A STUDY OF THE INFORMATION AND COMPREHENSION ABILITIES OF MENTALLY RETARDED, NORMAL AND SUPERIOR CHILDREN

by

Bernice Reiff Epperson
B. S. (University of California at Berkeley) 1954

THESIS

Submitted in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

AT THE

SACRAMENTO STATE COLLEGE

Approved:

Rodger Bishton, Chairman
Walter T. Petty

Date 7/24/58
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. THE PROBLEM AND DEFINITION OF TERMS</td>
<td>1</td>
</tr>
<tr>
<td>The Problem</td>
<td>2</td>
</tr>
<tr>
<td>Statement of the problem</td>
<td>2</td>
</tr>
<tr>
<td>Hypothesis I</td>
<td>2</td>
</tr>
<tr>
<td>Hypothesis II</td>
<td>3</td>
</tr>
<tr>
<td>Significance of the Problem</td>
<td>3</td>
</tr>
<tr>
<td>Limitations of the Study</td>
<td>5</td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>5</td>
</tr>
<tr>
<td>Plan of the Study</td>
<td>7</td>
</tr>
<tr>
<td>II. REVIEW OF RELATED LITERATURE</td>
<td>8</td>
</tr>
<tr>
<td>Qualitative Analysis of Mental Age</td>
<td>8</td>
</tr>
<tr>
<td>Relation of Mental Age to the Specific Curriculum Area of Reading</td>
<td>13</td>
</tr>
<tr>
<td>The Wechsler Intelligence Scale for Children</td>
<td>17</td>
</tr>
<tr>
<td>III. SOURCE OF DATA AND METHODOLOGY</td>
<td>20</td>
</tr>
<tr>
<td>Overview of Procedures</td>
<td>20</td>
</tr>
<tr>
<td>Selection of the Sample</td>
<td>21</td>
</tr>
<tr>
<td>Description of the Instrument Used</td>
<td>24</td>
</tr>
<tr>
<td>Wechsler Intelligence Scale for Children: General</td>
<td>24</td>
</tr>
</tbody>
</table>
LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Summary of Sample Distribution</td>
<td>23</td>
</tr>
<tr>
<td>II. Summary of the Data (In Mean Scores)</td>
<td>28</td>
</tr>
<tr>
<td>III. Results of Deviations</td>
<td>29</td>
</tr>
<tr>
<td>IV. Variance Table for the Information Subtest</td>
<td>30</td>
</tr>
<tr>
<td>V. Difference in the Group Means on the Information Subtest of the Wechsler Intelligence Scale for Children</td>
<td>31</td>
</tr>
<tr>
<td>VI. Variance Table for Comprehension Subtest of the Wechsler Intelligence Scale for Children</td>
<td>32</td>
</tr>
<tr>
<td>VII. Difference in the Group Means on the Comprehension Subtest of the Wechsler Intelligence Scale for Children</td>
<td>33</td>
</tr>
<tr>
<td>VIII. Raw Data for Mentally Retarded Group</td>
<td>49</td>
</tr>
<tr>
<td>IX. Raw Data for Normal Group</td>
<td>50</td>
</tr>
<tr>
<td>X. Raw Data for Superior Group</td>
<td>51</td>
</tr>
</tbody>
</table>
CHAPTER I

THE PROBLEM AND DEFINITION OF TERMS

With the recent accelerated interest in special education, an increasing concern has developed for methods and curriculum to be used in teaching those who deviate intellectually from the average, the mentally retarded and the superior. In order to develop methods and curriculum for teaching the mentally retarded and the superior, more must be known about how mental age and experience (as measured by chronological age) affect learning.

Curriculum and methods have been developed for the mentally retarded and the superior with regard for the mental age of the children concerned. This concept is supported by Kirk\(^1\) in this statement made with regard to the mentally retarded: "the only adjustment made for the mentally handicapped is that the material designed for eight-year-old normal children will be used for mentally handicapped children with a mental age of eight." This statement is based upon some questionable assumptions: (1) that the needs of these children do not differ, and (2) that the mental age is representative of a specific ability rather than combinations of

---

abilities. It could be possible, however, that groups who differ in chronological age, even though their mental ages are the same, may differ in patterns of abilities as measured by the subtests of intelligence tests.

This study was an attempt to investigate two aspects of intelligence that might qualify the extent to which the principle, that a curriculum designed for a normal child of a specific mental age is applicable to all children of that same mental age, was useful. The question was the extent to which the abilities to comprehend and remember specific information are alike between the deviate groups and the average.

I. THE PROBLEM

Statement of the problem. The purpose of this study was to compare mentally retarded children, normal children, and superior children of like mental ages in the specific dimensions of intelligence as measured by the Comprehension and Information subtests of the Wechsler Intelligence Scale for Children.²

Two null hypotheses were tested in this study.

Hypothesis I. There is no significant difference between the three groups on the Information subtest of the Wechsler Intelligence Scale for Children.

²Also referred to as WISC.
Hypothesis II. There is no significant difference between the scores of the three groups (mentally retarded, normal and superior) on the Comprehension subtest of the Wechsler Intelligence Scale for Children.

