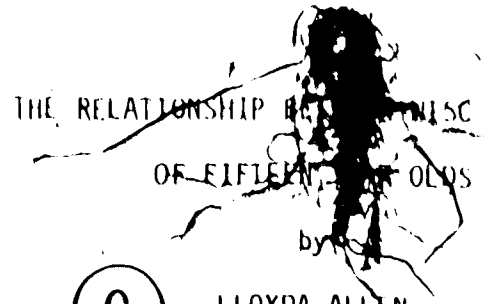
THE UNIVERSITY OF ALBERTA



THE RELATIONSHIP BETWEEN WISC AND WAIS

OF FIFTEEN [illegible] OLDS

by

 LLOYDA ALLEN

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF EDUCATION IN COUNSELLING PSYCHOLOGY

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

EDMONTON, ALBERTA

FALL, 1973

ABSTRACT

The present investigation was carried out to provide additional information regarding the Wechsler Adult Intelligence Scale and the Wechsler Intelligence Scale for Children as subjects approached the age of 16 years. Previous research seemed inconclusive with respect to a feasible alternative to the WISC, particularly with 15 year old subjects. As a result, the basic assumption tested in the present study was that the two Wechsler scales (WISC and WAIS) would yield similar IQ scores when administered to 15 year old students.

Initially, analysis was carried out on test results for thirty Edmonton composite high school students to determine the degree of comparability between the WISC and the WAIS. Extrapolated 15 year old norms were applied to the WAIS total scaled scores and a second analysis was then carried out comparing the original WISC scores and the adjusted WAIS scores.

Canadian Lorge-Thorndike scores were compared to both the WISC and WAIS scores to determine the degree of comparability between a group administered intellectual test and an individually administered test.

The results indicate that the WISC and WAIS differ significantly. The mean WISC IQ scores for the Verbal, Performance and Full Scales were appreciably higher than those obtained for the same three scales on the WAIS. Extrapolated 15 year old norms for the WAIS resulted in more comparable IQ scores when compared to the WISC. There was no

significant difference between the mean Verbal IQs of the WISC and the adjusted WAIS IQs. The Performance and Full Scale means of the two tests remained significantly different with a difference from one to three IQ points.

The WISC and WAIS were shown to have a higher correlation with each other than with the Canadian Lorge-Thorndike.

ACKNOWLEDGEMENTS

To Dr. Peter Calder for his help and direction throughout my studies.

To Anne Mulgrew for her endless hours of testing, help and consultation.

To Colin Park for his patient guidance with the statistics used in this study.

TABLE OF CONTENTS

CHAPTER PAGE

LIST OF TABLES

CHAPTER I

INTRODUCTION

Intelligence tests play a major role in present-day clinical situations as well as in decisions concerning the educational placement and personality assessment of particular individuals. The scores which intelligence tests yield are used to make statements, essentially predictive in nature, about a child's academic achievement.

The Wechsler Intelligence Scale for Children (WISC) appears to be one of the most commonly used tools for intellectual assessments. The original attempts to validate the WISC were made by comparing it to the Stanford Binet (Binet). Since the review of the WISC by Littell (1960), the use of the WISC has expanded greatly and its validity is generally accepted. In recent years a turnabout has occurred and instead of the Binet, the WISC has become the standard by which the newer measures are now validated (Himelstein, 1966).

The Problem Under Investigation

In many circumstances, particularly in schools and institutions, a "select group" of students or patients are tested one or more times before the age of 16 with the WISC and subsequently, one or more times with the Wechsler Adult Intelligence Scale (WAIS). These "select groups" are often comprised of students from "gifted" or "special" classes and/or patients in mental institutions. Many of these individuals are administered a battery of psychological tests on a yearly basis. Since the WISC is applicable up to the age of 15 years

11 months and the WAIS from 16 years 0 months, the question naturally arises as to whether or not the two scales are comparable and equivalent at the chronological age of 16 years. Ross and Morledge (1967) report that at age 16, results of IQ's on the WISC and WAIS are highly comparable, particularly for the Full Scale IQ.

Quereshi (1968 b) utilized 124 above average adolescents aged 15 in a similar study. Half the students were given the WAIS first, while the other half were administered the WISC. All subjects were retested with the other scale approximately three months later. In this approach, the mean IQ's favoured the WISC by one to six points.

In a further matching study, Quereshi and Millar (1970) compared 72 above-average adolescents aged 17 on the WISC and WAIS. Here the mean Verbal IQ (VIQ) was higher for the WAIS by two points, while the mean Performance IQ (PIQ) was higher for the WISC by seven points.

Since inappropriate norms for the WISC at age 17 and the WAIS at age 15 were used in the above studies, it is questionable whether or not the scores obtained on the two scales are in fact comparable. The use of the WISC and WAIS as alternates within the clinical setting would only be possible if the equivalence of the two tests was established or if subjects were shown to obtain equivalent scores on both tests.

The primary concern of this study rose from clinical observations of 15 year old students who, during the test situation, made verbal responses to the clinician indicating that items contained in the lower end of the WISC scale were too simplistic

and unchallenging. As a result of such items, the testees seemed to develop negative attitudes toward the test in the initial testing stage. It became evident that such variables would contribute to invalidating test results.

Another concern of this study involves the assessment of two individuals within a single classroom, one age 15, the other age 16. Normally the two students would be administered different IQ scales, the WISC and WAIS respectively. Are these students to be compared legitimately using the results of two different scales? This question would seem to need further exploration.

Another consideration of this study emerged from Wechsler's own ideas regarding the factors of intelligence. David Wechsler viewed variables such as drive, motivation and interest as significant factors in determining intelligence (Wechsler, 1958). After numerous WISC assessments, it seems possible that motivation and interest may be adversely affected by repeated testing. Consequently, there appears to be a need for another, similar type of intellectual assessment which will act as a suitable alternate for the WISC, especially around the age of 16.

Although there are currently no suitable norms for the WAIS at age 15, the present study will attempt to compare performance of 15 year old students on the WISC and WAIS. The object of such an attempt will be to consider the WAIS as a suitable alternate instrument to the WISC, particularly as students approach the transfer age of 16. As well, a group test of intelligence, the Canadian Lorge-Thorndike, will be compared to the WAIS and WISC.

to determine whether or not the resultant IQ's on this group intelligence test are similar to those on the individual Wechsler scales. In addition, it is the intention of this study to examine whether the scaled scores on a specific subtest of the WISC are equivalent to the same subtest on the WAIS. Finally, 15 year old norms will be extrapolated for the WAIS in order to take into account the degree to which maturation affects the students' score on the WAIS. A final comparison of scores will be made between the adjusted WAIS IQ score and actual WISC score.

