19.24</td>
<td>13.03**</td>
<td>Perkins-Binet, Form U</td>
<td>84.57</td>
<td>17.17</td>
</tr>
<tr>
<td>Grade 5</td>
<td>94.35</td>
<td>15.57</td>
<td>25.24</td>
<td>3.91*</td>
<td>WISC-R, Verbal Scale</td>
<td>78.78</td>
<td>15.56</td>
</tr>
<tr>
<td>Grade 7</td>
<td>102.25</td>
<td>15.92</td>
<td>27.31</td>
<td>3.82*</td>
<td>Perkins-Binet, Form U</td>
<td>86.33</td>
<td>15.80</td>
</tr>
<tr>
<td>Grade 9</td>
<td>96.83</td>
<td>10.66</td>
<td>31.64</td>
<td>1.85</td>
<td>WISC-R, Verbal Scale</td>
<td>86.17</td>
<td>12.88</td>
</tr>
<tr>
<td>Total</td>
<td>98.91</td>
<td>15.02</td>
<td>25.41</td>
<td>7.65**</td>
<td>Perkins-Binet, Form U</td>
<td>83.79</td>
<td>15.38</td>
</tr>
</tbody>
</table>

* p < .01
** p < .001
was 1.12 to 2.46 times that of the WISC-R, Verbal Scale. An $F_{\text{max}}$ test for homogeneity of variance was applied at each grade level and for the total group. Results, displayed in Table 5, showed that for an $N=52$ the difference between the two variances was significant ($p < .05$).

Table 5
Test of Homogeneity of Variance

<table>
<thead>
<tr>
<th>Grade</th>
<th>df</th>
<th>$F_{\text{max}}$</th>
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</thead>
<tbody>
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<td>13, 13</td>
<td>1.1205</td>
</tr>
<tr>
<td>5</td>
<td>13, 13</td>
<td>1.6221</td>
</tr>
<tr>
<td>7</td>
<td>11, 11</td>
<td>1.7284</td>
</tr>
<tr>
<td>9</td>
<td>11, 11</td>
<td>2.4565</td>
</tr>
<tr>
<td>Total</td>
<td>51, 51</td>
<td>1.6521*</td>
</tr>
</tbody>
</table>

* $p < .05$

Table 6 contains the correlations of the Perkins-Binet, Form U and the WISC-R, Verbal Scale. In order to make adjustments for the very large SDs all correlations were corrected for restriction of range. The correlations all achieved significance at $p < .01$ level.
Table 6
Correlations of the Perkins-Binet, Form U and the WISC-R, Verbal Scale by Grade Level

| Grade Level | Uncorrected | Corrected
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 3</td>
<td>.969*</td>
<td>.943*</td>
</tr>
<tr>
<td>Grade 5</td>
<td>.837*</td>
<td>.683*</td>
</tr>
<tr>
<td>Grade 7</td>
<td>.912*</td>
<td>.777*</td>
</tr>
<tr>
<td>Grade 9</td>
<td>.940*</td>
<td>.850*</td>
</tr>
<tr>
<td>Total</td>
<td>.872*</td>
<td>.738*</td>
</tr>
</tbody>
</table>

* p < .01
a = corrected for restriction of range

Hypothesis II: There will be high positive correlations significant at the .05 level between the Perkins-Binet Tests of Intelligence for the Blind, Form U IQ scores and the Wide Range Achievement Test Reading, Spelling, and Arithmetic standard scores in grade levels three, five, seven, and nine.

Means and standard deviations of the standard scores for the Reading, Spelling, and Arithmetic subtests of the WRAT are shown in Table 7. Correlations of the standard scores of the WRAT with the mean IQ scores of the Perkins-Binet, Form U are shown in Table 8. Again, correlations were corrected for restriction of range. At the third grade level the correlation of .63 (p < .05) between the
Table 7
Means and Standard Deviations of the WRAT by Grade Level