II. SIGNIFICANCE OF THE PROBLEM

Success in school is related to success in reading. As a result, the public, especially the parents and even the child, place great importance on reading and charge the school with the responsibility of making every child proficient in reading. There is some experimental evidence to support the fact that there is relationship between reading proficiency and general ability. A high correlation between vocabulary and total intelligence was obtained on the WISC. There is a higher correlation between the verbal scale of the WISC and school success than between the performance scale and school success which leads one to question the relative correlations between the verbal subtest scores and school success, defined here to be success in reading.

The special dimensions of intelligence illustrated by performance on the Information and Comprehension subtests of the WISC should give some insight into the reading problems peculiar to each of the groups being studied.
Information (memory for details) and comprehension are used in most tests to determine some aspects of reading ability. Some tests purport to test ability level and others purport to test the effective level of reading comprehension and information. The Durrell-Sullivan Reading Capacity Test attempts to measure comprehension ability and ability to identify specific word meanings. The Gates Reading Survey for Grades 3-10, California Test of Reading Achievement, S.R.A. Achievement Test, the Diagnostic Reading Test, and the Durrell-Sullivan Reading Diagnostic Test and Durrell-Sullivan Reading Achievement Test are some that attempt to measure comprehension and consider it one of the main factors in reading. They also direct attention toward memory of specific details and place some emphasis upon this ability in the total measure of reading ability.

Burks and Bruce have suggested that there is a difference in the specific dimensions of intelligence as measured by the WISC Information and Comprehension subtests between poor and good readers. If there were the same differences between the groups studied here, some implications for the teaching of reading to the deviate groups could result.

---

3Harold F. Burks and Paul Bruce, "Characteristics of Poor and Good Readers as Disclosed by the Wechsler Intelligence Scale for Children," Journal of Educational Psychology, 46 (1955), pp. 488-489.
III. LIMITATIONS OF THE STUDY

There were some limitations to this study. These are listed below.

1. The smallness of sample size and the method of sampling had a limiting effect on the results of the study.

2. The sample consisted of three groups. Two of the groups, the superior and the normal, were taken from a relatively high socio-economic group; the third group, the mentally retarded group, was taken from a relatively low socio-economic group.

3. The mental age was accepted as that derived by the California Test of Mental Maturity. No attempt was made to estimate the true mental age. In the case of the mentally retarded the score that was used in placement was used for the calculation of the mental age. In all cases, this score was either that of the Stanford-Binet or the WISC.

IV. DEFINITION OF TERMS

In many instances, some of the terms used in this study have been used elsewhere in the literature with different meanings. Because of this variation in meaning of terms, it was necessary here to define mentally retarded children, normal children, superior children, information and comprehension.
Mentally retarded child. A mentally retarded child was a child, in a special class, whose estimated ability was based upon an I.Q. between 50 and 80 as measured with the California Test of Mental Maturity.

Normal child. A normal child was a child, in a regular class, whose estimated ability was based upon an I.Q. between 90 and 109 as measured with the California Test of Mental Maturity.

Superior child. A superior child was a child, in a regular class, whose estimated ability was based upon an I.Q. above 120 as measured with the California Test of Mental Maturity.

Information. Information referred only to the measure of information obtained from the administration of the Information subtest of the WISC. This particular type of information required recall of previous learning.

Comprehension. Comprehension referred only to the measure of comprehension obtained from the administration of the Comprehension subtest of the WISC. It specifically deals with solutions to problems that are common to everyday experience.
V. PLAN OF THE STUDY

This chapter has been concerned with the orientation of the reader to the problem and its implications. The remaining chapters will be concerned with the review of related literature, source of data and procedures used in the study, the results, and conclusions and recommendations, in that sequence.
CHAPTER II

REVIEW OF RELATED LITERATURE

The problem being studied is specifically concerned with three areas of literature: (1) qualitative analysis of mental age, (2) relation of mental age to the specific curriculum area of reading, and (3) the Wechsler Intelligence Scale for Children: Information and Comprehension subtests. Studies involving each of these three areas will be considered under these separate headings.

I. QUALITATIVE ANALYSIS OF MENTAL AGE

With the increasing frequency of the use of intelligence tests in schools, some consideration should be given to the interpretation of the concept of mental age. Stroud emphasized the point that the mental age is a generality and that some care must be taken in interpreting the mental age to mean anything specific. He suggested several questions that should be considered along with the mental age concept: "Do mental ages of a given magnitude vary qualitatively? and Can we make the same prediction relative to school achievement of bright and dull children of like mental ages?"


2 Ibid., p. 78.
One of the first attempts to qualify mental age was a study by Merrill. With the Stanford-Binet Scale used as a measuring instrument, she concluded that mentally retarded children tended to be superior on items which were influenced by maturity and greater experience.

Also using the Stanford-Binet as a measuring instrument, Wallin found, in a study comparing dull and bright children, that the dull were superior to the bright in tasks of Counting Backward and Vocabulary. He pointed again to age and experience as an explanation for the relative success of the mentally dull over the bright.

Laycock and Stanley in a study comparing two groups, 40 old-dull and 40 young-bright of comparable mental age, on performance on the subtests of the Stanford-Binet, found no


statistically significant differences. Even though Kolstoe\textsuperscript{6} reviews this study as "the retarded group [were] more successful in reproductive tasks, while the bright were superior in memory and reasoning,"\textsuperscript{7} these can only be interpreted as trends in the results.