Purpose of the Study

In summary, the purpose of this study is an attempt to answer the following questions:

1. Is there a significant difference between the scores achieved by students on the WAIS and their scores on the WISC?
2. To what degree are the students scores on the WAIS and WISC related?
3. Is there a significant difference between the IQ quotients obtained by students on the Canadian Lorge-Thorndike (CLT) and those obtained on either the WISC or WAIS?
4. To what extent does extrapolation of the 15 year old WAIS IQ quotients alter the relationship between the WISC and WAIS?

Limitations of the Study

There is one limitation to the present study which is immediately apparent. The sample is restricted to subjects in the dull normal to very superior range of mental ability. These ranges

are described in accordance with Wechsler's interpretation of intelligence quotients. The high school from which the sample was selected had previously streamed the lower (below IQ 85) students to a vocational school. The study was carried out on a relatively small population of thirty subjects, all of whom were registered in the same school. Generalizations to other populations will have to be done with a great deal of caution.

Definitions

For the purpose of this study, the following definition of intelligence was used.

Intelligence: Operationally defined, Intelligence is that which is measured by either the WISC, WAIS or Canadian Lorge-Thorndike.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

Studies reviewed in the literature found little evidence of an intellectual assessment which would act as a suitable alternate for the WISC. The present study considered The Canadian Lorge-Thorndike and the Wechsler Adult Intelligence Scale as possible alternates for the WISC. Literature relating to the above tests as well as some other related tests is reviewed.

The WISC and Stanford Binet

Most of the studies which compared the Binet to the WISC involved children of above-average ability. Levinson (1960) compared Jewish private school enrollees and found a mean Binet IQ of 117 and WISC scores of 106 VIQ, 104PIQ and 106 FIQ. Similarly, McCoy (1963) compared bright achieving students to non-achieving students. An even greater discrepancy between the two tests was reported (a Binet IQ of 139 vs a WISC Full Scale IQ of 124 for non-achievers, and a Binet IQ of 130 vs a WISC Full Scale IQ of 128 for achievers. Lucito and Gallager (1960) examined children rated as gifted. The Binet mean IQ was 161 while WISC scores averaged 20 or more points lower (a VIQ of 139, a PIQ of 136 and a FIQ of 141). This difference was considered in terms of the differential upper limits between the two tests.

Jones (1962) studied school children at three different age levels. The Binet was reported higher by six or more points (a

median IQ of 111 vs a FIQ of 104).

After the introduction of the Stanford-Binet (LM) in 1960, Sonneman (1964) administered both the new Binet and WISC to 100 normal fourth grade students and reported higher Binet (LM) means of 106 vs WISC means of 103.

In general, except for retardates, the above studies indicate that the Binet yields a higher score than the WISC. Zimmerman and Woo-Sam (1972) also conclude in a review of research, that these must be disappointing results for those who rely heavily on the Binet as an alternate to the WISC and they call for caution when interpreting differences between these two tests for individuals.

The WISC and the Lorge Thorndike

Two studies comparing the WISC and Lorge Thorndike were carried out by Corwin (1965) and Sonneman (1964). The latter study utilized school children aged nine and ten and reported correlations between the two verbal batteries of .66, between the two non-verbal batteries of .54 and between the two Full Scale scores of .69.

Neufeld (1973) in a comparative study between the WISC and Canadian Lorge-Thorndike (CLT) concluded that while either the WISC or CLT may be used to assess IQ, it does not appear feasible to suggest that any of the CLT subtests could replace WISC subtests. Each instrument is a self contained unit.

The WISC and Other Tests

In a search for the test which could be administered more simply and more rapidly than the WISC, studies have compared the

WISC to the Peabody Picture Vocabulary Test (PPVT), the Wide Range Achievement Test (WRAT), the Children's Manifest Anxiety Scale (CMAS), achieyement tests in reading and arithmetic, and the Slosson Intelligence Test (SIT).

Silberberg and Feldt (1966) administered the PPVT and WISC to 82 pupils drawn from a referral population. Although relatively high correlations were found between the PPVT and WISC, both the Verbal and Full Scale quotients for the PPVT quite consistently overestimated those yielded by the WISC.

On the other hand, Matheny (1971), compared disadvantaged preschoolers who were administered the PPVT and WISC. Despite the significant correlations between the WISC and PPVT IQ scores, comparisons of the scores for each child showed little agreement on gross classifications of intelligence. In general, the PPVT IQ scores tended to underestimate the Verbal, Performance and Full Scale IQ scores of the WISC and to overestimate the incidence of retardation. It was concluded that testing young children with the PPVT as the measure of IQ is of dubious value for research and clinical application.

Consistent with the conflicting results of these two studies, Lindstrom (1962) and Tobias and Gorlick (1961) have reported that PPVT normative values tend to overestimate the values yielded by the WISC, while Mein (1962), Rudoff and Purseglove (1963) and Dunn and Brooks (1960), found the opposite trend. Tobias and Gorlick (1961) suggest these differences may be due to the restricted environment which characterized the experimental groups.

Reger (1966) administered the WISC, WRAT and CMAS individually to 31 boys and girls who were mentally retarded and institutionalized. Reading scores on the WRAT correlated negatively with other scores, while the arithmetic portion of the WRAT showed significant correlation only with age. Correlations were reported in a negative direction between the CMAS and 13 obtained scores on the WISC. Evidence is offered to suggest that a predictably negative relationship exists between the WISC and CMAS for retarded groups, and it appears that meaningful correlations between the WISC and WRAT cannot be obtained for this group.

Sonneman (1964) compared the WISC to achievement tests in reading and arithmetic. Results indicated correlations generally in the .60's between the WISC Verbal IQ and reading and arithmetic measures.

Maxwell (1971) administered the WISC and SIT to 80 children in the sixth grade special education class who were between the ages of 11 and 14. In general, the SIT score appeared to relate best with WISC Verbal scale scores. Furthermore, the Full Scale scores were very close even though not as consistent as the verbal scale. The SIT demonstrated its lowest relationship with the WISC Performance scale. For placement purposes, Maxwell concluded that the SIT is of little practical value when compared to the WISC; for rough screening purposes, the SIT is adequate when compared to the WISC Verbal and Full Scale IQ's.