<table>
<thead>
<tr>
<th>Grade</th>
<th>Reading Mean</th>
<th>SD</th>
<th>Spelling Mean</th>
<th>SD</th>
<th>Arithmetic Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 3 (N=14)</td>
<td>86.86</td>
<td>16.99</td>
<td>84.14</td>
<td>14.03</td>
<td>85.64</td>
<td>11.86</td>
</tr>
<tr>
<td>Grade 5 (N=14)</td>
<td>89.29</td>
<td>12.66</td>
<td>84.29</td>
<td>15.44</td>
<td>79.86</td>
<td>13.71</td>
</tr>
<tr>
<td>Grade 7 (N=12)</td>
<td>84.58</td>
<td>10.36</td>
<td>79.17</td>
<td>10.79</td>
<td>80.08</td>
<td>11.65</td>
</tr>
<tr>
<td>Grade 9 (N=12)</td>
<td>88.42</td>
<td>18.83</td>
<td>88.33</td>
<td>13.28</td>
<td>84.75</td>
<td>14.95</td>
</tr>
<tr>
<td>Total (N=52)</td>
<td>87.35</td>
<td>14.74</td>
<td>84.00</td>
<td>13.57</td>
<td>82.60</td>
<td>12.98</td>
</tr>
</tbody>
</table>
Table 8
Correlations of the Perkins-Binet, Form U
and the WRAT by Grade Level

<table>
<thead>
<tr>
<th></th>
<th>Reading Uncorrected</th>
<th>Reading Corrected&lt;sup&gt;a&lt;/sup&gt;</th>
<th>WRAT Spelling Uncorrected</th>
<th>WRAT Spelling Corrected&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Arithmetic Uncorrected</th>
<th>Arithmetic Corrected&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 3</td>
<td>.51</td>
<td>.40</td>
<td>.53</td>
<td>.48</td>
<td>.61*</td>
<td>.63*</td>
</tr>
<tr>
<td>Grade 5</td>
<td>.41</td>
<td>.33</td>
<td>.41</td>
<td>.27</td>
<td>.54*</td>
<td>.41</td>
</tr>
<tr>
<td>Grade 7</td>
<td>.80**</td>
<td>.74**</td>
<td>.74**</td>
<td>.67*</td>
<td>.66*</td>
<td>.52</td>
</tr>
<tr>
<td>Grade 9</td>
<td>.81**</td>
<td>.49</td>
<td>.60*</td>
<td>.39</td>
<td>.51</td>
<td>.28</td>
</tr>
<tr>
<td>Total</td>
<td>.60**</td>
<td>.43**</td>
<td>.50**</td>
<td>.37**</td>
<td>.56**</td>
<td>.38**</td>
</tr>
</tbody>
</table>

* p < .05  
** p < .01

<sup>a</sup> = corrected for restriction of range
WRAT Arithmetic and the Perkins-Binet, Form U was the only significant correlation obtained. No significant correlations were obtained at the fifth grade level. Significant correlations of .74 ($p < .01$) and .67 ($p < .05$) were achieved between the Perkins-Binet, Form U and the Reading and Spelling subtests at the seventh grade level. The correlation of .52 between the Perkins-Binet, Form U and the Arithmetic subtest of the WRAT was not significant. At the ninth grade level no significant correlations were obtained. Significant correlations ($p < .01$) of .43, .37, and .38 were achieved between the Perkins-Binet, Form U and the Reading, Spelling, and Arithmetic subtests of the WRAT when all the scores were pooled and $N=52$.

Hypothesis III: There will be high positive correlations significant at the .05 level between the Wechsler Intelligence Scale for Children-Revised, Verbal Scale IQ scores and the Wide Range Achievement Test Reading, Spelling, and Arithmetic standard scores in grade levels three, five, seven, and nine.

Correlations of the standard scores of the WRAT with the mean IQ scores from the WISC-R, Verbal Scale are shown in Table 9. All correlations were corrected for restriction of range. At the third grade level the correlation of .57 ($p < .05$) between the WRAT Arithmetic and the WISC-R, Verbal Scale was the only significant correlation obtained. No significant correlations were obtained at the fifth grade level. Significant correlations ($p < .01$) of .87, .84, and .79 were achieved between the WISC-R, Verbal Scale and the Reading, Spelling, and Arithmetic subtests respectively at the seventh grade level. At the ninth
Table 9
Correlations of the WISC-R, Verbal Scale and the WRAT by Grade Level

