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A study of the differences between boys and girls and between boys and girls of different IQ levels, on a certain selection of subtests of the Wechsler Intelligence Scale for children

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A STUDY OF THE DIFFERENCES BETWEEN BOYS AND GIRLS, AND BETWEEN BOYS AND GIRLS OF DIFFERENT IQ LEVELS, ON A CERTAIN SELECTION OF SUBTESTS OF THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN

by

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CHAPTER I

THE PROBLEM AND ITS SIGNIFICANCE

Introduction

Psychological testing is a field which has received a considerable amount of attention today. In the area of mental retardation, however, there is comparative dearth of speculative material. Only recently, hypotheses concerning "an inequality in general level of intellectual functioning"[1] have been arrived at by classroom educators and school psychologists, and the Stimulus Trace theory has been offered as an explanation for some of the behavioral inadequacies of the retardate.

Mental retardation has not only psychological but also social implications, and strikes children without regard for the family's status in society. Although mental retardation has been recognized since pre-Christian times, only since the turn of the century has there been significant examination of the problem. With the 1950's came a new surge of interest aimed at recognizing and

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[1]Alfred A. Baumeister and Claude J. Bartlett, "A Comparison of the Factor Structure of Normals and Retardates on the WISC," American Journal of Mental Deficiency, LXVI (January, 1962), 641.

solving broader problem which hinder the life of the retardate.

Over and over again the question has been asked, "Who are the mentally retarded?" A retardate is no longer defined merely as one who, because of arrested mental development, is unable to handle himself or his affairs with prudence; in addition, he is identified as an individual whose lack of intellectual endowment is such as to render him incapable of attaining an average score or rating on full-scale standardized intelligence tests. Educators agree that three factors must be considered in the classification of the retardate. These three factors are ability, achievement, and performance.

In helping the mentally retarded every possible avenue has to be explored. Research findings have encouraged a better understanding of the retardate and of the means by which he may reach his potential. Diagnostic procedures are basic to an adequate evaluation of the retardate and are, therefore, basic to the formation of a plan for the retardate's future.

At the present time, one of the methods available for determining intelligence is by ascertaining IQ or its equivalent. The value of this information is readily acknowledged by persons engaged in the teaching of retarded children and slow learners. Even though the IQ measurement is not always satisfactory, the importance of finding out whatever is possible about the factors which contribute to

intelligence test performance must be recognized. Psychometric tests--such as the Wechsler Intelligence Scale for Children--reveal or measure some of the mental characteristics possessed by the subject. Wechsler points out that an intelligence test is not a simple expression of an individual's ability. He states:

> The thing we seek to measure when we measure intelligence is the net result of the complex interaction between the various factors entering into intelligent behavior. In practice we measure this resultant fact by means of tests of ability. An intelligence scale is an assembled battery of such tests; the intelligence rating obtained from them is a numerical expression of their combined contribution. Although the amounts contributed by each test may be, and usually are, expressed as a simple sum, the factors which determine the scores ought not, strictly speaking, to so combine, since the result is not a linear function of these factors. More likely it is what mathematicians call a complex function but the exact form of this function is yet to be determined.[2]

According to Baumeister and Bartlett, "The assumption has usually been made that the dimensions of ability are identical in mentally retarded children and normals, the difference between the two groups representing an inequality in general level of intellectual functioning rather than a dissimilarity in intellectual structure."[3] In the same study it is noted, however, that

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[2]David Wechsler, The Measurement and Appraisal of Adult Intelligence (Baltimore: William and Wilkins Company, 1958), p. 16.

[3]Baumeister and Bartlett, 641.

an important difference between the two groups emerges in testing on the WISC, a difference which seems to indicate dissimilarity in intellectual structure. This difference is the appearance among the retardates of a group factor which is not found among the normals. The three subtests with loadings on this factor are: Arithmetic, Picture Arrangement, and Coding.

Wechsler remarks that Arithmetic shows not only significant reference to general reasoning but also to the factors identified as numerical fluency, mechanical knowledge, and information. Reasoning seems to have been considerably overemphasized and memory substantially underestimated.[4]

Many examiners indicate that the subtest Picture Arrangement measures the subject's ability to size up a total situation.[5] The ability tapped on this subtest appears to correspond to what writers refer to as "social intelligence."

Coding is considered to be a test of new learning ability. It measures the speed and accuracy with which new symbolic associations are formed. The test requires the subject to pair correctly arbitrarily associated symbols. His success on this task will depend in part on his perceptual alertness, immediate memory, and motor

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[4]Wechsler, 130.

[5]Ibid., p. 75.

speed, as well as on interest in the specific task.

Arithmetic, Picture Arrangement, and Coding subtests all appear to tap a common factor called Stimulus Trace.[6] This factor involves immediate memory. Baumeister, Bartlett, and Hawkins state that the WISC Trace factor has special significance in evaluating or describing the retardate.

Statement of the Problem

Research and study aimed at understanding the intellectual structure and functioning of the retarded and the slow learner has been minimal. One of the most significant contributions in this direction has been the previously mentioned study of WISC subtest scores by Baumeister and Bartlett which discerned the Stimulus Trace factor appearing in certain of the scores of retardates but not in those of normals. The present study was undertaken primarily to examine sex differences between particular subtest scores of the so-called Stimulus Trace factor in a specific group of retarded and slow learners in a particular locale.

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[6]Alfred A. Baumeister, Claude J. Bartlett, and William F. Hawkins, "Stimulus Trace as a Predictor of Performance," American Journal of Mental Deficiency, LXVII (March, 1963), 726.

Population

For the purpose of this study, data on the Wechsler Intelligence Scale for Children were obtained on 118 children (74 boys and 44 girls) from the files of the Catholic Psychological Center in Atlanta, Georgia. These children ranged in chronological age from seven through fifteen years. Each had achieved a Full Scale IQ score of 89 or less on the WISC. It should be noted, however, that this group includes a small number of children who, though their full scale IQ was not above 89, achieved a Verbal or Performance IQ score exceeding 89.

Purpose of the Study

The purpose of the investigation was to study the scores on certain subtests of the Wechsler Intelligence Scale for Children in relation to the theory concerning Stimulus Trace or Short-Term Memory. The writer chose 118 children whose Full Scale IQ scores on the WISC were 89 or below. In order to facilitate comparison of different IQ levels in parts of the study, the 118 children were divided into the following groups: Full Scale IQ 80-89: 67 children; Full Scale IQ 70-79: 28 children; Full Scale IQ 69 and below: 23 children. Findings on the subtest scores for Arithmetic, Picture Arrangement, and Coding were used. The Vocabulary subtest was also related to the Short Term Memory factor.

More specifically, the intentions of this study were

to answer the following questions:

1. Is there a difference between the sexes in the total group on the Full Scale IQ's, Verbal IQ's, and Performance IQ's?

2. Is there a difference between the sexes in the total group on the scores of the subtests which are related to the Stimulus Trace factor?

3. Is there a difference between the sexes in the IQ group below 69 on Full Scale IQ's, Verbal IQ's, and Performance IQ's?