Although voluminous research concerning the Wechsler scales has been published, the above research generally suggests that there is no suitable substitute for the WISC.

The WISC and the WAIS

Wechsler (1958) suggests the WISC to be a downward extension of the WAIS. As a result, several studies have examined the comparability of the two tests at specific ages and at different IQ levels.

Barclay (1969) compared a randomly selected sample of WISC subjects with a second group of randomly selected WAIS subjects. The study failed to reveal any significant difference between subjects tested and compared as groups. Since no test re-test data is available on any individual, this may account for the differences obtained in other studies.

Ross and Morledge (1967) compared the WISC and WAIS at the chronological age of 16. In order to test comparability of the WISC and WAIS IQ's, a group of 30 were tested first with the WISC and four weeks later with the WAIS. At some time during the four week interval, each individual passed his 16th birthday. Results appear to indicate that changing from the WISC to the WAIS at chronological age 16 gives a highly comparable IQ particularly for the full scale. Comparisons of Verbal and Performance IQ's were highly correlated as well (.95 VIQ, .92 PIQ, .96 FIQ). These high correlations however, must not obscure the fact that differences as great as 13 points in a Full Scale IQ were encountered.

In a study which employed 120 students aged 15 years 10 months to 16 years 2 months, Hannon and Kicklighter (1970) compared WISC and WAIS performance controlling for both practice or order effects and for intellectual level. The findings clearly indicate that the WAIS

produces significantly higher IQ scores in the less-than-average range and that the WISC produces significantly higher scores in the average and above average ranges. The mean differences were approximately seven points in the other groups.

Quereshi and Miller (1970) administered three Wechsler scales (WAIS, WISC and the Wechsler-Bellevue II) to 72 randomly selected 17 year old high school students in order to investigate their comparability. Results indicated that the subtest scores and IQ's for the given three scales were not equivalent. Although there was high similarity of item content, the three scales fail to meet the statistical criteria of equivalence of 17 year olds.

Simpson (1970) was disturbed by the frequency with which students have been placed in special classes for the educable mentally retarded (EMR) on the basis of the WISC, only to be found ineligible for continued EMR placement because of an IQ above the celing (79) of the EMR range, when re-tested several years later on the WAIS. He compared the WISC and WAIS with students of below-average intelligence under controlled condition. Analysis of variance revealed the overall differences between the WISC and WAIS on the Verbal Scales and on the Full Scales to be significant beyond the .001 level, while differences between the two tests on the Performance scales was significant beyond the .01 level. Simpson concluded that students who are below the average range of intelligence obtained signtficantly higher WAIS than WISC IQ's. As a result, in spite of the similarities in administration and format, the two instruments cannot be considered comparable when used with

below-average-intelligence students.

Two studies which incorporated extrapolation procedures on the WISC or WAIS were found to have information pertinent to this study. Ogdon (1960), in determining IQ's below 46 for the WISC, submitted a downward extrapolation of scale scores. Silverstein (1963), in a similar study with the mentally retarded, attempted to develop extrapolation tables for the WAIS as well. Both studies report that extrapolated IQ values may be appropriately used, however, certain limitations exist. The further the extrapolation is made from the empirical data, the greater the probability of error. Also attenuating the reliability of the lower extrapolated IQ is the smaller number of items successfully completed to establish scaled scores. The present study overcomes these limitations by the fact that extrapolations occur near the empirical data and since normal 15 year olds were used, the number of successful items completed should not be a significant variable.

In summary, past literature has given definite importance to examining the comparability of the WISC and WAIS. The evidence concerning retardates seems conclusive; the WAIS is not a feasible substitute for the WISC. The evidence for normal subjects at the transfer age of 16 however, remains open to question.

CHAPTER III

METHODOLOGY

Sample and Administrative Procedures

The subjects selected for this study were thirty students from a composite high school within the Edmonton Public School System. Students were randomly selected by means of computer, and all were between the ages of 15 years, and 15 years, 11 months. From the original 44 subjects selected, 14 were subsequently eliminated since their Canadian Lorge-Thorndike scores were unavailable. The Lorge-Thorndike had been administered to the subjects the previous semester.

All subjects were administered the WISC and WAIS. The tests were administered in a counter-balanced order with a period of four weeks between first and second testing. All of the tests were administered by graduate students in Educational Psychology at the University of Alberta, and subjects were assigned to a different tester for each assessment. Tests were individually administered in counselling offices during normal school hours. Sub-tests were administered in the standard order except for supplementary tests (Mazes and Digit Span) on the WISC. To check for incorrect scoring, all of the profile sheets were reviewed by the testers as a group.

Hypotheses

Appropriate null hypotheses were developed to test each of the stated aims of this study. These hypotheses will be reported along with results in Chapter IV. A level of significance of .05

was designated as being necessary to reject the null hypotheses.

Treatment of the Data

Since the present research was to determine the relationship of the WISC to the WAIS, comparability was judged on the basis of IQ quotients and scaled scores rather than raw scores. There were two reasons for concentration on the scaled scores: (1) the sub-tests of the WISC and WAIS consist of unequal difficulty arrays, thus the comparison of raw score would be misleading, and (2) comparisons of sub-test performance are usually based on scaled scores in educational or clinical settings.

Initially, the sub-test scaled scores for Information, Comprehension, Similarities, Arithmetic and Vocabulary on the WISC were correlated with corresponding WAIS sub-test scores. Digit Span and Mazes were omitted from both the verbal batteries.

The sub-test scaled scores for the non-verbal batteries included Picture Completion, Picture Arrangement, Block Design, Object Assembly and Coding (Digit Symbol). The WISC sub-tests scores were correlated with corresponding WAIS scores and Verbal, Performance and Full Scale IQ quotients for both the WISC and WAIS were correlated as well.

The Verbal and Performance IQ quotients for the WISC and WAIS were then correlated with the Verbal and Non-Verbal IQ quotients of the Canadian Lorge-Thorndike in an effort to observe whether or not a third IQ measure would rank students in a manner similar to either the WISC or WAIS.

Finally, the sub-test scaled scores, the Verbal, Performance and Full Scale IQ's of the WISC and WAIS and CLT were subjected to a correlated t-test to test for the significance of the difference between means.