<table>
<thead>
<tr>
<th>Grade</th>
<th>Reading Uncorrected</th>
<th>Reading Corrected</th>
<th>WRAT Spelling Uncorrected</th>
<th>WRAT Spelling Corrected</th>
<th>ARITHMETIC Uncorrected</th>
<th>ARITHMETIC Corrected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 3</td>
<td>.44</td>
<td>.35</td>
<td>.44</td>
<td>.41</td>
<td>.53*</td>
<td>.57*</td>
</tr>
<tr>
<td>Grade 5</td>
<td>.39</td>
<td>.43</td>
<td>.19</td>
<td>.18</td>
<td>.47</td>
<td>.49</td>
</tr>
<tr>
<td>Grade 7</td>
<td>.79**</td>
<td>.87**</td>
<td>.76**</td>
<td>.84**</td>
<td>.73**</td>
<td>.79**</td>
</tr>
<tr>
<td>Grade 9</td>
<td>.84**</td>
<td>.82**</td>
<td>.71**</td>
<td>.80**</td>
<td>.59**</td>
<td>.60**</td>
</tr>
<tr>
<td>Total</td>
<td>.53**</td>
<td>.53**</td>
<td>.44**</td>
<td>.47**</td>
<td>.56**</td>
<td>.60**</td>
</tr>
</tbody>
</table>

*a = corrected for restriction of range

* p < .05
** p < .01
grade level correlations of .82 and .80 between the WISC-R, Verbal Scale and the Reading and Spelling subtests of the WRAT were significant at $p < .01$ level. Significance at the $p < .05$ level was achieved with the .65 correlation between the WISC-R, Verbal Scale and the Arithmetic subtest of the WRAT. Significant correlations ($p < .01$) of .53, .47, and .60 were achieved between the WISC-R, Verbal Scale and the Reading, Spelling, and Arithmetic subtests of the WRAT when all the scores were pooled and $N=52$.

Because greater stability usually results from a large sample from a population, one other correlation, displayed in Table 10, was calculated. For $N=52$ the correlations between the three WRAT subtests and the Perkins-Binet, Form U were averaged and a mean correlation obtained. The same was done for the correlations between the three WRAT subtests and the WISC-R, Verbal Scale. The difference between these correlations was calculated using a $t$ test for correlated coefficients of correlation. Significance was not achieved. The statistic did not show that a significant difference existed between the mean correlation of the three WRAT subtests and the Perkins-Binet, Form U and the mean correlation of these three subtests and the WISC-R, Verbal Scale.

A stepwise multiple regression analysis was conducted to determine the relationship between the predictor variables and the criteria variables. Predictor variables included the Perkins-Binet, Form U mean IQ score for the total group; the WISC-R, Verbal Scale mean IQ score for the total group; and the six individual subtests of the WISC-R, Verbal Scale (Information, Similarities, Arithmetic,
Table 10
Test for Correlation of Coefficients of Correlation
(N=52)

<table>
<thead>
<tr>
<th>Tests</th>
<th>Mean Correlation Coefficient</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perkins-Binet, Form U/ Wide Range Achievement Test</td>
<td>.395</td>
<td>1.60</td>
</tr>
<tr>
<td>WISC-R, Verbal Scale/ Wide Range Achievement Test</td>
<td>.598</td>
<td></td>
</tr>
</tbody>
</table>

Note: Correlation was not significant at $p < .05$

Vocabulary, Comprehension, and Digit Span). Criteria variables were the Reading, Spelling, and Arithmetic subtests of the WRAT.

Predictor variables, $R^2$ values, and $F$ values are presented in Table 11. Results showed that the Digit Span and Information subtests of the WISC-R were the best predictors of Reading achievement. Together these two variables accounted for 44 percent of the shared variance with the Reading subtest. The Digit Span subtest, by itself, proved to be the best predictor of Spelling. The Digit Span and Spelling subtests had a shared variance of 26 percent. Arithmetic performance on the WRAT was best predicted by the Arithmetic subtest score on the WISC-R, Verbal Scale. Here 36 percent of the variance was accounted for by these two variables. All predictions were significant at $p < .01$ level. It was noted that the Perkins-Binet, Form U IQ score was never a significant variable in the prediction of academic achievement.
<table>
<thead>
<tr>
<th>Criterion</th>
<th>Predictor(s)</th>
<th>Multiple R</th>
<th>$R^2$</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRAT Reading</td>
<td>WISC-R Digit Span Subtest</td>
<td>.61</td>
<td>.38</td>
<td>30.50*</td>
</tr>
<tr>
<td></td>
<td>WISC-R Information Subtest</td>
<td>.66</td>
<td>.44</td>
<td>19.17*</td>
</tr>
<tr>
<td>WRAT Spelling</td>
<td>WISC-R Digit Span Subtest</td>
<td>.51</td>
<td>.26</td>
<td>17.99*</td>
</tr>
<tr>
<td>WRAT Arithmetic</td>
<td>WISC-R Arithmetic Subtest</td>
<td>.60</td>
<td>.36</td>
<td>27.79*</td>
</tr>
</tbody>
</table>