An extension of the previously mentioned study by Laycock and Stanley was made by Thompson and Magaret.\textsuperscript{8} By enlarging the sample population, they hoped to make the results more significant. Thompson and Magaret found a reliable difference between the groups on thirty items of the Stanford-Binet Scale, Form L. The analysis of the items indicated that the normal were superior on items of rote memory.

In a later study, Magaret and Thompson\textsuperscript{9} attempted to extend the investigation to the superior children. They found some indication that the mental defectives do better on items connected with test materials. They interpreted this


\textsuperscript{7}Ibid., p. 163.


to mean that greater experience gives this facility. The superior group were found to be superior to the defective group in memory items. The defective group was found to be superior on other items including the item Comprehension IV (0.005 P).

Ramesehan\textsuperscript{10} in a study of 53 bright (superior, mean I.Q. 115.2) and 35 dull pupils (normal, mean I.Q. 101.2) of like mental ages tested on the Chicago Tests of Primary Mental Abilities and the Iowa Tests of Educational Development, found the bright group significantly superior to the dull group on Verbal Meaning and Reasoning differences. The dull group was found to be significantly superior to the bright group in space.

On the Iowa Test of Educational Development the bright group was found to be superior to the dull group on all sub-tests with significant differences in the case of Corrective Writing, Quantitative Thinking, and General Vocabulary.

The most recent comprehensive study on the meaning of mental age was made by Kolstoe.\textsuperscript{11} In a study comparing 29 dull children with 29 bright children of comparable mental

\textsuperscript{10} R. A. Ramesehan, "Note on the Validity of Mental Age Concept," \textit{Journal of Educational Psychology}, 41 (January 1950), pp. 56-58.

\textsuperscript{11} Kolstoe, \textit{op. cit.}, pp. 161-168.
age, using the WISC as the measuring instrument, he found a significant difference between the dull and bright groups on the Comprehension, Coding, Symbol Copying (speed), PMA, Digit, Symbol Copying (accuracy). The dull children's performance was significantly superior on the Comprehension, Coding, Symbol Copying (speed) and PMA; the bright children's performance was superior on Digits and Symbol Copying (accuracy). No significant difference was found on the Information subtest between the two groups (F ratio .04).

Sandercock and Butler\(^{12}\) made an analysis of the performance of mental defectives on the WISC. They found no significant difference between the performance of the mental defectives on the level established for normal children on the Comprehension subtest (mean sign, .01). However, on the Information subtest, the mental defectives' performance was significantly lower than the norms established for the test (mean sign, 1.06).

In summary, a review of the literature on qualitative analysis of mental age suggests that there are differing abilities between the three groups being studied. The mentally retarded group seems to perform better on test items which require experience; the normal and bright children seem to be superior to the mentally retarded on memory items.

II. RELATION OF MENTAL AGE TO THE SPECIFIC CURRICULUM AREA OF READING

The question, "Can we make the same prediction relative to school achievement of bright and dull children of like mental ages?" was asked in the first section of this review. This section of the review of literature is concerned more specifically with the predictions that can be made about the particular curriculum area of reading.

Wheeler\textsuperscript{13} feels that if a child has difficulty in one of the requirements for reading he will be unable to read regardless of intelligence. He does not discuss the possibility that certain dimensions of intelligence may be related to reading ability. His discussion deals with total intelligence.

In an attempt to develop a reading comprehension measure, Bloomers and Lindquist\textsuperscript{14} stated that most reading tests required the subject to answer specific questions, read a selection containing the answer, and comprehend rapidly rather

\textsuperscript{13} Lester R. Wheeler, "Relation of Reading to Intelligence," \textit{School and Society}, 70 (October 1949), pp. 225-227.

than powerfully. These requirements are similar to those of the WISC: Information and Comprehension subtests.

Smith and Fillmore,\(^{15}\) in a comparison study of the Ammons Full Range Picture Vocabulary Test\(^{16}\) and the WISC for remedial reading cases, found a .73 correlation between the Verbal Scale and the Ammons FRPV Test. The correlation between the Vocabulary subtest of the Wechsler and the Ammons FRPV Test was even less significant. This would suggest that the Verbal Section and the Vocabulary subtest do not predict the same strengths and weaknesses in reading that the Ammons FRPV Test does.

One of the most comprehensive studies made in the area of reading and mental age was made by Bliesmer\(^{17}\) in which he studied bright and dull children of the same mental ages, using the Durrell Analysis of Reading Difficulty and the Iowa Tests of Basic Skills (Reading Comprehension Test: Advanced Battery). He found that the bright were superior


\(^{16}\)Also referred to as FRPV Test.

\(^{17}\)Emery P. Bliesmer, "Reading Abilities of Bright and Dull Children of Comparable Mental Ages," *Journal of Educational Psychology*, 45 (October 1954), pp. 321-331.
with respect to total reading comprehension, locating or recognizing factual details, recognizing main ideas, drawing inferences and conclusions. There was a suggestion of probable superiority of the bright with respect to memory for factual details and perception of relationships among definitely stated ideas. In general, the bright were superior to the dull in the more complex abilities.