Extrapolation of 15 Year Old WAIS IQ Quotients

A table of extrapolated IQ equivalents of sums of scaled scores was developed for 15 year olds for use with the WAIS tests. Consistent with the practice followed in most intelligence tests, the WAIS quotient is obtained by referring the examinee's scaled score total to an IQ conversion table appropriate for each individual's chronological age. Unlike the WISC, each conversion table of the WAIS covers an interval of two or more years rather than four month intervals. As a result, individuals who make a given raw score, but who are as much as twenty-four months apart in chronological age are given the same IQ value on the WAIS. For this reason, the WAIS scaled scores were extrapolated to ages 15-0, 15-3, 15-6, and 15-9. The trends of the WAIS scaled scores were tested for linearity as outlined by Kirk (1968). A linear equation was applied to each scaled score and the resultant IQ quotients were tabled at three month intervals (see Appendix A). The adjusted WAIS IQ quotients and the original WAIS IQ quotients were then correlated and tested to observe whether or not their means differed significantly.

Figure 1 is a graphic representation of the extrapolation procedure followed in developing the norm tables found in the

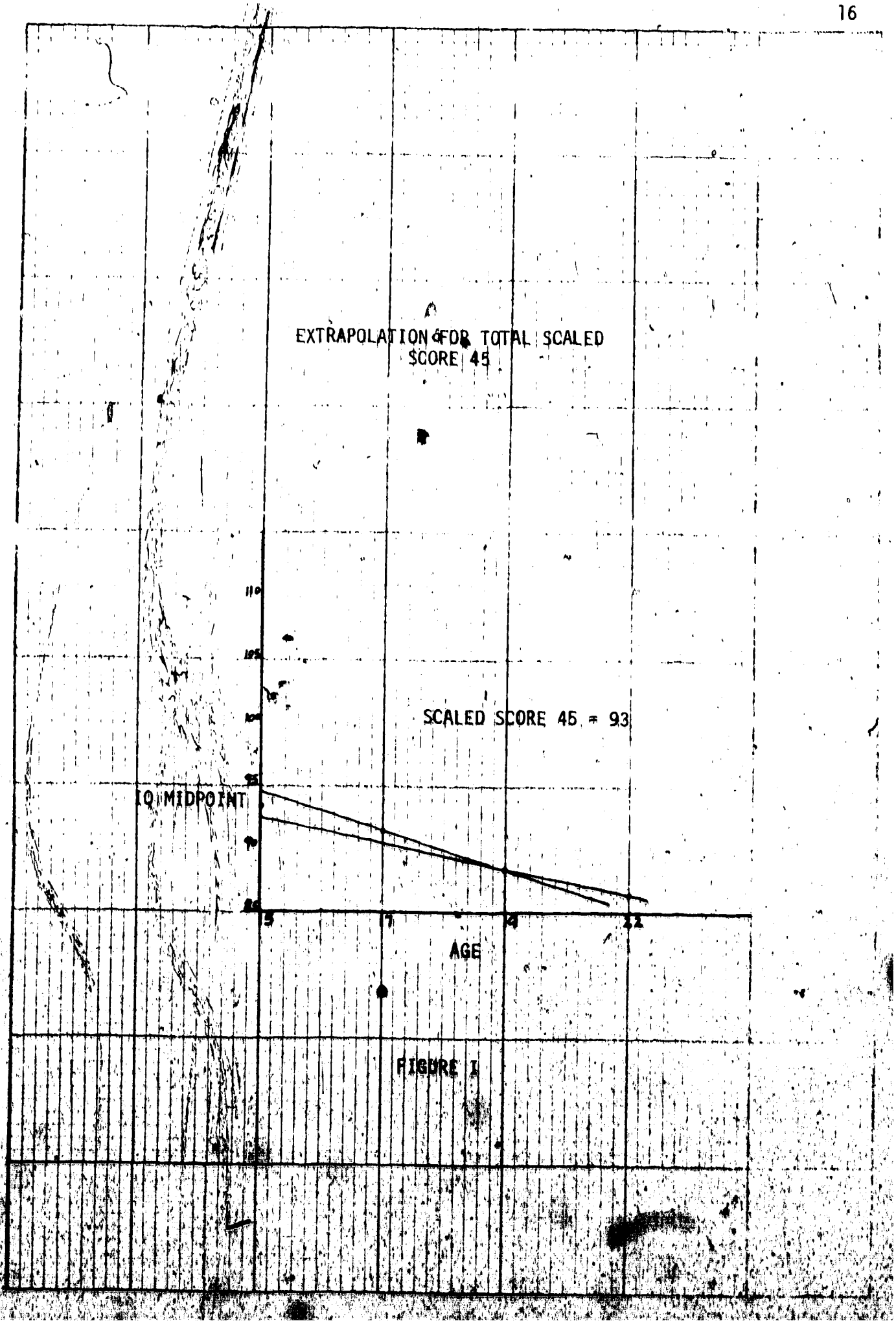

EXTRAPOLATION FOR TOTAL SCALED SCORE 45
SCALED SCORE 45 = 93
IQ MIDPOINT
AGE

FIGURE I

Appendix. As an example, a WAIS total scaled score of 45 for Verbal performance is plotted for corresponding IQ's against three age levels drawn from the Wechsler Adult Intelligence Scale Manual (1955, p. 78-80). Results of other graphic representations indicated that the lines formed between ages 16 to 24 were so nearly linear, it was possible to apply linear equations to each of the total scaled scores on the Verbal, Performance and Full Scale IQ equivalents. IQ extrapolations were obtained for ages 15 years 0 months, 15 years 3 months, 15 years 6 months and 15 years 9 months.

Since the IQ points obtained from the manual covered an age range of 2 to 4 years, in cases where the linear equation obtained two points, a mid point was established and rounded to the nearest whole IQ value. A similar technique was used by Silberberg and Feldt (1966) for interpolating Peabody Picture Vocabulary Scores.

New extrapolated norms (Appendix A) were applied to the WAIS tests. Correlations and probabilities for differences between means were then computed for the WISC and adjusted WAIS scores.

CHAPTER IV

RESULTS

Analyses of the data were carried out as described in Chapter III. The first analysis of the data involved tests of the significance of differences between (a) mean IQ quotients on the WISC and WAIS, (b) mean sub-test scaled scores on the WISC and corresponding scores on the WAIS, (c) mean IQ quotients of the CLT and the WISC, and (d) mean IQ quotients of the CLT and the WAIS.

The second analysis of the data included computation of the Product Moment Correlations between (a) the Verbal Performance and Full Scale IQ quotients on the WISC and corresponding scores on the WAIS, (b) the sub-test scaled scores on the WISC and WAIS, (c) the CLT Verbal and Non-Verbal IQ quotients and the corresponding WISC and WAIS quotients.