* $p < .01$
Chapter V

SUMMARY

This study examined the correlations of the scores of low vision children on the Perkins-Binet Tests of Intelligence for the Blind, Form U; the Wechsler Intelligence Scale for Children-Revised, Verbal Scale; and the Wide Range Achievement Test. Fifty-two children from the third, fifth, seventh, and ninth grades who used print as their primary reading mode served as subjects. The children attended classes for the visually handicapped provided by the Columbus, Cleveland, and Cincinnati Public Schools and the Ohio State School for the Blind. The two intelligence tests were administered in a counterbalanced order followed by the administration of the WRAT.

Means and standard deviations were computed for the three tests at each grade level. Results showed that for the group at large, mean IQ scores on the two intelligence tests were significantly different ($p < .001$). In practical terms this meant that scores from the two tests were not interchangeable. A test for homogeneity of variance also proved statistically significant. All correlations were corrected for restriction of range. Correlations of the two intelligence tests indicated a good linear relationship between them ($p < .01$). Correlations of each of the IQ tests with the WRAT
indicated slight to moderate relationships. The WISC-R, Verbal Scale correlated at more grade levels and to a higher degree with the three WRAT subtests than did the Perkins-Binet, Form U. Neither IQ test correlated with achievement scores at the third or fifth grade levels. A stepwise multiple regression of all examined instruments showed that three of the eight predictor variables from the two intelligence tests were to a moderate extent able to predict academic achievement. Digit Span and Information best predicted Reading; Digit Span best predicted Spelling; and the Arithmetic subtest best predicted Arithmetic achievement. The Perkins-Binet, Form U was never a significant predictor of achievement.

Standards for Educational and Psychological Tests reported that a test manual should present evidence of validity and reliability. The Perkins-Binet, Form U was entirely void of almost any technical data and instead claimed technical adequacy by association with the Stanford-Binet, its major test of origin. However, this method of deriving technical adequacy was clearly inadequate. The research involved in the present study provided technical data. Given the results of the study there were several critical issues that needed to be addressed. These included the test's statistical properties, its practicality, and its test mechanics.

Statistical Properties
Reliability refers to the absence of error in measurement. It is a major consideration in evaluating the psychometric characteristics of a test. For example, if a test is reliable and the tested
trait or behavior is stable, a person will receive the same score on repeated testings (Salvia & Ysseldyke, 1981). To the extent that a subject's score fluctuates the test lacks reliability. Marking the bounds of acceptable deviation in test scores as it relates to reliability is the measure of dispersion. A common descriptor of dispersion or variability is the standard deviation. The standard deviation provides the basis for expressing an individual's scores on different tests in terms of norms. If reliability is dependent on the stability of obtained scores, then a test with a large degree of variability could not be assumed to be reliable.

The WISC-R has a mean IQ score of 100 and an SD of 15. The Stanford-Binet, the Perkins-Binet's major test of origin, has a mean IQ score of 100 and a SD of 16. Research comparing the WISC-R (Full Scale and/or Verbal Scale IQ score) to the Stanford-Binet, Form L-M IQ score indicates no significant difference in mean IQ scores between the two tests (Brooks, 1977; Raskin, et al., 1978; Sewell & Manni, 1977). It was assumed that the mean IQ score and the SD of the Perkins-Binet, Form U would be similar to that of the WISC-R, Verbal Scale. However, the 52 low vision subjects obtained a mean IQ score of 83.79 with an SD of 15.58 on the WISC-R, Verbal Scale and a mean IQ score of 98.81 with a SD of 25.41 on the Perkins-Binet, Form U. The IQ scores from the WISC-R, Verbal Scale and the Perkins-Binet, Form U were statistically different. The IQ score from the Perkins-Binet, Form U was not interchangeable with the IQ score of the WISC-R, Verbal Scale. The Perkins-Binet, Form U IQ
scores were spread across an extremely wide range. This contributed to its very large SD. The children who obtained spurious scores were distributed across the four grade levels and came from three of the four site locations. The children were not similar in their visual acuities nor in the etiology of their visual handicaps. Coveny (1973) obtained similar results with 66 blind and low vision subjects and attributed the disparity to scoring variability. Yet this phenomenon seemed due to significantly more critical and complex causes.