Burks and Bruce, in a study of poor and good readers and their performance on the WISC, found that the poor readers were superior to the good readers in their performance on the Comprehension, Block Design, and Picture Arrangement subtests. The lack of need for long or short term symbolic memory on these particular tasks was used as an explanation for this difference. These subtests require associational clues from past experience but of a very commonplace nature. (For example, "What is the thing to do when you cut your finger? needs little or no symbolic associations.")

They found that the good readers were superior to the poor readers in (1) items where memory functions are most necessary, and (2) items where a given stimulus does not remain immediately available. The poor readers performed

---

18 Harold F. Burks and Paul Bruce, "Characteristics of Poor and Good Readers as Disclosed by the WISC," *Journal of Educational Psychology*, 46 (December 1955), pp. 488-489.

19 Ibid., p. 488.
especially poorly on the Information subtest. This difference Burk and Bruce attributed to lack of memory of specially learned material.

The Information subtest demands recall of specially learned material; the subject either knows the answer or does not. The low score on this test might possibly be influenced by the fact that, being a poor reader, the subject has had less opportunity to acquire knowledge.\(^{20}\)

Altus\(^{21}\) asked the question, "Is there a distinctive test pattern associated with scores on the WISC with severe reading disabilities?" She found, in a group of children with severe reading difficulties with I.Q.'s above 80, that the results on the Information subtest were significantly lower than on the Picture Completion, Vocabulary, and Digit Span subtests. The results on the Comprehension subtest were not significantly different, but higher than those on the Information subtest.

In summary, a review of the literature on the relation of mental age to reading suggests that it might be possible to make some predictions about reading success from particular intelligence subtest scores and some reading test scores, but it does not seem likely that these predictions can be made from the general mental age score.

\(^{20}\)Ibid., p. 489.

III. THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN

After the development of adult scales of intelligence, Wechsler found a need for an intelligence scale for use with children. Hence, he developed the Wechsler Intelligence Scale for Children. In developing this scale, he merely extended his adult scale, the Wechsler-Bellvue Intelligence Scale: Form II, to include additional items at the lower end of the scale to permit examination of children as young as five years of age.

Mental defectives were compared on their performance on the Wechsler-Bellvue Scales and the WISC by Vanderhost, et al. They found that the performance on the two tests resulted in similar I.Q. scores for the ages 11 to 16 years, inclusive.

Pastovic made a study of the validity of the WISC in which he states that it should not be considered as equivalent to a Binet I.Q. at age levels below ten years since the


Wechsler Scale score is consistently lower than that of the Binet.

In a study comparing the verbal and the non-verbal parts of the California Test of Mental Maturity and the WISC, Altus\textsuperscript{25} found the two tests "markedly" comparable in group evaluations, and "roughly" comparable in individual scores.

Sloan and Schneider\textsuperscript{26} found that the WISC has a high correlation with the Stanford-Binet and Grace Arthur performance tests and the Stanford-Binet verbal test.

In an attempt to select a short form of the WISC, Carleton and Stacey\textsuperscript{27} found correlations from .64 to .88 on subtest combinations to the Full Scale Score. These combinations of subtests which included the Comprehension and Information subtests resulted in correlations toward the lower extreme.

\textsuperscript{25} Grace Altus, "Relationships Between Verbal and Non-Verbal Parts of the California Test of Mental Maturity and the WISC," \textit{Journal of Consultant Psychology}, 19 (1952), pp. 143-144.

\textsuperscript{26} W. Sloan and Bernard Schneider, "A Study of WISC," \textit{American Journal of Mental Deficiency}, 55 (1951), pp. 573-576.

Estes found in a study of the effect of socio-economic status on performance on the WISC that second grade children from a high socio-economic group scored significantly higher than second grade children from a low socio-economic group. However, when the children were retested two years later, there was no longer a significant difference between the two groups.

In summary, the Wechsler Intelligence Scale for Children is an adaptation of the Wechsler-Bellvue Scale to test children with ages as low as five years. It has been found to test much the same abilities as those tested by the Stanford-Binet and the Grace Arthur Performance Scale. Socio-economic status appears to influence performance less as age increases.

---

CHAPTER III

SOURCE OF DATA AND METHODOLOGY

The purpose of this investigation was to compare three groups of children, mentally retarded, normal and superior, on their information and comprehension abilities. The Wechsler Intelligence Scale for Children, Information and Comprehension subtests, was the primary source of data. This chapter outlines the selection of the sample, describes the instrument used, describes the conditions under which the instrument was administered, reviews the scoring of the instrument used, and describes the treatment of the data.

I. OVERVIEW OF PROCEDURES

After the selection of the sample was made, the members of the sample were administered the Information and Comprehension subtests of the Wechsler Intelligence Scale for Children. The raw scores of these tests were used as data for analyzing differences between the three groups who participated in the study.
II. SELECTION OF THE SAMPLE

The selection of the sample was based upon mental age, chronological age, and school placement. The cumulative records were first reviewed for chronological ages; then they were checked for appropriate mental ages. The records of the mentally retarded were further studied for the cause of retardation. This was an attempt to eliminate any known cases of retardation due to brain injury because there is research that suggests that the intellectual functions of the brain injured differ from those of the familially retarded. The normal and superior samples were selected from regular classes; the mentally retarded sample was taken from a special class situation.