In the final analysis, correlation coefficients were computed and tests for significance of differences between mean quotients were obtained for WISC and adjusted WAIS scores on the Verbal, Performance and Full Scales.

The null hypotheses for each comparison between the WISC, WAIS and CLT are reported below. Each of the hypothesis is followed by tables summarizing the results of the analysis for each of the conditions. A level of significance of .05 was deemed necessary for rejection of the null hypothesis.

Hypothesis Testing

The means, standard deviations of the Verbal, Performance, Full Scales, as well as the sub-tests on the WISC and WAIS were obtained and are reported in Table I. The results were used to support or reject the following null hypotheses which developed out of the aims of this study.

1. There is no significant difference between the Verbal IQ quotients obtained by students on the WISC or the WAIS.
2. There is no significant difference between the Performance IQ quotients obtained by students on the WISC or the WAIS.
3. There is no significant difference between the Full Scale IQ quotients obtained by students on the WISC or WAIS.
4. There is no significant difference between the mean Information sub-test score on the WISC and the mean Information sub-test score on the WAIS.
5. There is no significant difference between the Comprehension sub-test mean score on the WISC and the mean Comprehension sub-test score on the WAIS.
6. There is no significant difference between the Arithmetic sub-test mean score on the WISC and the corresponding mean score on the WAIS.
7. There is no significant difference between the Similarities sub-test mean score on the WISC and the corresponding mean score on the WAIS.
8. There is no significant difference between the Vocabulary sub-test mean score on the WISC and the corresponding mean score on the WAIS.

9. There is no significant difference between the Picture Completion sub-test mean score on the WISC and the corresponding mean score on the WAIS.
10. There is no significant difference between the Picture Arrangement sub-test mean score on the WISC and the corresponding mean score on the WAIS.
11. There is no significant difference between the Block Design sub-test mean score on the WISC and the corresponding mean score on the WAIS.
12. There is no significant difference between the Object Assembly sub-test mean score on the WISC and the corresponding mean score on the WAIS.
13. There is no significant difference between the Coding (Digit Symbol) sub-test score on the WISC and the corresponding mean score on the WAIS.

On the basis of the results reported in Table I, null hypotheses one, two and three were rejected. The differences between means on the Verbal, Performance and Full Scale IQ quotients were 2.70, 5.67 and 4,76, respectively. It may be noted that the mean WISC IQ was higher than the mean WAIS IQ in all three comparisons.

Significant differences between means were also found to exist on the Information, Comprehension, Similarities, Picture Completion and Coding (Digit Symbol) sub-tests. Thus, hypotheses four, five, seven, nine and thirteen are also rejected.

Pearson Product Moment Correlations were found between the IQ quotients and sub-tests on the WISC and WAIS and are reported in

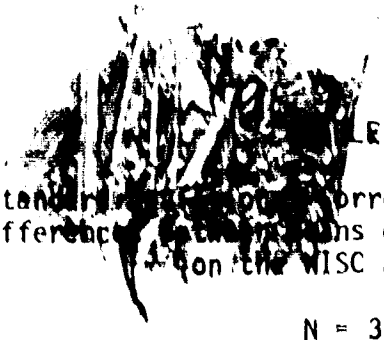


TABLE I

Means, Standard Deviations, Correlations, and Probabilities of Differences between Means of IQ's and Scaled Scores on the WISC and WAIS

N = 30

SCALE	WISC		WAIS			
	MEAN	SD	MEAN	SD	r	p
Intelligence Quotients						
Verbal	104.73	12.15	102.03	7.95	.877	.031
Performance	113.67	13.14	108.00	9.78	.609	.007
Full Scale	109.83	12.15	105.07	7.74	.850	.001
Scaled Scores						
Information	10.80	2.85	9.40	1.52	.616	.002
Comprehension	10.03	3.48	8.50	2.46	.590	.006
Arithmetic	10.07	2.52	9.73	2.16	.459	.463
Similarities	12.27	2.52	10.67	1.49	.575	.000
Vocabulary	9.63	1.35	9.07	2.15	.650	.067
Picture Completion	10.83	3.10	9.57	1.61	.185	.039
Picture Arrangement	10.20	3.40	10.50	2.42	.437	.611
Block Design	11.90	2.82	11.27	2.97	.575	.204
Object Assembly	12.57	2.25	11.70	2.48	.445	.068
Coding	14.67	2.82	11.80	2.54	.674	.000

Table I as well. The following conclusions were made:

The Verbal, Performance and Full Scale IQ on the WISC correlated highly with those on the WAIS. The highest correlation was between the two Verbal batteries (.877). The level of correlation is consistent with values reported by Quereshi (1968 b) and Quereshi and Miller (1970).

Low, but generally significant correlations (beyond the .05 level) were found between all the individual sub-tests except Picture Completion which was (.185). The highest correlations among sub-tests on the Verbal scale are for Vocabulary and Information (.650 and .616, respectively). These results are consistent with those reported by Ross and Morledge (1967) with students who were 16 years of age.

The means and standard deviations of the Verbal and Performance scales, between the Canadian Lorge-Thorndike (CLT) and the two Wechsler scales (WISC and WAIS) were found and are reported in Table II. As with Table I, the results were used to support or reject hypotheses fourteen through seventeen which were developed out of the aims of the study.

14. There is no significant difference between the CLT Verbal IQ quotients and the WISC Verbal IQ quotients.
15. There is no significant difference between the CLT Non-Verbal IQ quotient and the WISC Performance IQ quotient.
16. There is no significant difference between the CLT Verbal IQ quotient and the WAIS Verbal IQ quotient.
17. There is no significant difference between the CLT Non-Verbal IQ quotient and the WAIS Performance IQ quotient.

TABLE II

Means, Standard Deviations, Correlations and Probabilities of Differences Between Means to Compare the CLT IQ Quotients to the WISC and WAIS IQ Quotients

Scale	WISC		CLT		r	p	WAIS		CLT		r	p
	Mean	SD	Mean	SD			Mean	SD	Mean	SD		
Verbal	104.7	12.15	107.6	11.56	.615	.149	102.0	7.93	107.6	11.56	.634	.003
Performance (Non-Verbal)	113.6	13.14	110.4	10.17	.478	.159	108.0	9.78	110.4	10.17	.223	.820

On the basis of the results in Table II, hypotheses fourteen, fifteen and seventeen are supported by the probability results which indicate the difference between the Verbal and Performance (Non-Verbal) scores on the WISC and CLT are not significant. The same can be said for the Performance means on the CLT and the WAIS. Hypothesis sixteen is rejected, on the other hand, since the difference between means for the Verbal scales of the WAIS and the CLT are significantly different beyond the .05 level.