Correlations of the Perkins-Binet, Form U and the WISC-R, Verbal Scale were moderately to highly significant, though a decline was noted when correlations were corrected for restriction of range. The assumption that resulted from this statistic was that there was a significant degree of linear relatedness between the two IQ measures. Particular values of the Perkins-Binet, Form U were associated with particular values of the WISC-R, Verbal Scale. As a result of the statistical analyses discussed thus far it would seem reasonable to adopt the stance taken by Borg and Gall (1971) who suggested that since "it is much easier to establish the reliability of a test than to establish its validity . . . if no specific information is provided in the test manual, the research worker may safely assume that the reliability of the test is low" (p. 143).

However, the quality that most affects the value of a test is its validity. Validity is high if a test gives the information the decision maker needs. No matter how satisfactory it is in other respects, a test that measures the wrong thing or that is wrongly
interpreted is useless (Cronbach, 1949). Validity itself is inferred, not measured. It is inferred from a collection of coefficients and is judged as adequate, marginal, or unsatisfactory. Procedures for ascertaining validity deal with the relationship between performance on the test and other independently observable facts about the behavioral characteristics under consideration. One of the methods employed to study these relationships is termed criterion related validity. This validity examines the effectiveness of the test in predicting the individual's behavior in specified situations. The two types of criterion related validity are predictive and concurrent. This research concerned itself with concurrent validity.

Among the criteria most frequently employed in validating intelligence tests are achievement tests. In this research the Wide Range Achievement Test served as the criterion to validate performance on the Perkins-Binet, Form U and the WISC-R, Verbal Scale. Salvia and Ysseldyke (1981) reported that since most intelligence tests were developed to predict school achievement, correlations that ranged from .60 to .80 were typical. As demonstrated in the review of literature (Jastak & Jastak, 1978; National Center for Health Statistics, 1967) the WRAT had been shown to possess substantial reliability and validity on its own. In this research standard scores on the WRAT remained constant across subject area (Reading, Spelling, and Arithmetic) and grade level. Results indicated that the correlations between the Perkins-Binet, Form U and the WRAT were not significant at the third, fifth, or ninth
grade levels and, at best, moderately significant at the seventh grade level. When the group was taken as a whole the correlation between the two tests was slight. On the other hand, the WISC-R and WRAT correlations were moderate to high at the upper two grade levels and resembled similar correlations obtained with a sighted population (Hartlage & Boone, 1977; Jastak & Jastak, 1978). Correlations were not significant at the lower two grade levels. Therefore, one must ask why neither intelligence test correlated significantly with the WRAT at the third or fifth grade levels. This seemed to point to an area of future research and will be discussed later.

In regard to academic skills it was noted that the academic skills of most of the low vision children were one to four years below the level at which their sighted peers of the same age achieved. Birch, Tisdall, Peabody, and Sterett (1966) reported that the "most important feature of the typically partially seeing sixth grader is his underachievement" (p. 104). They observed that these youngsters were approximately two and one half years behind academically, based on their age and mental ability. Due to the fact that students in their study were placed in special education programs, on the average, when pupils were between seven and seven and one half years of age, they made two recommendations. First, they stressed the appropriateness of preschool identification and planning for low vision students. Assessment should include delineation of the nature, extent, and prognosis of their handicap as well as a thorough analysis of their educational needs and potential. The second recommendation was to initiate this plan
when the child began school rather than waiting to see how he achieved in the regular education class.