4. Is there a significant difference between the sexes in the IQ group below 69 on certain selected subtests of the WISC?

5. Is there a difference between the sexes in the IQ group from 70 to 79 on Full Scale IQ's, Verbal IQ's, and Performance IQ's?

6. Is there a significant difference between the sexes in the IQ group from 70 to 79 on certain selected subtests of the WISC?

7. Is there a difference between the sexes in the IQ group from 80 to 89 on Full Scale IQ's, Verbal IQ's, and Performance IQ's?

8. Is there a significant difference between the sexes in the IQ group from 80 to 89 on certain selected subtests of the WISC?

Limitations of the Study

Because this study is restricted to a comparatively small sampling of boys and girls, the results obtained must be viewed with reservation. Though certain directions are indicated by the study, the location and sampling were limited and are, therefore, not adequate to represent the retarded population as a whole.

Summary

During the past few years a considerable amount of

research has been undertaken to compare the learning abilities of retardates with normals. Until recently investigations have afforded insufficient attention to the differential abilities of the mentally retarded. These recent studies indicate that: 1) the retarded subject has weaknesses in the area of stored information; 2) the retarded subject seems to have most ability in the use of structured concrete visual materials;[7] 3) the retarded subject emerges in certain subtests on the WISC with a heavy loading in the Stimulus Trace factor, which involves immediate memory.

This present study was undertaken to investigate sex differences on certain tests constituting the Stimulus Trace factor appearing in a group of children whose Full Scale IQ on the WISC was 89 or less. The scaled scores on the Arithmetic, Picture Arrangement, and Coding subtests were employed. Differences between the sexes on the subtests were investigated, as were the highest and lowest IQ levels of the sample.

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[7]James J. Gallagher and Leonard J. Lucito, "Intellectual Patterns of Gifted Compared with Average and Retarded," Exceptional Children, XXVII (May, 1961), 479-482.

CHAPTER II

REVIEW OF RELATED LITERATURE

Background of Testing

Since the beginning of time man has recognized that all human beings are not identical, do not operate the same in a given task. Testing--the method used to measure these individual differences--has undergone a long history of development. Today is an age of highly specialized testing, in which methods for qualitative as well as quantitative measurement and comparison are continually advancing.

In the area of psychological testing, the contribution of Binet at the end of the nineteenth century stands as initially significant. In an attempt to find out why and how "bright" and "dull" children differed,[1] he structured a test to be given to the individual child which could objectively and numerically reveal the relationship of mental age and chronological age. This relationship is what has been designated as IQ. Though the Binet test has undergone three revisions, the structure of the test has remained substantially the same.

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[1]Lee J. Cronbach, Essentials of Psychological Testing (New York: Harper and Brothers, 1960), p. 160.

In the 1940's Wechsler realized that the factors contributing to the numerical IQ were more complex than the test employed revealed. He designed a testing procedure which was based on these underlying complex factors and the results of which would explicitly reveal (interpret) these factors. With reference to this complexity Wechsler stated:

> Much of the productive work done on the measurement of intelligence during the past decades has been devoted to the problem of identifying the basic elements or common factors of intelligence, and we shall presently consider how fruitful that has been. But three points need to be made at once. The first is that discovery and isolation of the "vectors of the mind" is only part of the problem involved in the definition of general intelligence; the second, that it is not possible to identify general intelligence with sheer intellectual ability; and the third, that general intelligence cannot be treated as an entity apart, but must be envisaged as an aspect of a greater whole, namely, the total personality structure with which it shares common elements and with which it is integrally related.[2]

Today the Wechsler Intelligence Scale for Children (published in 1949) has found wide acceptance among psychologists working with children, and takes its place in clinical procedure next to the Binet in appraising their intellectual capacity. This wide acceptance of the WISC applies to the testing not only of normal children but of retarded children and slow learners as well.

A number of studies have been made which compare the

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[2]David Wechsler, The Measurement and Appraisal of Adult Intelligence (Baltimore: The Williams and Wilkins Company, 1958), p. 5.

scores achieved on the WISC with those of other intelligence test given to mentally defective children. Baumeister lists 21 such studies.[3] Among the most widely recognized studies, Nale (1951),[4] Stacey and Levin (1951),[5] and Sloan and Schneider (1951)[6] have reported high correlation between the Stanford-Binet and the WISC Full Scale. More recently, Rohrs and Haworth (1962)[7] indicate similarly high correlation.

Silverstein, in his survey, indicates that the WISC is employed with great popularity as a clinical instrument among psychologists working with the mentally retarded.[8] According to Baumeister, a survey conducted by

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[3]Alfred A. Baumeister, "Use of the WISC with Mental Retardates: A Review," American Journal of Mental Deficiency, LXIX (September, 1964), 187.

[4]S. Nale, "The Children-Wechsler and the Binet on 109 Mental Defectives at the Polk State School," American Journal of Mental Deficiency, LVI (April, 1951), 419-434.

[5]C. L. Stacey and Janice Levin, "Correlation Analysis of Scores of Subnormal Subjects on the Stanford-Binet and Wechsler Intelligence Scale for Children," American Journal of Mental Deficiency, LV (April, 1951), 590-597.

[6]Sloan and Schneider, "A Study of the Wechsler Intelligence Scale for Children with Mental Defectives," American Journal of Mental Deficiency, LV (April, 1951), 573-575.

[7]F. W. Rohrs and M. R. Haworth, "The 1960 Stanford-Binet, WISC, and Goodenough Tests with Mentally Retarded Children," American Journal of Mental Deficiency, LXVI (May, 1962), 853-859.

[8]A. B. Silverstein, "Psychological Testing Practices in State Institutions for Mentally Retarded," American Journal of Mental Deficiency, LXVIII (November, 1963), 440-445.

Weise in California revealed that school psychologists who replied to his questionnaire more frequently administered the WISC than any other test on suspected retardates from grade two through high school. Moreover, indirect evidence of the great interest in the WISC is indicated by Baumeister's notation of approximately 50 published research studies in which this test has been employed with retardates.[9]

The WISC is of importance to this study not only because of its wide use with retardates, but also because of the significance of extensive analytical interpretation of it. Investigations of this nature are opening up new avenues to understanding the differences of internal structuring of intellectual patterns.

The WISC contains a Verbal section and a Non-Verbal or Performance section, each of which is composed of five sub-tests. Up to 1960, as indicated by Littell's review,[10] research on the test seems to have been only on the division of the WISC into Verbal and Performance Scales. Many studies (e.g. Balinsky, 1941; Hammer, 1950; Davis, 1956; Cohen, 1957),[11] examining a collection of scores on the

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[9]Baumeister, 183.

[10]William Littell, "The Wechsler Intelligence Scale for Children: Review of a Decade of Research," Psychological Bulletin, LVII (1961), 132-155.

[11]James J. Gallagher and Leonard J. Lucito, "Intellectual Patterns of Gifted Compared with Average and Retarded," Exceptional Children, XXVII (May, 1961), 480.