Pearson Product Moment Correlations were obtained between the CLT IQ quotients and the WISC, WAIS respectively and are reported in Table II as well. On the basis of those findings the following conclusions were made:

Verbal and Performance correlation coefficients between the WISC and CLT are relatively low but significant at the .01 level. Correlations between the WAIS and CLT are significant at the .01 level for Verbal scores and at the .05 level of significance for Performance (Non-Verbal) scores. There may be some similarity between the three test batteries; however, correlations as low as these account for only 17-36% of the variance which, although low, are consistent with some previous findings by Corwin (1966) and Sonneman (1964).

There exists less relationship between the Performance (Non-Verbal) batteries of the Wechsler scales and the CLT. These results are consistent with reported common variance between the CLT and WISC Verbal batteries by Neufeld (1973).

TABLE III

Correlations and Probabilities for Differences Between Means for the WISC with the WAIS and Adjusted WAIS

Scales	Correlation			P
	WISC Verbal	WISC Performance	WISC Full Scale	
WAIS Verbal	.877			.031
WAIS Performance		.609		.007
WAIS Full Scale			.850	.001
Adjusted WAIS Verbal	.880			.195
Adjusted WAIS Performance		.591		.049
Adjusted WAIS Full Scale			.854	.007

The probabilities of differences between means on the WISC and the adjusted WAIS were computed and are reported in TABLE III. The results were used to support or reject the following null hypotheses (eighteen through twenty) which were developed out of the aims of the study.

18. There is no significant difference between the WISC Verbal IQ quotients and the adjusted WAIS Verbal IQ quotients.
19. There is no significant difference between the WISC Performance IQ quotients and the adjusted WAIS Performance quotients.
20. There is no significant difference between the WISC Full Scale IQ quotients and the adjusted WAIS Full Scale quotients.

On the basis of the results reported in Table III, null hypothesis eighteen is supported since there is no significant difference between the WISC Verbal IQ and the adjusted WAIS Verbal IQ Quotient. Significant differences were observed between the means on the Performance and Full Scale IQ's of the WISC and adjusted WAIS. Thus, hypotheses nineteen and twenty are rejected.

Pearson Product Moment Correlations were found between the subjects scores on the WISC and adjusted WAIS and are reported in Table III. As was expected, the Verbal, Performance and Full Scale IQ's continue to correlate highly with those of the adjusted WAIS.

TABLE IV

Means and Standard Deviations of IQ Scores on the WISC, WAIS and Adjusted WAIS

Original WAIS	Mean	SD	Adjusted WAIS	Mean	SD	WISC	Mean	SD
Verbal	102.03	7.95	Verbal	103.17	8.00	Verbal	104.73	12.15
Performance	108.00	9.78	Performance	109.57	9.76	Performance	113.67	13.14
Full Scale	105.07	7.74	Full Scale	106.17	7.64	Full Scale	109.83	12.15

Table IV contains the means and standard deviations of IQ scores on the WISC, WAIS and the adjusted WAIS. Analysis of the table indicates the following:

The difference between the means on the Verbal, Performance and Full Scale IQ quotients are now 1.56, 4.10 and 3.66

respectively, when the adjusted WAIS scores are compared to the WISC. Although the extrapolation procedures have reduced the difference (originally 2.70, 5.67 and 4.76), it may still be noted that the mean WISC IQ remained higher than the mean WAIS IQ.

Standard deviations in Table IV indicate that the WISC tends to be a more discriminating instrument for students who are fifteen years of age than are either the WAIS or the adjusted WAIS.

Summary of the Results

Conclusions were drawn regarding the twenty null hypotheses and results were obtained by computing t-tests for differences between means. The results may be summarized as follows:

1. There is a significant difference between the Verbal, Performance and Full Scale quotients on the WISC and WAIS.
2. There is a significant difference between the Information, Comprehension, Similarities, Picture Completion and Coding (Digit Symbol) sub-tests on the WISC and corresponding WAIS sub-tests.
3. There is no significant difference between the Arithmetic, Vocabulary, Picture Arrangement, Block Design and Object Assembly sub-tests on the WISC and corresponding WAIS sub-tests.
4. There is no significant difference between Verbal and Performance IQ quotients of the WISC and CLT or between the WAIS and CLT Performance IQ quotients.
5. There is a significant different between the WAIS Verbal IQ quotient and the corresponding CLT quotient.

6. There is no significant difference between the WISC Verbal IQ quotient and the Adjusted WAIS quotient.
7. There is a significant difference between the Performance and Full Scale IQ's on the WISC and adjusted WAIS.

CHAPTER V

DISCUSSION, CONCLUSIONS AND IMPLICATIONS

Discussion

It seems evident from the results of correlations between the WISC and WAIS that the instruments seem highly related; however, the means for Verbal, Performance and Full Scale IQ's are significantly higher on the WISC than on the WAIS. Thus, in spite of the high correlations (.877, .609, .850, respectively) between the WISC and WAIS, the IQ scores cannot be deemed equivalent.

The t-tests on differences between means establish that the WISC mean scores are significantly higher than WAIS means. The fact that 16 year old norms for the WAIS were applied to the 30 subjects who had not yet attained the age of 16 years may be one of the causal factors for the reported difference.

The t-tests for differences between means showed WISC means to be significantly higher than WAIS means in five sub-test areas: Information, Comprehension, Similarities, Picture Completion and Coding. It would appear that the additional educational experience of a 16 year old may account for the higher WISC scores in Information, Comprehension and Similarities.

Correlations between equivalent sub-tests for the WISC and WAIS are generally low but significant at the .05 level. There is some question regarding the very low correlation between the WISC and WAIS Picture Completion scores since on the surface at least, these tasks are very similar. However, the administration procedures with regard to Picture Completion tasks are different in terms of time and

termination point. The WAIS allows a maximum exposure of twenty seconds for each item and all items are shown to the subject, while the WISC allows a maximum exposure of fifteen seconds for each item and the test is discontinued following four consecutive failures. Thus, it can only be assumed that these two sub-tests are not equivalent.