The calculation of the mental ages used in this study was based upon the individual scores of the California Test of Mental Maturity. In many cases with the mentally retarded group it was found that individuals were unable to register a score or a significant score on the California Test of Mental Maturity. In order to keep the mental age scores within the group relatively consistent, the score that was used in placing the individual in the special class situation was utilized. This information was the product of an individual test score, the Stanford-Binet: Form L, or the Wechsler Intelligence Scale for Children.
The sample was designed to include the groups as defined by Terman and Merrill\(^1\) as superior (I.Q. from 120-139), normal (I.Q. from 90-109), and mentally defectives, top group (I.Q. from 60-69).

The age range accepted in the study was from 7.5 to 15.0 years. The WISC was specifically designed for use with children between the ages of five and fifteen years which include the extremes of the age range in this study.

The thirty boys and girls who were subjects of this study all resided and attended schools in the area north of Sacramento. The members of the mentally retarded groups were of junior high school age and attended the junior high schools in the Grant Union High School District. The normal and superior populations represented in this sample were chosen from an elementary school in the North Sacramento Elementary School District.

The environment from which the members of these groups came were relatively the same except for the mentally retarded group. The mentally retarded group probably came from homes of lower socio-economic level than did the other groups inasmuch as the schools from which they came are situated in what is regarded as an underprivileged community.

The mentally retarded sample was taken from three separate junior high schools. The normal and superior samples were taken from one and the same elementary school.

A graphic description of the sample is given in Table I.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Chronological Age Range</th>
<th>Mean</th>
<th>Mental Age Range</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mentally retarded</td>
<td>10</td>
<td>14.2 - 15.0</td>
<td>14.6</td>
<td>9.3 - 10.4</td>
<td>9.77</td>
</tr>
<tr>
<td>Normal</td>
<td>10</td>
<td>9.5 - 10.5</td>
<td>10.1</td>
<td>9.6 - 10.4</td>
<td>10.09</td>
</tr>
<tr>
<td>Superior</td>
<td>10</td>
<td>7.5 - 8.0</td>
<td>7.8</td>
<td>9.5 - 10.6</td>
<td>10.08</td>
</tr>
</tbody>
</table>

The mentally retarded group consisted of ten subjects ranging in age from 14.2 years to 15.0 years with a mean age of 14.6 years, and ranging in mental age from 9.3 years to 10.4 years with a mean mental age of 9.77 years. The normal group included ten subjects ranging in age from 9.5 years to 10.5 years with a mean age of 10.1 years, and ranging in mental age from 9.6 years to 10.4 years with a mean mental age of 10.09. The superior group consisted of ten subjects ranging in age from 7.5 years to 8.0 years with a mean age of 7.8, and ranging in mental age from 9.5 to 10.6 years with a mean mental age of 10.08 years.
III. DESCRIPTION OF THE INSTRUMENT USED

Wechsler Intelligence Scale for Children: General.
The Wechsler Intelligence Scale for Children is designed for individual testing of intelligence, specifically for use with children between the ages of five and fifteen years.

The total test consists of ten subtests which are divided into two main categories, performance and verbal. The verbal subtests, Information and Comprehension, are the ones with which this investigation is concerned.

A large sample at each age level was used in standardizing the entire test.

The reliability for the total test (Full Scale Score) and the subtests were computed at three age levels: age 7 1/2, age 10 1/2, and age 13 1/2 years. It was found that on the Full Scale Score (including the ten main subtests) the reliability coefficient was .92 at age 7 1/2, .95 at age 10 1/2, and .94 at age 13 1/2.\(^2\)

Wechsler Intelligence Scale for Children: Information.
The Information subtest of the WISC requires the subject to

---


\(^3\) Ibid., pp. 10-12.
give specific (factual) answers from memory to specific questions. In scoring this section, 1 or 0 points are awarded for each answer. There is a maximum score of 30 points. The testing is discontinued when the subject earns the score of 0 on five consecutive questions.

Intercorrelation between the Information subtest and the Verbal Scale Score is .64 at age 7 1/2, .62 at age 10 1/2, and .80 at age 13 1/2 years, and the Full Scale Score is .59 at age 7 1/2, .77 at age 10 1/2, and .73 at age 13 1/2 years.4

Reliability is expressed in the form of reliability coefficients. The reliability coefficients for the Information subtest are .66 at age 7 1/2, .80 at age 10 1/2, and .82 at age 13 1/2 years.

The Wechsler Intelligence Scale for Children: Comprehension. This test requires the subject to give a verbal explanation of how he would respond to problems common to everyday experience. The subject may be granted 2, 1, or 0 points for his answer; the maximum total of possible points being 28. When the subject gives three consecutive responses which are assessed the score of 0, the testing is discontinued.

Intercorrelation between this subtest and the Verbal Scale score is .49 at age 7 1/2, .70 at age 10 1/2, and .68

at age 13 1/2, and the Full Scale score is .54 at age 7 1/2, .69 at age 10 1/2, and .59 at age 13 1/2 years.

The extent to which the Comprehension subtest is reliable is represented in these reliability coefficients: .59 at age 7 1/2, .73 at age 10 1/2, and .71 at age 13 1/2 years.

In viewing the relations between the two subtests, the intercorrelations of .37 at age 7 1/2, .65 at age 10 1/2, and .61 at age 13 1/2 were found.