Examination of the data gleaned from the regression analyses again suggested only a slight to moderate relationship between three predictor variables and the three criterion variables. Results showed that the best predictors of Reading were the Digit Span and Information subtests of the WISC-R, Verbal Scale. The Digit Span subtest was designed to tap the child's ability to recall information in the proper sequence and detail. The test also tapped the child's attention span and his ability to synthesize and organize material in a structured situation. The Information subtest measured associative thinking and general comprehension of facts which were acquired both at home and at school. The amassing of information partly reflects the retentive capacity of the person (Parker, 1969). The acquisition of these facts is based on the child's interest, background, alertness to his surroundings, and his overall urge to collect knowledge. The ability of a child to recognize words (Reading subtest) requires the following two skills: the ability to recall information in the proper sequence and the ability to organize and synthesize. Classes for the visually handicapped emphasize memory and precision in learning. Visually handicapped children who do well in school have to learn to attend and concentrate as well as to manipulate variables. For the student with serious visual limitations listening becomes the most significant avenue of learning. Reading, the process of receiving information through graphic stimuli is closely related to listening. The
cognitive processes associated with these two skills are quite similar (Henderson, 1973). Skills involved in the predictor variables (Digit Span and Information) were quite similar to those tapped by the Reading subtest. Similar to this phenomenon is the association between the Digit Span subtest and Spelling. Once again concentration and memory are the necessary behavioral criteria that produce efficiency of spelling success. Spelling depends extensively on aural learning patterns (Barraga, 1976) as did the Digit subtest. The Arithmetic subtest of the WISC-R, Verbal Scale also tapped the child's mental alertness as revealed by the manner in which he retained, assembled, and manipulated the elements of the problem. While the WRAT arithmetic presented many of the problems in a visual, as opposed to an oral fashion, both tests tapped arithmetic computation skills. The WISC-R arithmetic subtest proved to be a fair predictor of the WRAT subtest. On none of the regression analyses was the Perkins-Binet, Form U ever a significant predictor of academic achievement. Thus, while regression equations were judged significant, the shared variance between the elements was slight to moderate. David Warren (1977) suggested that "the critical test of the validity of the Perkins-Binet will be accomplished only over a period of years as data are collected on the ability of the test to predict success in academic and other functional situations" (p. 126). This study's results suggested that the Perkins-Binet, Form U was not successful in its ability to predict academic success.
Practicality

The approximately one and one half hour administration time of the Perkins-Binet, Form U was three times as long as the administration time of the WISC-R, Verbal Scale. With an average to above average child the test took well over two hours to administer. The manner of presentation of particular test items (e.g., Repeating Digits) required large amounts of concentration and effort by the subject. Additionally, the test items themselves contributed to the subject's loss of attention. For example, there were 33 digit repetitions which were required to be administered in one session.

Principles of Testing

Ethical principles of testing restricted the generalizations that could be made concerning the Perkins-Binet, Form U evaluation results. The manual is void of almost all normative data. The general instructions that preceded the test items revealed that the examiner might question, probe, or even rephrase a question for a child. While many psychologists employ these techniques in order to test a child's limits and make behavioral observations, the technical adequacy of any test is severely restricted when there are no specific test administration standards. The idea of being free to alter instructions when administering the test may in and of itself invalidate standardization. As well, the test prescribes leniency in its scoring criteria. This leniency would have a significant effect on IQ scores. The present research did not include this criterion.
Test Mechanics

As a result of the extensive and in-depth use of the Perkins-Binet, Form U numerous mechanical errors beyond those previously published (Genshaft & Ward, 1982) were noted. In terms of the test form itself, items appeared on it which were not explained in the manual and items were listed in the manual yet appeared nowhere on the test form. On the Repeating Digits subtest the manual's list of levels did not correspond to the age levels listed on the test form. The manual listed SAI, SAIII, SAI while the test form listed, in roman numerals, age levels III through XVIII. The subjects were given three opportunities at each of levels III and IV to repeat forward a three and four digit series of numbers but nowhere on the test form was he given the opportunity to receive credit for the successful completion of these tasks. The Digits Forward at Level VII (manual) were listed on the protocol at Level VIII. It appeared that the age levels listed in the manual did not correspond to their location on the test form but instead corresponded to their location on the Stanford-Binet. This makes it very confusing for the examiner to locate the desired age level on the test form in order to score the subject's responses. On the Block Assembly task the instructions implied that the child was provided two trials for each block presentation. For Block Assembly #4 the test form provided scoring space for only one trial while two scoring opportunities were provided for designs one through three and five.
Finally, the test's name did not remain the same throughout the manual. On the cover it was called the Perkins-Binet Tests of Intelligence for the Blind. On the heavy blue divider that followed page 81 it was named the Perkins-Binet Tests of Intelligence for Blind Children.