Wechsler tests, consistently identified two major factors derived from intellectual patterns: Verbal Comprehension and Perceptional or Non-Verbal Organization. There seems to be no systematic investigation of the nature of the specific factors tapped by the subtests.

From the beginning the WISC has been thought of as a clinical diagnostic instrument. Many avenues of research have been investigated to demonstrate the utility of the scale. With specific reference to the retarded, much has been said concerning the disparity between the Verbal IQ and the Performance IQ frequently yielded in the testing of retardates. "Interest in this discrepancy stems from the fact that the WISC was deliberately constructed in such a manner as to equate the two IQ's. Thus, any marked differences might reveal something significant about the individual."[12]

Among the first to consider any diagnostic significance with reference to the Verbal/Performance differences in the retarded was Seashore in 1951. His study noted that among 55 mentally retarded children tested, thirty achieved a Performance IQ higher than Verbal, twenty-two scored higher on Verbal than Performance, while only three children's test results displayed no difference between the two

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[12]Baumeister, 186.

sections.[13]

In 1955, Newman and Loos found that mentally defective children classed as familial obtained significantly higher scores on the Performance tests than on the Verbal tests. It was further found that mentally defective children classed as undifferentiated also achieved significally higher on Performance than on Verbal, but to a lesser degree than the familial retardates.[14]

Though the finding that retardates' Performance IQ scores are higher than Verbal IQ scores does not have unanimous support,[15] awareness of this phenomenon has brought about significant research. In an attempt to understand more fully and gain insight into the reasons

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[13]H. G. Seashore, "Differences Between Verbal and Performance IQ's on the Wechsler Intelligence Scale for Children," Journal of Consultant Psychology, XV (February, 1951), 62-67.

[14]J. R. Newman and F. M. Loos, "Differences Between Verbal and Performance IQ's with Mentally Defective Children on the Wechsler Intelligence Scale for Children," Journal of Consultant Psychology, XIX (February, 1955), 16.

[15]"In addition to the results reported by Seashore (1951), Sandercook and Butler (1952) found their Ss to give about equal performances on the two scales. Atchison (1955) and Young and Pitts (1951) have found higher Verbal than Performance IQ's in their retarded Ss. The fact that Ss tested in these last two studies were Negroes may be significant, although at this point it si difficult to see why their particular subculture should produce the relatively high verbal scores...

...Moreover, the results of studies comparing 'organics' and 'non-organics' suggest that brain damaged Ss may perform more comparably on the two scales than the cultural familial undifferentiated retardates." Baumeister, 188.

for this Performance/Verbal discrepancy, psychologists turned to a specific and detail analysis of the subtests which comprise each section. Because of many investigations in this area, it has been noted that there are different subtest patterns of intellectual strengths and weaknesses.

> The rationale for pattern analysis is dependent upon the presence of reliable, specific variance for certain subtests. That is, an assumption is made that there is a significant amount of subtest specificity [subtest scatter] for certain groups of individuals.[16]

When Gallagher and Lucito conducted their study with the gifted, average and retarded, they noted that "retarded subjects showed weaknesses in the area of stored information. . . [while] the relative strength of the perceptual organization factor in the retarded indicates a superior capacity to use structured concrete-visual materials."[17]

Previously it had been thought that normal and retarded individuals had identical dimensions of ability, that the differences between the two groups was "an inequality in general level of intellectual functioning rather than a dissimilarity in intellectual structure."[18] For example, of the twelve factorial investigations on the Wechsler scales listed in the Baumeister study, not one of

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[16] Ibid., 189.

[17] Gallagher and Lucito, 481.

[18] Alfred A. Baumeister and Claude J. Bartlett, "A Comparison of the Factor Structure of Normals and Retardates on the WISC," American Journal of Mental Deficiency, LXVI (January, 1962), 641.

them studies the structures of abilities of groups.[19]

Baumeister and Bartlett, however, in 1961, attempted a test of the hypothesis that the mental abilities of retardates differ qualitatively from the abilities of normals.[20] When their study was completed, they reported that three factors appeared for both groups of children tested: General, Verbal, and Performance. However, a significant difference emerged between the two groups--the occurrence among the retardates of a group factor not appearing among the normals.

> . . . in the case of the defectives a fourth factor emerged in their analysis. The subtests which loaded on this factor, in the order of their loadings, were Coding (.67), Arithmetic (.36), and Picture Arrangement (.20). A number of interpretations were made of the factor including Number, Concentrations, and Stimulus Trace or Short-term Memory. The last interpretation was based upon a theory proposed by Ellis (in press) to account for impairment of the retardate's ability to remember events over a short period of time. According to Ellis, a stimulus impinging upon the organism establishes a momentary reverberation (trace) which outlasts the duration of the stimulus. The hypothesized stimulus trace is said to vary with respect to amplitude and particularly duration. Disruption of the stimulus trace, either through manipulation of environmental variables or through some inherent characteristic of the organism should cause a deficit in short-term memory.[21]

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[19] Ibid., 642.

[20] Ibid., 645.

[21] Alfred A. Baumeister and Claude J. Bartlett, "Further Investigations of WISC Performance of Mental Defectives," American Journal of Mental Deficiency, LXVII (January, 1962), 257.

> The trace factor is dependent upon the ability to attend during both the reception and reproduction phases of the remembering process. Thus, it involves immediate memory. The order in which the subtests require the S to retain new information during the testing situation is Coding, Arithmetic, and Picture Arrangement. The magnitude of the loadings follows this order. Thus, the lack of perserveration of the stimulus trace among retarded persons may characterize the difference in factor structure of abilities found between the two groups on the WISC.[22]

The appearance of the trace factor among retardates emerges then as diagnostically significant, and is a stimulus to rethinking concerning the structure of intellectual ability in the retardate.

It is on the basis of the foregoing research that the present study was suggested, with the purpose of determining whether or not sex differences existed among specific groups of children having IQ's ranging from 80 to 89, 70 to 79, and below 60 to 69 on the particular subtests identified as the Stimulus Trace.

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[22]Baumeister and Bartlett, American Journal of Mental Deficiency, LXVI, 644-645.

CHAPTER III

PROCEDURE

Today there is much discussion about the intellectual abilities of the children enrolled in schools. Among children, different levels of functioning are recognized. School authorities encounter many instructional problems in trying to reach these diverse levels. One of the first methods employed to identify the different learning levels of children is group tests. These tests can be helpful in determining achievement levels in basic academic skills; but in many instances information obtained from group testing is not adequate enough to assist in understanding the individual child's specific learning difficulties. More exhaustive diagnostic procedures must be employed.