IV. ADMINISTRATION OF THE INSTRUMENT

During the administration of the Information and Comprehension subtests of the WISC all specifications and directions outlined in the manual for these tests were observed. Each subject was administered the tests individually by a qualified graduate student from Sacramento State College. In every case the administration of the Information subtest preceded that of the Comprehension subtest. The use of the ceiling level was observed (five consecutive answers scored as 0 for the Information subtest; three consecutive answers scored as 0 for the Comprehension subtest).
V. SCORING OF THE INSTRUMENT USED

In scoring the Information and Comprehension subtests of the WISC, the directions stated in the manual were used. The scores used for computation of the statistical data were the raw scores of each test.

VI. TREATMENT OF THE DATA

An analysis of variance and Tukey's "honestly significant difference" test were applied to test the differences between the means.

VII. SUMMARY

This chapter included an outline of the selection of the sample, a description of the instrument used, a description of the conditions under which the instrument was administered, a review of the scoring of the instrument used, and a statement of the treatment of the data. The next chapter will be concerned with the findings of this study.

---

CHAPTER IV

RESULTS AND DISCUSSION

This chapter is devoted to the analysis of the results obtained from the administration of the Wechsler Intelligence Scale for Children: Information and Comprehension sections to the three groups studied. Table II gives a summary of these results (in mean scores).

TABLE II

SUMMARY OF THE DATA
(In mean scores)

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>C.A.</th>
<th>M.A.</th>
<th>I.Q.</th>
<th>Information Raw score</th>
<th>Comprehension Raw score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mentally retarded</td>
<td>10</td>
<td>14.6</td>
<td>9.77</td>
<td>66.7</td>
<td>9.6</td>
<td>10.5</td>
</tr>
<tr>
<td>Normal</td>
<td>10</td>
<td>10.1</td>
<td>10.09</td>
<td>100.2</td>
<td>12.0</td>
<td>10.1</td>
</tr>
<tr>
<td>Superior</td>
<td>10</td>
<td>7.8</td>
<td>10.08</td>
<td>128.7</td>
<td>10.8</td>
<td>7.7</td>
</tr>
</tbody>
</table>

I. RESULTS*

Since the Information Section was administered first, its results will be considered prior to those of the Comprehension Section.

*The raw data upon which the results are based can be found in Appendix II.
Information Section. The results on the Information Section were as follows: (1) the mentally retarded group had a mean score of 9.6 with a standard deviation of 1.07, (2) the normal group had a mean score of 12.0 with a standard deviation of 1.70, and (3) the superior group, a mean score of 10.8 with a standard deviation of 2.43. These are given in Table III.

**TABLE III**

RESULTS OF DEVIATIONS

<table>
<thead>
<tr>
<th>Group</th>
<th>Information Mean</th>
<th>Information S.D.</th>
<th>Comprehension Mean</th>
<th>Comprehension S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mentally retarded</td>
<td>9.6</td>
<td>1.07</td>
<td>10.5</td>
<td>3.30</td>
</tr>
<tr>
<td>Normal</td>
<td>12.0</td>
<td>1.70</td>
<td>10.1</td>
<td>1.73</td>
</tr>
<tr>
<td>Superior</td>
<td>10.8</td>
<td>2.43</td>
<td>7.7</td>
<td>3.46</td>
</tr>
</tbody>
</table>

When an analysis of variance was made of the responses of the group to the Information subtest, a significant difference was found in the F ratio at the .05 level. (See Table IV for details).

For the test of significance between the groups Tukey's \(^1\) "honestly significant difference" test was applied.

---

The mean differences between the groups were: (1) mentally retarded and normal, 2.4, (2) mentally retarded and superior, 1.2, and (3) normal and superior, 1.2. Only the difference between the mentally retarded and the normal groups was found to be significant. The mentally retarded scored significantly lower than the normal group. This significant difference between the mentally retarded and normal groups prevent acceptance of null Hypothesis 1, that there is no significant difference between the three groups in their responses on the Information subtest of the WISC.

Table V gives a graphic presentation of this material.
### TABLE V

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Normal</th>
<th>Superior</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MEAN</strong></td>
<td>12.0</td>
<td>10.8</td>
</tr>
<tr>
<td><strong>DIFFERENCE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mentally retarded</td>
<td>9.6</td>
<td>2.4*</td>
</tr>
<tr>
<td>Superior</td>
<td>10.8</td>
<td>1.2</td>
</tr>
</tbody>
</table>

*Using Tukey's "honestly significant difference" test, 1.99 is required for significant difference at .05 level of confidence; 2.56 is required for significance at the .01 level.*
Comprehension subtest. The results on the Comprehension subtest were as follows: (1) the mentally retarded groups had a mean score of 10.5 with a standard deviation of 3.30, (2) the normal group had a mean score of 10.1 with a standard deviation of 1.73, and (3) the superior group had a mean score of 7.7 with a standard deviation of 3.46. (See Table III, page 29).

Using an analysis of variance and Tukey’s “honestly significant difference” test, no significant differences were found between the three groups. Thus, the investigator is prevented from rejecting null Hypothesis II that there is no significant difference between the responses of the three groups studied on the Comprehension subtest of the WISC. (See Tables VI and VII).