Some confusion also existed in terms of item presentation. On the Repeating Digits task no guidance was given in terms of establishing a basal or ceiling level. Thus the examiner was required to administer 18 series of Digits Forward and 15 series of Digits Reversed to every child. For a young child or for a child who had poor auditory recall, this almost initial test task could be quite frustrating. On the subtest labeled Patience, Rectangles; the instructions referred to the "uncut card" and "a figure" neither of which appeared in the test kit or manual. At Level XII, 6 was the task, Memory for Words. No similar task existed on the Stanford-Binet yet no guidance was given for speed of presentation. The manual listed a particular administration order for Dissected Sentences (XVI, 4) yet the cards presented to the subject were labeled in a different order. Minkus Completion I alluded to it, and Minkus Completion II instructed the examiner to have the child "fill in the missing words for each blank in the selection printed in the record booklet." In neither case were the sentences printed on the test form.

Ease and consistency of presentation could be enhanced if the circle (Level III), the square (Level VI), and the Diamond (Level IX)
were printed on the test form as were similar tasks on the Stanford-Binet. In addition, on Copying a Diamond the manual listed materials as paper and pencil yet instructed the examiner to have the child draw the diamond on a sheet of film. Finally, judging from the numerous requests the examiner received to read the material out loud, the print size of Dissected Sentences, Minkus Completions, and Codes subtests should probably be enlarged.

Several inconsistencies were noted in terms of scoring criteria. On Dissected Sentences (X, 5) there appeared to be several alternatives that would be creditable yet no scoring criteria were provided. At level XVI, 3 no scoring criterion was provided for the distinction between "character" and "reputation." On the Codes subtest (XVIII, 5) scoring criteria were also missing. As well, the instructions implied that a subject might receive half credit but the manual does not list how that half credit might be earned. Finally, a minor printing error occurred within the Vocabulary scoring criteria on item #19, "regard," where credited responses were titled with a "minus" instead of a "plus."

For some of the aforementioned missing items or scoring criteria resolution could be obtained by referring back to the Stanford-Binet Manual. Although the Perkins-Binet manual made the assumption that "users of the Perkins-Binet Tests of Intelligence for the Blind will have completed an appropriate training program in the administration of the Stanford-Binet Intelligence Scales" (p. 19), the exclusion of certain directions, test items, and scoring criteria made the Perkins-Binet a less than adequate assessment tool.
Limitations

This study, like most studies of the visually handicapped, was limited by its small sample size. The Distribution of Federal Quota Registration by School Grade and Reading Media as of January 5, 1981 reported that in the third, fifth, seventh, and ninth grades 3012 children read enlarged print. Thus, this study's sample represented .017 percent of those children. This study was also limited by the narrow geographic location of subject selection sites. Three large metropolitan cities in Ohio might not necessarily have represented the larger sample of visually handicapped children in the United States. As well, since the examiner's sample did not contain an even distribution of residential and nonresidential students across the grade levels no meaningful statistical analysis could be ascertained along this dimension. Finally, as with most studies concerned with the visually handicapped, the heterogeneity of subjects made grouping according to visual acuity or etiology of handicap impractical.

Future Research

This researcher recommends that before future research is conducted using the Perkins-Binet, Form U its limitations in reliability, validity, and test mechanics be corrected. As well, it is imperative that the manual be revised to include data on the technical adequacy of this instrument. Included therein must be an exploration of the "best fit" formula, by which deviation IQ scores were obtained. A cursory comparison of the conversion tables
in the Perkins-Binet and Stanford-Binet manuals showed very different IQ scores for the same mental age to chronological age ratio.

Once these major revisions are in place future research might compare an item analysis of the Perkins-Binet, Form U to an item analysis of the WISC-R, Verbal Scale to statistically determine if the two tests tap the same abilities and skills. As well, research needs to be conducted to examine the correlation between the WISC-R, Verbal Scale and measures of academic achievement, other than the WRAT, with young visually handicapped children. In this research the WRAT failed to achieve significance in its correlation with the WISC-R, Verbal Scale. Perhaps further research would yield higher correlations. Finally, future research might examine the Perkins-Binet, Form N and continue to amass the sorely needed data on all low vision children.
APPENDIX A

Demographic Data Form
Demographic Data Form

Child:

Sex:

Date of Birth:

Grade:

Visual Acuity:

Age of Onset:

Etiology:

Existence of any other handicapping condition:
Dear Parent,

This winter a project will be started within the Ohio Public Schools that involves visually impaired children. It will be implemented by Dr. Judy Genshaft and Ms. Jo Ellin Gutterman. The purpose of the project is to provide much needed information on technically adequate assessment techniques for visually impaired children.