An individual approach to testing makes possible the use of more precise instruments, and careful clinical observations can be obtained. This is particularly helpful in the case of retarded and slow learning children. The retarded or slow learning child cannot be evaluated in a group setting where procedures and instruments were designed for the normal child. Moreover, individual testing assist in understanding the nature of the retardate's deficiency. As Gunzburg explained:

> Individuals demonstrate intelligent behavior in three different ways; they competently handle ideas and words (verbal intelligence), objects (non-verbal or practical intelligence), and people and personal relations (social intelligence). Subnormal people can be deficient to a greater or lesser extent in one or more of these aspects of intelligence.[1]

This study proposes to: 1) examine the IQ levels of a selected group of 118 retarded and slow learning school children tested on the Wechsler Intelligence Scale for Children, and 2) study the differences between boys and girls of similar IQ levels on Verbal IQ and Performance IQ scores and on certain selected subtests of the WISC. The particular subtests of interest are those identified with the so-called Stimulus Trace theory as proposed by Baumeister and Bartlett.[2]

Selection of Population

The subjects used in this study were attending one of the fourteen parochial schools in the Archdiocese of Atlanta which were making use of the facilities of the Catholic Psychological Center in Atlanta. These schools were located in the metropolitan areas of Atlanta and Savannah. The socio-economic backgrounds of the children

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[1]Herbert C. Gunzburg, Social Rehabilitation of the Subnormal (London: Bailere, Tindell, and Cox, 1960), p. 11.

[2]Alfred A. Baumeister and Claude J. Bartlett, "Further Factorial Investigations of WISC Performance of Mental Defectives," American Journal of Mental Deficiency, LXVII (September, 1962), 257.

were, therefore, similar.

In each case a teacher, previously having noticed the difficulties of a particular child, had referred the child to the principal. The situation was discussed with the parents. When the parents requested individual testing of their child, a referral was made to the Atlanta center.

Selection of Children

Five hundred children had been examined at the Catholic Psychological Center in Atlanta during the period of September, 1957, to June, 1962. From these 500, a selection was made for this study of children whose chronological age fell between 7-0 and 14-9, and who achieved a Full Scale IQ of 89 or less on the WISC. The total number chosen was 118, which is 23.6 per cent of the number tested.

These 118 boys and girls were divided into groups as follows:

1) Those achieving a Full Scale IQ of 80 to 89
2) Those achieving a Full Scale IQ of 70 to 79
3) Those achieving a Full Scale IQ of 69 or below

Table 1 indicates the population of the study and the IQ levels in terms of number and per cent.

TABLE 1

POPULATION OF STUDY AND IQ LEVELS

IQ Levels	Boys		Girls		Total	
	Number	Per cent	Number	Per cent	Number	Per cent
80 - 89	43	36.4	24	20.3	67	56.7
70 - 79	19	16.1	9	7.6	28	23.7
Below 69	12	10.2	11	9.3	23	19.5
Total	74	62.7	44	37.2	118	99.9

As can be seen, the total group of children comprised 74 boys and 44 girls. That is, 62.7 per cent of the group were boys, 37.2 per cent were girls.

Selection of Test and Administration

The subjects selected for the study had been given all the WISC subtests.[3] However, the subtests chosen for particular study were Vocabulary, Coding, Picture Arrangement, and Arithmetic because they have been suggested in the explanation of the Stimulus Trace theory proposed by Baumeister and Bartlett.[4] The Vocabulary subtest on the WISC Verbal Scale demands use of acquired information,

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[3]Full Scale IQ, Verbal IQ, and Performance IQ scores are given in the Appendix, p.38

[4]Alfred A. Baumeister and Claude J. Bartlett, "A Comparison of the Factor Structure of Normals and Retardates on the WISC," American Journal of Mental Deficiency, LXVI (January, 1962), 641.

reliance on long-term memory. This information is dependent on one's cultural background and schooling. The subject's performance on this subtest is also dependent on his ability to understand and express verbal content material. The other three subtests, Coding, Picture Arrangement, and Arithmetic, involve tasks which require reliance on short-term memory. They contain numerical concepts, and the number facts are dependent on immediate recall. The verbal content in these three subtests seems to be minimal.

Summary

The importance of individual testing for the retarded and slow learning child has been indicated. The method of selection and the description of the subjects of this study have been explained. The data have been taken from the files of the Catholic Psychological Center in Atlanta, The Appendix contains the scores for the Full Scale, Verbal, and Performance IQ's on every child, as well as the scores for each of the selected subtests.

CHAPTER IV

PRESENTATION OF DATA

During a five-year period the necessary data for the completion of the present study had been secured through individual testing. Subjects selected for the study were all children whose chronological ages fell between 7-0 and 14-9 years, and who had been evaluated according to the Wechsler Intelligence Scale for Children. The subjects had been given all the WISC subtests, and had achieved a Full Scale IQ score of 89 or less.

The purpose of this study was to examine statistically the scaled scores on the Vocabulary test and the scaled scores related to the so-called stimulus trace effect which were achieved by the entire group of children. The entire group has been divided into three levels according to Full Scale IQ scores. The same measures have been studied for each level.

For each level, statistical results have been summarized in tabular form to compare the boys and girls of similar IQ's. For each group of scores the mean, the standard deviation, the t-ratio have been found.

The Full Scale IQ scores for every child used in the study have been listed according to the levels

determined. In Table 2 the sex differences of the total group on the Total IQ, Verbal IQ, Performance IQ, and selected subtests can be observed. It should be noted that the Full Scale IQ mean of the total group of boys is significantly higher than that of the girls. Similarly, while the means of the boys' Verbal IQ and Performance IQ scores are higher than those of the girls, only the former is of statistical significance (.001 level).

TABLE 2

SEX DIFFERENCES OF TOTAL GROUP ON TOTAL IQ, VERBAL IQ, PERFORMANCE IQ, AND SELECTED SUBTESTS OF THE WISC

Test Scores	Group	Mean	S.D.	S.E.M.	Diff.	$S.E._{DM}$	t-ratio
Total IQ	Boys	78.69	.23	.027	1.92	.25	7.68
	Girls	76.77	1.94	.25			
Verbal IQ	Boys	82.17	2.14	.254	4.74	.371	12.77
	Girls	77.43	1.78	.271			
Performance IQ	Boys	77.20	2.24	.262	.066	.458	.144
	Girls	77.14	2.47	.376			
Vocabulary	Boys	6.18	2.25	.263	.599	.412	1.45
	Girls	5.59	2.07	.317			
Coding	Boys	6.74	2.76	.323	1.59*	.584	2.73
	Girls	8.34	3.19	.487			
Picture Arrange.	Boys	6.67	2.55	.304	.188*	.536	.35
	Girls	6.86	2.90	.441			
Arithmetic	Boys	7.71	2.45	.287	.740	.454	1.63
	Girls	6.57	2.32	.353			

*Favors girls

On the Coding subtest the mean score of the girls (8.34) is significantly higher than that of the boys (6.74); the mean score of the girls on the Picture Arrangement subtest (6.86) is only slightly higher than that of the boys (6.67). The slight differences between the means on Arithmetic and Vocabulary favor the boys. It should be obvious then that although there are differences noted between the sexes, the two groups are not widely separated on the subtest scores, and the standard deviations show little variation. The only t-ratio of significance among the subtest scores is that of the Coding test (2.73). This ratio is larger than that requisite for significance at the .05 level of confidence.