TABLE VI

VARIANCE TABLE FOR COMPREHENSION SUBTEST OF THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Variance Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>45.87</td>
<td>2</td>
<td>$22.93 = s^2_b$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$F = 2.87^*$</td>
</tr>
<tr>
<td>Within</td>
<td>215.5</td>
<td>27</td>
<td>$7.98 = s^2_w$</td>
</tr>
</tbody>
</table>

*$3.35$ is required for significance at the .05 level.
TABLE VII

DIFFERENCE IN THE GROUP MEANS
ON THE COMPREHENSION SUBTEST OF
THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN*

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Mentally Retarded</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>10.5</td>
<td>10.1</td>
</tr>
<tr>
<td>Difference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superior</td>
<td>7.7</td>
<td>2.8</td>
</tr>
<tr>
<td>Normal</td>
<td>10.1</td>
<td>2.4</td>
</tr>
</tbody>
</table>

*3.15 is required for significance at the .05 level of confidence.
II. DISCUSSION

The findings on the Information subtest support those of Sandercock and Butler. Differences in retention might be a possible explanation for the ability of the mentally retarded group on this subtest being significantly lower than that of the normal group. Magaret and Thompson found that mentally retarded children had difficulty in memory items.

No significant differences were found on the Comprehension subtest of the WISC. The items on this subtest deal with problems common to everyday experiences and could be influenced by experience. Kolstoe suggests

an examination of the kinds of questions which are included in this subtest suggests that the successful answers depend primarily upon experience, (for example, Why is it better to build a house of brick than of wood?).

---


From this, one would have expected the mentally retarded group to have been superior to the normal and the superior groups; however, there was a great deal of overlapping in the scores between the groups which resulted in no significant difference between the three groups.

III. SUMMARY

This chapter has been concerned with the results and possible explanations of the results. The next chapter will conclude this study and include possible recommendations for further study.
CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

I. SUMMARY

Ten mentally retarded, ten normal, and ten superior children of the same mental ages were administered the Information and Comprehension subtests of the Wechsler Intelligence Scale for Children. It was the purpose of this study to compare these three groups in the specific dimensions of intelligence as measured by the Information and Comprehension subtests of the WISC.

A summary of the findings are as follows:

1. The mentally retarded group scored significantly lower than the normal group on the Information subtest of the WISC.

2. There were no significant differences between the performance of the normal and the superior groups or the mentally retarded and the superior groups on the Information subtest.

3. No significant differences were found between any of the three groups in this study in their performance on the Comprehension subtest of the WISC. In each case, individual differences were in a wide range, with scores in each group overlapping with those of other groups.
II. CONCLUSIONS

It can be concluded that there is a difference in the meaning of mental age. Identical skills are not necessarily represented by similar mental ages. The mental age of the mentally retarded represents a lesser skill in Information or memory items than the mental age of the normal child. This would suggest that the mentally retarded might have difficulty in those areas of reading which require abilities similar to those required on the Information subtest of the Wechsler Intelligence Scale for Children.

III. RECOMMENDATIONS

The following might improve or expand upon the findings in this study:

1. Administering other subtests of the Wechsler Intelligence Scale for Children to three similar groups might result in a more complete analysis of abilities peculiar to each of these groups.

2. These three groups might be compared in their reading facilities by administering diagnostic reading tests. There may be specific areas or abilities that are common to one or several of the groups.
3. Since poor readers and mentally retarded children score significantly lower on the Information subtest of the WISC, further study of the abilities required in this subtest might give additional insight into the problems that these children have in reading.


Merrill, M. A. "On the Relation of Intelligence to Achievement in Cases of Mentally Retarded Children," Comparative Psychology Monographs, Vol. 2 (September, 1924), pp. 1-100.


APPENDIX I
WECHSLER INTELLIGENCE SCALE FOR CHILDREN

GENERAL INFORMATION

Directions: Read each question as stated and in the order given.

Subjects 8 or older, not suspected mental defectives. Subject may begin with item 4 and be credited for items 1, 2, and 3 if he passes items 4, 5, and 6. If any of these is failed, administer items 1, 2, and 3 before proceeding further.

If the response is not clear it is permissible to say, Explain more fully, or Tell me more about it, but not to ask leading questions nor to spell the words.

Discontinue: 5 consecutive failures.

Scoring: Each item is scored 1 or 0.

Maximum score: 30 points.

TEST QUESTIONS

1. How many ears have you?
2. What do you call this finger?
3. How many legs does a dog have?
4. From what animals do we get milk?
5. What must you do to make water boil?
6. In what kind of a store do we buy sugar?
7. How many pennies make a nickel?
8. How many days in a week?
9. Who discovered America?
10. How many things make a dozen?