Further conclusions derived from the data lend evidence to support the hypothesis that neither the WISC nor WAIS is equivalent to the Canadian Lorge-Thorndike. The t-tests on differences of means between the Verbal and Performance scores on the WISC were significantly different at the .001 level. Such was the case with the WAIS as well. Lorge-Thorndike Verbal and Non-Verbal mean scores did not show significant differences. Correlations between the WISC Verbal and Performance scores was .533 and between the WAIS Verbal and Performance scores .415. However, correlations between the CLT Verbal and Non-Verbal scores was higher at .688. This may indicate that there is a great deal of overlap in what is being tested by the two scales of the CLT.

Conclusions based on the test data regarding the Lorge Thorndike might be considered in light of earlier research. Nyberg et al. (1969) found that IQ's which are derived from the Non-Verbal form of the test should not be compared directly to those from the Verbal form of the test. Nyberg further concluded that the Non-Verbal battery will not predict school performance as well as the

Verbal battery for the average child. The present study found apparent differences between how the WISC and WAIS ranked the thirty subjects and how the CLT ranked those same subjects, particularly for the Non-Verbal scale. It is possible that these differences may rest in the fact that the CLT does not measure the same types of abilities measured by the two Wechsler scales (see Lorge-Thorndike Technical Manual, p. 14). Thus, it appears that the CLT does not yield an equivalent IQ score and to that degree is not a suitable alternative to the WISC and WAIS.

Conclusions

Conclusions based on the analysis between the WISC and WAIS in the present investigation indicate that although the two tests correlate highly, mean scores obtained differ significantly. The conclusion that the WISC and WAIS are not equivalent tests is inescapable since the WAIS was not designed for use with subjects below the age of sixteen. However, the extrapolation technique used in derivation of the WAIS norms proved to yield quotients which are more consistent with the WISC quotients than are the original WAIS quotients. If the psychologist wishes to substitute the adjusted WAIS for the WISC, he can assume from the test results that for a similar population, the Verbal mean scores will not differ significantly. The Performance and Full Scale IQ's differ significantly; the mean IQ differences are approximately three points, an indication that the two scales do give similar results.

In terms of this study, the discussion and conclusions above seem to answer the questions set forth in Chapter I. It seems possible for a psychologist to administer the WAIS to a 15 year old when circumstances deem this procedure necessary. The IQ quotient derived

from the WAIS for a particular 15 year old will be quite similar to that IQ quotient obtained on the WISC.

Implications for Further Research

In view of the above test results, some consideration must be given to the methodological approach of this study. A larger sample incorporating a wider range of IQ scores would have been more desirable. This study leaves unanswered, the question as to whether the same results would have been obtained for a sample which included subjects in the below-average range of intelligence since previous research indicates that this group does significantly better on the WAIS. Further studies incorporating the full range of subjects would be wise to analyse both the high and low functioning subjects separately to check for this effect.

The present study has uncovered issues which seem worthy of further investigation. To begin with, the WISC will not always test the limits of a student who has exceptional ability in a specific area. The use of the WAIS, on the other hand, will test these limits and perhaps produce a more accurate clinical picture. If the extrapolation procedures carried out in the present investigation were obtained and utilized, the psychologist could be assured of obtaining a more similar IQ score on the WAIS for a fifteen year old subject, as well as testing the limits of a particular subjects ability.

REFERENCES

Barclay, A., Griedman, E.C., & Fidel, Y. A Comparative Study of WISC and WAIS Performance Scores and Score Patterns Among Institutionalized Retardates, Journal of Mental Deficiency Research, 1969, 13, 99-105.

Barclay, A., & Carolan, P. A Comparative Study of the WISC and the Stanford Binet Intelligence Scale, Form L-M, Journal of Consulting Psychology, 1966, 30, 563.

Corwin, B.J. The Influence of Culture and Language on Performance, Journal of School Psychology, 1965, 3, 41-47.

Dunn, L.M., & Brooks, S.T. PPVT Performance of Educable Mentally Retarded Children, Training School Bulletin, 1960, 57, 35-40.

Grun, H.B. A Statistical Comparison of the WISC and the WAIS, Dissertation Abstracts, 1966, 26, 5866.

Hannon, J.E., & Kicklighter, R. The WAIS versus WISC in Adolescents Journal of Consulting and Clinical Psychology, 1970, 35, 179-182.

Himelstein, P. Research with the Stanford Binet, Form L-M, Psychological Bulletin, 1966, 65, 156-164.

Jones, S. The WISC Applied to a Sample of London Primary School Children, British Journal of Educational Psychology, 1962, 32, 119-133.

Kirk, R.E. Experimental Design: Procedures for the Behavioral Sciences, Wadsworth: Brooks and Cole, Belmont, Calif., 1968.

Levinson, B.M. A Comparative Study of Verbal and Performance Ability of Monolingual and Bilingual Native Born Jewish Preschool Children of Traditional Patentage, Journal of Genetic Psychology, 1960, 97, 93-113(a).

Lindstrom, A.E. A Comparison of the PPVT and the WISC, Unpublished Manuscript, Edina-Morningside Public Schools Library, Edina, Minn., 1968.

Littell, W.M. The WISC - A Review of a Decade of Research, Psychological Bulletin, 1960, 57, 132-162.

Lorge, I., Thorndike, R., & Hagen, E. Technical Manual, Lorge-Thorndike Intelligence Tests, New York: Houghton Mifflin, 1966.

Lucito, L., & Gallagher, J. Intellectual Pattersn of Highly Gifted Children on the WISC, Peabody Journal of Education, 1960, 38, 131-136.

Matheny, Adam P., Jr. Comparability of WISC and PPVT Scores Among Young Children, The Journal of Exceptional Children, 38(2), 147-150, 1971.

Maxwell, Michael T. The Relationship Between the WISC and SIT, Journal of Child Study, 1(3), 164-171, 1971.

McCoy, G.F. Scores of High and Low Achieving Academically Gifted Pupils in Individual Measures of Intellectual Ability, American Psychologist, 1963, 18, 378.

Neufeld, H. The Relationship Between the WISC and the Canadian Lorge-Thorndike Intelligence Tests, An Unpublished Master's Thesis, University of Alberta, Edmonton, 1973.

Nyberg, V.R. Canadian Lorge-Thorndike Intelligence Test - A User's Appraisal. A paper presented at the Canadian Guidance and Counselling Assoc. Convention, Edmonton, Alberta, June 1969.