A comparison of the boys with the girls in the IQ group below 69, as shown in Table 3, indicates that all the mean scores in this group favor the girls. It is observable from the table that the differences between the sexes on the subtest scores are minimal and the standard deviations show little variation. The t-ratio for differences between the sexes on the subtests are not significant; but they are significant on Total IQ, Verbal IQ, and Performance IQ. All three of these ratios exceed the 2.069 requisite for significance at the .05 level of confidence.

TABLE 3

SEX DIFFERENCES OF GROUP BELOW IQ 69 ON TOTAL IQ, VERBAL IQ PERFORMANCE IQ, AND SELECTED SUBTESTS OF THE WISC

Test Scores	Group	Mean	S.D.	$S.E._M$	Diff.	$S.E._{D_M}$	t-ratio
Total IQ	Boys	60.42	1.44	.434	2.08*	.561	3.70
	Girls	62.50	1.12	.356			
Verbal IQ	Boys	66.25	1.78	.536	1.67*	.728	2.29
	Girls	67.92	1.56	.493			
Performance IQ	Boys	60.42	1.754	.528	2.08*	.754	2.76
	Girls	62.50	1.70	.539			
Vocabulary	Boys	3.75	2.35	.707	.34*	1.20	.332
	Girls	4.09	2.35	.743			
Coding	Boys	5.66	2.35	.707	.15*	1.40	.139
	Girls	5.81	2.58	.816			
Picture Arrange.	Boys	3.41	1.93	.581	.40*	.844	.473
	Girls	3.81	1.94	.765			
Arithmetic	Boys	5.33	2.80	.843	.03*	1.515	.026
	Girls	5.36	2.42	.765			

*Favors girls

Table 4 shows the comparison of boys and girls in the IQ group 70-79. Mean scores in this group favor the boys with the exception of those in Vocabulary and Coding.

It can be observed from this table that the differences between the sexes on the subtest scores are minor, and the standard deviations show little variance. The t-ratios for differences on the Total IQ, Verbal IQ,

Performance IQ and the subtests are not significant. No ratio exceeds the 2.069 requisite for significance at the .05 level of confidence.

TABLE 4

SEX DIFFERENCES OF GROUP 70 TO 79 ON TOTAL IQ, VERBAL IQ, PERFORMANCE IQ, AND SELECTED SUBTESTS OF THE WISC

Test Scores	Group	Mean	S.D.	$S.E._M$	Diff.	$S.E._{D_M}$	t-ratio
Total IQ	Boys	75.11	2.67	.629	.89	1.14	.78
	Girls	74.22	2.69	.951			
Verbal IQ	Boys	81.16	7.40	1.74	1.94	2.92	.66
	Girls	79.22	6.70	2.36			
Performance IQ	Boys	75.43	7.08	1.66	.21	3.11	.067
	Girls	75.22	7.50	2.65			
Vocabulary	Boys	5.32	1.86	.431	.01*	.592	.016
	Girls	5.33	1.15	.406			
Coding	Boys	6.52	2.03	.478	.36*	.778	.46
	Girls	6.88	1.74	.614			
Picture Arrange.	Boys	6.22	2.04	.481	.55	.987	.56
	Girls	5.67	2.44	.862			
Arithmetic	Boys	7.48	1.75	.412	.81	.676	1.03
	Girls	6.67	1.52	.537			

*Favors girls

An examination of the scores found in Table 5 indicates that the mean scores in the IQ group 80-89 favor the boys except in the subtests Coding and Picture Arrangement.

TABLE 5

SEX DIFFERENCES OF GROUP 80 TO 89 ON TOTAL IQ, VERBAL IQ, PERFORMANCE IQ, AND SELECTED SUBTESTS OF THE WISC

Test Scores	Group	Mean	S.D.	$S.E._M$	Diff.	$S.E._{D_M}$	t-ratio
Total IQ	Boys	85.21	2.72	.419	1.91	.711	2.68
	Girls	83.30	2.76	.575			
Verbal IQ	Boys	88.57	6.75	1.02	4.21	1.37	3.08
	Girls	84.30	4.44	.923			
Performance IQ	Boys	84.09	6.50	1.002	.84	1.82	.461
	Girls	83.25	7.35	1.53			
Vocabulary	Boys	7.21	1.75	.285	.84	.479	1.83
	Girls	6.37	1.85	.385			
Coding	Boys	7.84	2.21	.339	2.08*	.709	2.93
	Girls	9.92	2.99	.623			
Picture Arrange.	Boys	7.79	1.09	.168	1.04*	.422	2.46
	Girls	8.83	1.86	.387			
Arithmetic	Boys	8.51	2.13	.328	.68	.525	1.30
	Girls	7.83	1.97	.410			

*Favors girls

It is observable from the table that the differences between the sexes on Total IQ, Verbal IQ, which favor the boys, and the difference between the sexes on subtests Coding and Picture Arrangement, which favor the girls, are significant. All four of these ratios exceed the 2.069 requisite for significance at the .05 level of confidence. The standard deviations shows little variation except on Verbal IQ where there is a difference of 2.13 favoring the

boys. The t-ratios on subtests Vocabulary and Arithmetic are not significant; however, they are significant on Coding and Picture Arrangement. Also, there is a significant difference in the t-ratios on Total IQ and Verbal IQ.

Summary

Data have been presented showing tests of significance of difference between mean scores of boys and girls on Full Scale IQ, Verbal IQ, Performance IQ, and four selected subtests of the Wechsler Intelligence Scale for Children: Vocabulary, Coding, Picture Arrangement and Arithmetic. The following chapter summarizes the findings.

CHAPTER V

SUMMARY AND CONCLUSION

The present investigation, admittedly limited by the restriction of subjects to 118 boys and girls, has been an attempt to study the scores on certain subtests of the Wechsler Intelligence Scale for Children in relation to the theory concerning Stimulus Trace or Short-Term Memory. The writer hoped through its results to discern areas of significance emerging in the comparison and analysis of scores.

The 118 children used for the study had chronological ages between 7-0 and 14-9, and had achieved on the WISC a Full Scale IQ of 89 or less. Test data on these children were obtained from the Catholic Psychological Center in Atlanta, Georgia. The subjects had been given all the WISC subtests, but this study made use only of the scores on Arithmetic, Picture Arrangement, Coding, and Vocabulary, because of their relationship to the Stimulus Trace theory.

The initial questions asked in Chapter I can be answered in the following way with regard to the 118 children used in this study:

1. Is there a difference between the sexes in the total group on the Full Scale IQ's, Verbal IQ's, and Performance IQ's?

2. Is there a difference between the sexes in the total group on the scores of the subtests which are related to the Stimulus Trace theory?

The mean scores of the boys in this study were higher than those of the girls in Total IQ, Verbal IQ, and Performance IQ. The sex differences on Total IQ and Verbal IQ were highly significant; that on Performance IQ was not statistically significant. On the subtests, however, the means of Coding and Picture Arrangement favored the girls, while those of Vocabulary and Arithmetic favored the boys. It should be noted that the only significant difference was that favoring the girls on the Coding subtest.