The evaluation tools include the Perkins-Binet Tests of Intelligence for the Blind (Form U), the Wechsler Intelligence Scale for Children-Revised (Verbal Scale), and the Wide Range Achievement Test. The evaluation sessions will be conducted by a certified school psychologist who has received additional training in the area of assessment of the visually impaired. Assessments will be administered so that they cause the least disruption to your child's educational program.

This project will involve sixty children from the third, fifth, seventh, and ninth grades. Each child will work with the school psychologist for one to two sessions of 1 - 1 1/2 hours each. There will be occasions when your child will work individually with the school psychologist and other occasions when he will be part of a small group composed of other children from his grade.

All information will be kept confidential. Evaluation results will be shared with your school system's special education department in order to update your child's individual education program. The administration and teaching staff are aware and support this project. You may use the attached permission form to give consent for your child to participate in this project.

We look forward to the start of the project and hope you will permit your child to participate. Please return the signed permission form to your child's teacher as soon as possible. If you have any questions or desire more information, please call Dr. Judy Genshaft (614/422-8787) or Jo Ellin Gutterman (office-614/267-5481, home-614/868-9196).

Thank you for your attention and cooperation.

Sincerely,

Dr. Judy Genshaft, Ph.D.
Project Director

Jo Ellin Gutterman
Primary Investigator

College of Education
APPENDIX C

Permission Slip
THE OHIO STATE UNIVERSITY  

CONSENT FOR PARTICIPATION IN  
SOCIAL AND BEHAVIORAL RESEARCH  

I consent to participating in (or my child's participation in research entitled: CORRELATIONS OF THE SCORES OF LOW VISION CHILDREN ON THE PERKINS-BINET TESTS OF INTELLIGENCE FOR THE BLIND, FORM U; THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN-REVISED, VERBAL SCALE; AND THE WIDE RANGE ACHIEVEMENT TEST.  

Judy L. Genshaft, Jo Ellin Guttermann or his/her authorized (Principal Investigator) 
(Exceptional Children) 
representative has explained the purpose of the study, the procedures to be followed, and the expected duration of my (my child's) participation. Possible benefits of the study have been described as have alternative procedures, if such procedures are applicable and available.  

I acknowledge that I have had the opportunity to obtain additional information regarding the study and that any questions I have raised have been answered to my full satisfaction. Further, I understand that I am (my child is) free to withdraw consent at any time and to discontinue participation in the study without prejudice to me (my child). The information obtained from me (my child) will remain confidential unless I specifically agree otherwise by placing my initials here _______.  

Finally, I acknowledge that I have read and fully understand the consent form. I sign it freely and voluntarily. A copy has been given to me.  

Date: _______________________________ Signed: __________________________ (Participant)  

Signed: ___________________________ Signed: ___________________________ (Principal Investigator or his/her Authorized Representative) (Person Authorized to Consent for Participant-- If Required)  

Witness: ___________________________  

HS-017 (Rev. 12-81)--To be used only in connection with social and behavioral research.
APPENDIX D

Introduction/Child Permission
INTRODUCTION/CHILD PERMISSION

Hello. My name is Jo Ellin Gutterman, and the first thing I would like to do is to thank you for meeting with me today. If you are willing to take part in the study I am doing we will meet for three to four sessions of approximately 1 - 1 1/2 hours each. These sessions will occur so that they cause the least disruption to your academic classes. Most of the time our meeting will only include the two of us. There may be other occasions when we get together with a few other children in your grade whom you probably know.

Our work together will involve a series of tests or evaluations. A person does not receive grades on these tests, instead your answers help us to learn those things you already know and other things that we need to teach you. In fact, as we work you may realize that you have already taken part or all of these tests before.

There will be many questions that are easy and some that are much more difficult. Some items have to do with subjects you are taught in school and others have little to do with school. I just ask that you try your hardest and do the best job that you can!

The work that you will be doing with me is strictly on a volunteer basis and you should know that you are free to withdraw from the study at any time if you so choose.

Any questions? Let me ask you to sign this form which signifies that you willingly agree to participate.

Thank you. Let us get ready to begin.

Child’s name ___________________________ Child’s number __________
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