Ogdon, Donald P. WISC IQ's for the Mentally Retarded, Journal of Consulting Psychology, 1960, 24, 187-188.

Querishi, M.Y., & Miller, J.M. The Comparability of the WAIS, WISC, and WBII, Journal of Educational Measurement, 1970, 7, 105-111.

Querishi, M.Y. The Comparability of WAIS and WISC Sub-test Scores and IQ Estimates, Journal of Psychology, 1968, 68, 73-82.

Reger, R. WISC, WRAT and CMAS Scores in Retarded Children, American Journal of Mental Deficiency, 1966, 70, 717-721.

Rohrs, F.N.,& Haworth, M.R. The 1960 Stanford Binet, WISC, and Goodenough's Test with Mentally Retarded Children; Journal of Consulting and Clinical Psychology, 1967, 31, 331-332.

Ross, R.T., & Morledge, J. A Comparison of the WISC and WAIS at Chronol. Age 16, Journal of Consulting Psychology, 1967, 31, 331-332.

Silberberg, N.E., & Feldt, L.S. The PPVT As An IQ Screening Technique for Primary Grade Referral Cases, Journal of School Psychology, 1966, 5, 21-30.

Silverstein, A.B. WISC & WAIS IQs for the Mentally Retarded, American Journal of Mental Deficiency, 1963, 67, 617-618 (b).

Simpson, R.L. A Study of the Comparability of the WISC and WAIS, Journal of Consulting and Clinical Psychology, 1970, 34,

TEE-TEB

Sonneman, L.J. A Study of the Relationship Between Four Tests of Intelligence and One Test of Scholastic Ability, Dissertation Abstracts, 1964, 24, 4555.

Walker, K.P., & Gross, F.L. IQ Stability Among Educable Mentally Retarded Children, Training School Bulletin, 1970, 66, 181-187.

Wechsler, D. The Measurement and Appraisal of Adult Intelligence, 4th Ed., Baltimore: Williams and Wilkins, 1958.

Wechsler, David. The Wechsler Adult Intelligence Scale Manual, 1955.

Zimmerman, I.L., & Williamson, J. A Comparison of WISC and Stanford Binet LM Scores for Mentally Retarded School Children, An Unpublished Manuscript, 1965.

APPENDIX A

Extrapolated Verbal IQ Equivalents of Sums of Scales Scores for 14 Year Old Subjects on the WAIS

Total Scaled Score	Age 15-0	Age 15-3	Age 15-6	Age 15-9
	IQ	IQ	IQ	IQ
45	92	92	92	92
46	93	93	93	93
47	94	94	94	94
48	95	95	95	95
49	95	95	95	95
50	96	96	66	96
51	97	97	97	97
52	98	98	98	98
53	99	99	99	99
54	100	100	100	100
55	101	101	101	101
56	102	102	102	102
57	103	103	103	103
58	104	104	104	104
59	105	105	105	105
60	106	106	106	106
61	107	107	107	107
62	108	108	108	108
63	110	109	109	109
64	111	110	110	110
65	112	111	111	111
66	113	112	112	112
67	114	113	113	113
68	115	114	114	114
69	116	115	115	115
70	117	116	116	116
71	117	117	118	117
72	118	118	119	118
73	119	119	120	119
74	120	120	121	120
75	121	121	122	121
76	122	122	123	122
77	123	123	124	123
78	124	124	125	124
79	125	125	126	125
80	126	126	127	126
81	127	127	128	127
82	128	128	129	128
83	129	129	130	129
84	130	130	131	130

Extrapolated Performance IQ Equivalents of Sums of Scaled Scores for 15 Year Old Subjects on the WAIS

Total Scaled Score	Age 15-0	Age 15-3	Age 15-6	Age 15-9
	IQ	IQ	IQ	IQ
34	83	83	82	82
35	83	83	83	82
36	[illegible]	84	84	83
37	86	86	86	85
38	87	87	88	87
39	88	88	88	87
40	90	90	90	89
41	91	91	91	91
42	92	92	92	91
43	93	93	93	93
44	95	95	95	95
45	96	96	96	95
46	97	97	97	97
47	99	99	99	99
48	100	100	100	99
49	101	101	101	100
50	103	103	103	103
51	104	104	104	104
52	105	105	104	104
53	107	107	107	107
54	108	108	108	108
55	109	109	108	108
56	110	110	110	110
57	112	112	112	112
58	113	113	112	112
59	114	114	114	114
60	116	116	116	116
61	117	117	116	116
62	118	118	117	117
63	120	120	120	120
64	121	121	121	121
65	122	122	121	121
66	124	124	124	124
67	125	125	125	125
68	126	126	125	125
69	127	127	127	127
70	129	129	129	129
71	130	130	129	129
72	131	131	131	131
73	133	133	133	133

Extrapolated Full Scale IQ Equivalents of Sums of Scaled Scores for 15 Year Old Subjects on the WAIS

Total Scaled Score	Age 15-0	Age 15-3	Age 15-6	Age 15-9
	IQ	IQ	IQ	IQ
87	91	91	91	91
88	92	92	92	92
89	92	92	92	92
90	93	93	93	93
91	94	94	94	94
92	94	94	94	94
93	95	95	95	95
94	95	95	95	95
95	96	96	96	96
96	97	97	97	97
97	97	97	97	97
98	98	98	98	98
99	98	98	98	98
100	99	99	99	99
101	100	100	100	100
102	100	100	100	100
103	101	101	101	101
104	101	101	101	101
105	102	102	102	102
106	103	103	103	103
107	103	103	103	103
108	104	104	104	104
109	105	105	104	104
110	105	105	105	105
111	106	106	106	106
112	106	106	106	106
113	107	107	107	107
114	107	107	107	107
115	108	108	108	108
116	109	109	109	109
117	109	109	109	109
118	110	110	110	110
119	110	110	110	110
120	111	111	111	111
121	111	111	111	111
122	112	112	112	112
123	113	113	113	113
124	113	113	113	113
125	114	114	114	114
126	114	114	114	114

(cont'd)

Total Scaled Score	Age 15-0	Age 15-3	Age 15-6	Age 15-9
	IQ	IQ	IQ	IQ
127	115	115	115	115
128	116	116	116	116
129	116	116	116	116
130	117	117	117	117
131	117	117	117	117
132	118	118	118	118
133	119	119	119	119
134	119	119	119	119
135	120	120	120	120
136	120	120	120	120
137	121	121	121	121
138	122	122	122	122
139	122	122	122	122