3. Is there a difference between the sexes in the IQ group below 69 on Full Scale IQ's, Verbal IQ's, and Performance IQ's?

4. Is there a significant difference between the sexes in the IQ group below 69 on certain selected subtests on the WISC?

There were differences between the sexes in the IQ group below 69, means significantly favoring the girls on Total IQ, Verbal IQ, and Performance IQ scores. The means of all four subtest scores only slightly favored the girls.

5. Is there a difference between the sexes in the IQ group from 70 to 79 on Full Scale IQ's, Verbal IQ's, and Performance IQ's?

6. Is there a significant difference between the sexes in the IQ group from 70 to 79 on certain selected subtests of the WISC?

In the IQ group for 70 to 79 the differences in the means of Total IQ, Verbal IQ, and Performance IQ scores

slightly favored the boys. The means on Vocabulary and Coding subtests favored the girls, while the boys scored higher on Picture Arrangement and Arithmetic. None of these differences, however, was significant.

7. Is there a difference between the sexes in the IQ group from 80 to 89 on Full Scale IQ's, Verbal IQ's, and Performance IQ's?

8. Is there a significant difference between the sexes in the IQ group from 80 to 89 on certain selected subtests of the WISC?

A significant difference between the sexes in the IQ group from 80 to 89 favored the boys in Total IQ and Verbal IQ scores. On the subtests, the means of Vocabulary and Arithmetic tests slightly favored the boys, while the means of Coding and Picture Arrangement significantly favored the girls.

SUGGESTIONS FOR FURTHER RESEARCH

A repetition of the same type of investigation after a five year period would be valuable in reinforcing or modifying the conclusions of this study. By keeping the subjects and location constant, an additional insight could be gained as to the effect of time on the group under study.

By confining the study to children within a narrower age range, research would be simplified, and differences which can be attributed to factors other than sex would be lessened.

Again for the sake of simplifying research, it would be advisable to limit the group to those whose

IQ scores, Full Scale, Verbal, and Performance, fall below 75.

CONCLUSION

Among the subjects included in this study, it was found that within the total group boys obtained significantly higher means in Total IQ and Verbal IQ, while girls showed significant superiority in the Coding test. Boys excelled the girls on mean scores in Performance IQ, Vocabulary and Arithmetic subtests, while the girls' mean exceeded that of boys in Picture Arrangement.

Within the various IQ levels, girls of the 60 to 69 IQ group were significantly superior to boys in Verbal, Performance and Full Scale IQ, while the means of boys' scores in the 80 to 89 IQ group on Total and Verbal IQ significantly exceeded those of girls.

No consistent pattern of sex superiority emerged among the WISC subtests selected for study because of their occurrence in a Stimulus Trace group factor. In the total group, girls were significantly superior in Coding. Among the IQ groupings, differences in only two subtests were found to be statistically significant: girls of the 80 to 89 IQ group were superior to boys in both Coding and Picture Arrangement.

Chance differences favored girls on every subtest (60 to 69 IQ group), and on Vocabulary and Coding (70 to 79 IQ group). On subtests of Vocabulary and Arithmetic

in the 80 to 89 IQ group and on Picture Arrangement in the 70 to 79 IQ group, boys' means were slightly higher than girls.

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APPENDIX I

COMPOSITE GROUP DATA

IQ GROUP 80 TO 89 ON TOTAL IQ AND SELECTED SUBTESTS

Child Tested	Full Scale	Verbal	Per-formance	Vocabu-lary	Coding	Arith-metic	Picture Arrangement
1.	85	91	82	6	7	9	9
2.	88	94	83	9	7	7	5
3.	89	90	90	7	10	10	7
4.	81	80	86	4	8	7	11
5.	87	96	79	7	9	14	7
6.	86	96	78	7	7	9	6
7.	88	94	85	6	7	10	4
8.	89	96	83	6	10	10	7
9.	88	87	90	6	8	8	9
10.	89	99	80	8	5	8	6
11.	83	90	79	6	7	7	8
12.	80	85	78	6	9	9	9
13.	81	87	78	7	8	8	2
14.	89	91	89	7	11	10	9
15.	88	97	80	7	6	13	8

Child Tested	Full Scale	Verbal	Per-formance	Vocabu-lary	Coding	Arith-metic	Picture Arrangement
16.	84	79	93	5	11	7	10
17.	80	86	76	6	9	8	8
18.	85	85	87	7	4	6	8
19.	87	79	99	3	13	5	12
20.	83	80	89	6	11	7	10
21.	80	90	72	9	9	5	9
22.	86	92	82	10	4	10	8
23.	88	100	78	9	12	8	6
24.	83	87	82	7	12	10	7
25.	81	84	82	7	10	9	9
26.	80	79	86	5	11	8	9
27.	82	86	80	8	9	7	8
28.	85	79	96	9	8	4	10
29.	84	89	82	8	6	8	8
30.	87	97	78	9	8	12	11
31.	82	86	80	6	9	12	4

Child Tested	Full Scale	Verbal	Per-formance	Vocabu-lary	Coding	Arith-metic	Picture Arrangement
32.	86	74	89	6	7	8	11
33.	88	85	93	6	10	11	11
34.	86	94	79	9	8	9	6
35.	85	76	97	6	14	6	8
36.	85	84	87	4	9	10	9
37.	87	91	85	7	10	10	7
38.	85	89	85	5	14	12	3
39.	84	86	85	7	11	6	9
40.	80	75	89	5	8	5	11
41.	83	87	82	10	2	10	11
42.	81	90	75	8	10	7	8
43.	86	80	96	6	13	8	6
44.	82	81	86	8	14	7	6
45.	84	86	85	7	10	8	11
46.	82	79	89	5	8	7	9
47.	81	72	94	6	7	5	9

Child Tested	Full Scale	Verbal	Per-formance	Vocabu-lary	Coding	Arith-metic	Picture Arrangement
48.	85	86	87	7	8	11	9
49.	85	84	90	10	8	4	11
50.	87	81	96	6	6	7	12
51.	83	92	75	8	6	10	7
52.	85	80	94	3	8	9	10
53.	87	97	78	11	5	10	8
54.	83	97	71	9	4	9	5
55.	86	87	87	8	7	6	8
56.	81	86	79	7	11	7	10
57.	80	87	75	8	14	8	4
58.	88	87	90	6	12	9	10
59.	84	87	83	7	6	8	8
60.	88	84	96	6	7	8	8
61.	85	81	92	5	12	8	7
62.	89	97	82	11	9	8	9
63.	87	85	92	4	10	11	10

Child Tested	Full Scale	Verbal	Per-formance	Vocabu-lary	Coding	Arith-metic	Picture Arrangement
64.	88	80	99	7	4	6	13
65.	85	92	79	10	7	5	6
66.	80	84	79	4	7	9	7
67.	80	86	76	9	9	6	4