---

11. What are the four seasons of the year?
12. What is the color of rubies?
13. Where does the sun set?
14. What does the stomach do?
15. Why does oil float on water?
16. Who wrote "Romeo and Juliet"?
17. What is celebrated on the Fourth of July?
18. What does C.O.D. mean?
19. How tall is the average American man?
20. Where is Chile?
21. How many pounds are there in a ton?
22. What is the capital of Greece?
23. What does turpentine come from?
24. How far is it from New York to Chicago?
25. When is Labor Day?
26. Who discovered the South Pole?
27. What is a barometer?
28. What is a hieroglyphic?
29. Who was Genghis Khan?
30. What is a lien?
WECHSLER INTELLIGENCE SCALE FOR CHILDREN

GENERAL COMPREHENSION

Directions: Read each question to the Subject. Sometimes Subjects find it difficult to remember the entire question. It is, therefore, always permissible to repeat the question if no response is obtained after ten or fifteen seconds, but no alteration or abbreviation is permitted. It may be necessary to encourage the Subject by such remarks as Yes or Go ahead. If the response is not clear Please explain further, or Tell me more about it, may be added.

Discontinue: 3 consecutive failures (response scored 0).

Scoring: Each item is scored 2, 1, or 0.

Maximum score: 28 points.

TEST QUESTIONS

1. What is the thing to do when you cut your finger?

2. What is the thing to do if you lose one of your friend's balls (dolls)?

3. What would you do if you were sent to buy a loaf of bread and the grocer said he did not have any more?

4. What is the thing to do if a fellow (girl) much smaller than yourself starts to fight with you?

5. What should you do if you see a train approaching a broken track?

6. Why is it better to build a house of brick than of wood?

7. Why are criminals locked up?

8. Why should women and children be saved first in a shipwreck?

9. Why is it better to pay bills by check than by cash?

10. Why is it generally better to give money to an organized charity than to a street beggar?

11. Why should most government positions be filled through examinations?

12. Why is cotton fiber used in making cloth?

13. Why do we elect (or need to have) senators and congressmen?

14. Why should a promise be kept?
APPENDIX II
TABLE VIII
RAW DATA FOR MENTALLY RETARDED GROUP

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>C.A.</th>
<th>M.A.</th>
<th>I.Q.</th>
<th>Raw Score</th>
<th>Information</th>
<th>Comprehension</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14.5</td>
<td>10.2</td>
<td>70</td>
<td>9</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>14.7</td>
<td>9.6</td>
<td>65</td>
<td>9</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>15.0</td>
<td>10.4</td>
<td>69</td>
<td>10</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>14.5</td>
<td>9.4</td>
<td>64</td>
<td>9</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>14.8</td>
<td>9.3</td>
<td>63</td>
<td>10</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>14.75</td>
<td>10.0</td>
<td>68</td>
<td>9</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>14.4</td>
<td>9.6</td>
<td>67</td>
<td>10</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>14.2</td>
<td>10.0</td>
<td>71</td>
<td>12</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>14.8</td>
<td>9.7</td>
<td>66</td>
<td>10</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>14.8</td>
<td>9.5</td>
<td>64</td>
<td>8</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>146.4</td>
<td>97.7</td>
<td>667</td>
<td>96</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>14.6</td>
<td>9.77</td>
<td>66.7</td>
<td>9.6</td>
<td>10.5</td>
<td></td>
</tr>
</tbody>
</table>
TABLE IX
RAW DATA FOR NORMAL GROUP

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>C.A.</th>
<th>M.A.</th>
<th>I.Q.</th>
<th>Raw Score</th>
<th>Raw Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Information</td>
<td>Comprehension</td>
</tr>
<tr>
<td>1</td>
<td>9.75</td>
<td>9.6</td>
<td>99</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>10.0</td>
<td>10.4</td>
<td>103</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>9.75</td>
<td>10.2</td>
<td>105</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>10.5</td>
<td>9.9</td>
<td>95</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>5</td>
<td>10.1</td>
<td>10.2</td>
<td>101</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>9.5</td>
<td>10.0</td>
<td>105</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>10.4</td>
<td>10.1</td>
<td>97</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>8</td>
<td>10.2</td>
<td>10.1</td>
<td>98</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>9</td>
<td>10.1</td>
<td>10.4</td>
<td>103</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>10.4</td>
<td>10.0</td>
<td>96</td>
<td>11</td>
<td>9</td>
</tr>
</tbody>
</table>

Total 100.7 100.9 1002 120 101
Mean 10.1 10.09 100.2 12 10.1
TABLE X

RAW DATA FOR SUPERIOR GROUP

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>C.A.</th>
<th>M.A.</th>
<th>I.Q.</th>
<th>Raw Score Information</th>
<th>Raw Score Comprehension</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7.7</td>
<td>9.9</td>
<td>129</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>7.6</td>
<td>10.3</td>
<td>135</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>8.0</td>
<td>10.0</td>
<td>125</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>8.0</td>
<td>10.4</td>
<td>128</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>7.5</td>
<td>10.2</td>
<td>136</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>6</td>
<td>7.9</td>
<td>10.6</td>
<td>134</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
<td>7.8</td>
<td>9.7</td>
<td>124</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>8</td>
<td>8.0</td>
<td>10.1</td>
<td>126</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>7.7</td>
<td>9.5</td>
<td>124</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>8.0</td>
<td>10.1</td>
<td>126</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>78.2</strong></td>
<td><strong>100.8</strong></td>
<td><strong>1287</strong></td>
<td><strong>108</strong></td>
<td><strong>77</strong></td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>7.8</strong></td>
<td><strong>10.08</strong></td>
<td><strong>128.7</strong></td>
<td><strong>10.8</strong></td>
<td><strong>7.7</strong></td>
</tr>
</tbody>
</table>