IQ GROUP 70 TO 79 ON TOTAL IQ AND SELECTED SUBTESTS

Child Tested	Full Scale	Verbal	Per-formance	Vocabu-lary	Coding	Arith-metic	Picture Arrangement
68.	78	85	75	7	4	6	6
69.	73	79	72	6	0	6	7
70.	70	80	65	5	3	9	5
71.	77	91	67	6	8	9	1
72.	76	90	65	5	5	9	4
73.	70	72	74	5	7	6	2
74.	70	60	87	3	3	3	9
75.	72	79	71	5	6	6	7
76.	77	72	86	7	6	5	8
77.	79	76	86	7	12	8	7
78.	73	85	65	5	9	8	2
79.	75	76	78	6	8	10	6
80.	75	82	72	6	3	10	5
81.	77	80	79	4	7	9	6
82.	71	76	71	5	9	7	4

Child Tested	Full Scale	Verbal	Per-formance	Vocabu-lary	Coding	Arith-metic	Picture Arrangement
83.	77	82	75	6	5	10	8
84.	72	67	82	3	5	8	6
85.	73	79	72	6	6	6	8
86.	74	85	67	8	5	8	6
87.	76	79	78	7	4	8	7
88.	75	81	74	5	6	8	9
89.	77	81	76	4	11	7	7
90.	77	66	93	4	10	3	9
91.	77	75	83	7	4	6	7
92.	79	87	74	5	5	7	8
93.	77	87	71	8	8	8	7
94.	72	86	62	6	6	7	2
95.	76	75	82	4	6	5	5

IQ GROUP BELOW IQ 69 ON TOTAL IQ AND SELECTED SUBTESTS

Child Tested	Full Scale	Verbal	Per-formance	Vocabu-lary	Coding	Arith-metic	Picture Arrangement
96.	60	70	57	7	4	4	4
97.	54	60	55	2	3	4	0
98.	67	72	67	6	6	6	5
99.	56	58	62	1	5	3	3
100.	62	74	55	5	7	5	4
101.	68	79	62	5	6	7	6
102.	64	63	72	3	6	7	5
103.	62	69	62	2	5	7	6
104.	67	71	69	4	5	6	2
105.	64	74	61	2	7	5	7
106.	64	76	58	1	7	13	5
107.	68	65	78	7	5	5	5
108.	45	47	44	3	0	0	1
109.	67	72	67	6	8	6	3
110.	61	72	55	8	5	4	6

Child Tested	Full Scale	Verbal	Per-formance	Vocabu-lary	Coding	Arith-metic	Picture Arrangement
111.	66	71	67	6	4	4	2
112.	46	52	44	1	3	1	1
113.	66	75	62	4	4	6	6
114.	67	77	61	5	5	10	1
115.	54	69	47	4	1	5	2
116.	54	53	62	0	0	3	2
117.	64	65	71	3	9	5	4
118.	68	72	69	0	10	7	3

WISC RECORD FORM

NAME _____ AGE _____ SEX _____

ADDRESS _____

PARENT'S NAME _____

SCHOOL _____ GRADE _____

REFERRED BY _____

	Year	Month	Day		Scaled Score	IQ
Date Tested				Verbal Scale		
Date of Birth				Performance Scale		
Age				Full Scale		

*Prorated if necessary

	Raw Score	Scaled Score
VERBAL TESTS		
Information		
Comprehension		
Arithmetic		
Similarities		
Vocabulary		
(Digit Span)		
Sum of Verbal Tests		
PERFORMANCE TESTS		
Picture Completion		
Picture Arrangement		
Block Design		
Object Assembly		
Coding		
(Mazes)		
Sum of Performance Tests		

NOTES

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Examiner

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57-200 AS

1. INFORMATION	Score 1 or 0		Score 1 or 0		Score 1 or 0
1. Ears		11. Season—Year		21. Pounds—Ton	
2. Finger		12. Color—Rubies		22. Capital—Greece	
3. Legs		13. Sun—Set		23. Turpentine	
4. Animal—Milk		14. Stomach		24. New York—Chicago	
5. Water—Boil		15. Oil—Float		25. Labor Day	
6. Store—Sugar		16. Romeo—Juliet		26. South Pole	
7. Pennies		17. Fourth—July		27. Barometer	
8. Days—Week		18. C.O.D.		28. Hieroglyphic	
9. Discoverer—America		19. American—Man		29. Genghis Khan	
10. Things—Dozen		20. Chile		30. Lien	

2. COMPREHENSION	Score 2, 1 or 0
1. Cut—Finger	
2. Lose—Balls (Dolls)	
3. Loaf—Bread	
4. Fight	
5. Train—Track	
6. House—Brick	
7. Criminals	
8. Women—Children	
9. Bills—Check	
10. Charity—Beggar	
11. Government—Examinations	
12. Cotton—Fiber	
13. Senators	
14. Promise—Kept	

3. ARITHMETIC			
Problem	Response	Time	Score 1 or 0
1. 45"			
2. 45"			
3. 45"			
4. 30"			
5. 30"			
6. 30"			
7. 30"			
8. 30"			
9. 30"			
10. 30"			
11. 30"			
12. 60"			
13. 30"			
14. 60"			
15. 120"			
16. 120"			

4. SIMILARITIES	Score 1 or 0
1. Lemons—Sugar	
2. Walk—Throw	
3. Boys—Girls	
4. Knife—Glass	
5. Plum—Peach	Score 2, 1 or 0
6. Cat—Mouse	
7. Beer—Wine	
8. Piano—Violin	
9. Paper—Coal	
10. Pound—Yard	
11. Scissors—Copper Pan	
12. Mountain—Lake	
13. Salt—Water	
14. Liberty—Justice	
15. First—Last	
16. 49—121	

SUPPLEMENTARY TESTS

DIGIT SPAN

Digits Forward	Score (Circle)	Digits Backward	Score (Circle)
3-8-6	3	2-5	2
6-1-2	3	6-3	2
3-4-1-7	4	5-7-4	3
6-1-5-8	4	2-5-9	3
8-4-2-3-9	5	7-2-9-6	4
5-2-1-8-6	5	8-4-9-3	4
3-8-9-1-7-4	6	4-1-3-5-7	5
7-9-6-4-8-3	6	9-7-8-5-2	5
5-1-7-4-2-3-8	7	1-6-5-2-9-8	6
9-8-5-2-1-6-3	7	3-6-7-1-9-4	6
1-6-4-5-9-7-6-3	8	8-5-9-2-3-4-2	7
2-9-7-6-3-1-5-4	8	4-5-7-9-2-8-1	7
5-3-8-7-1-2-4-6-9	9	6-9-1-6-3-2-5-8	8
4-2-6-9-1-7-8-3-5	9	3-1-7-9-5-4-8-2	8

F____ + B____ = ____
Highest numbers circled

MAZES

Maze	Max. Errors	Errors	Score
A. 30"	2		0 1 2
B. 30"	2		0 1 2
C. 30"	2		0 1 2
1. 30"	3		0 1 2 3
2. 45"	3		0 1 2 3
3. 60"	5		0 1 2 3
4. 120"	6		0 1 2 3
5. 120"	8		0 1 2 3

Notes:

	Score 2 or 0	5. VOCABULARY
1. Bicycle		
2. Knife		
3. Hat		
4. Letter		
5. Umbrella		
	Score 2, 1 or 0	
6. Cushion		
7. Nail		
8. Donkey		
9. Fur		
10. Diamond		
11. Join		
12. Spade		
13. Sword		
14. Nuisance		
15. Brave		
16. Nonsense		
17. Hero		
18. Gamble		
19. Nitroglycerine		
20. Microscope		
21. Shilling		
22. Fable		
23. Belfry		
24. Espionage		
25. Stanza		
26. Seclude		
27. Spangle		
28. Hara-Kiri		
29. Recede		
30. Affliction		
31. Ballast		
32. Catacomb		
33. Imminent		
34. Mantis		
35. Vesper		
36. Aseptic		
37. Chattel		
38. Dilatory		
39. Flout		
40. Traduce		

6. PICTURE COMPLETION

	Score 1 or 0
1. Comb	
2. Table	
3. Fox	
4. Girl	
5. Cat	
6. Door	
7. Hand	
8. Card	
9. Scissors	
10. Coat	
11. Fish	
12. Screw	
13. Fly	
14. Rooster	
15. Profile	
16. Thermometer	
17. Hat	
18. Umbrella	
19. Cow	
20. House	

7. PICTURE ARRANGEMENT

Arrangement		Time	Order	Score
A. Dog	75"	1 / 2		0 — 1 ABC — 2 ABC
B. Mother	75"			0 — 1 OYT — 2 TOY
C. Train	60"			0 — 1 IR ON — 2 IRON
D. Scale	45"			0 — 2 ABC
(Fight)				
1. Fire	45"			0 — 4 — 5 (11-15) — 6 (6-10) — 7 (1-5) FIRE
2. Burglar	45"			0 — 4 — 5 (11-15) — 6 (6-10) — 7 (1-5) THUG
3. Farmer	45"			0 — 4 — 5 (11-15) — 6 (6-10) — 7 (1-5) QRST OR SQRT
4. Picnic	45"			0 — 4 — 5 (11-15) — 6 (6-10) — 7 (1-5) EFGH OR EFHG
5. Sleeper	60"			0 — 4 — 5 (16-20) — 6 (11-15) — 7 (1-10) PERCY
6. Gardener	75"			0 — 4 — 5 (21-30) — 6 (16-20) — 7 (1-15) FISHER OR FSIHER
7. Rain	75"			0 MSTEAR ASTEMR 2 — 4 — 5 (21-30) — 6 (16-20) — 7 (1-15) MASTER

8. BLOCK DESIGN

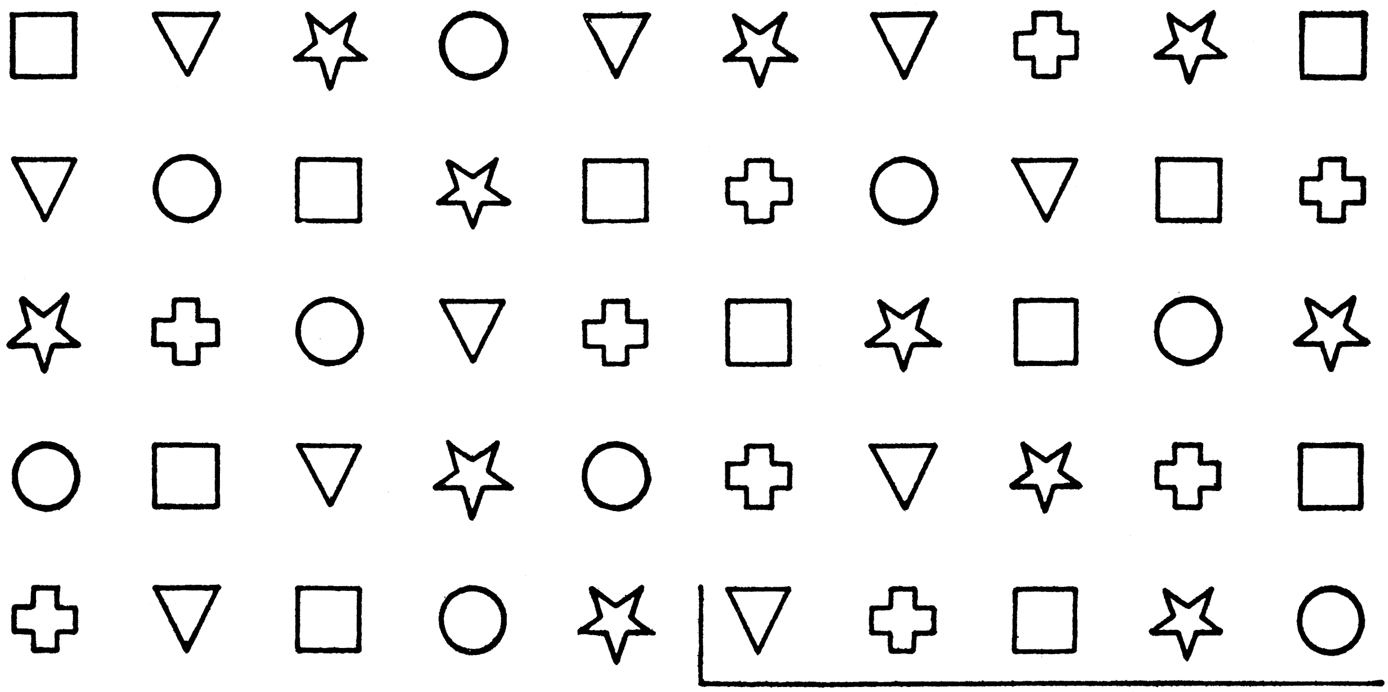
Design	Time	Pass-Fail	Score
A. 45"	1 / 2		2 / 0 1
B. 45"	1 / 2		2 / 0 1
C. 45"	1 / 2		2 / 0 1
1. 75"			0 — 4 (21-75) — 5 (16-20) — 6 (11-15) — 7 (1-10)
2. 75"			0 — 4 (21-75) — 5 (16-20) — 6 (11-15) — 7 (1-10)
3. 75"			0 — 4 (26-75) — 5 (21-25) — 6 (16-20) — 7 (1-15)
4. 75"			0 — 4 (21-75) — 5 (16-20) — 6 (11-15) — 7 (1-10)
5. 150"			0 — 4 (66-150) — 5 (46-65) — 6 (36-45) — 7 (1-35)
6. 150"			0 — 4 (81-150) — 5 (66-80) — 6 (56-65) — 7 (1-55)
7. 150"			0 — 4 (91-150) — 5 (66-90) — 6 (56-65) — 7 (1-55)

9. OBJECT ASSEMBLY

Object	Time	Score
Manikin 120"		0 1 2 3 — 4 (21-120) — 5 (16-20) — 6 (11-15) — 7 (1-10)
Horse 180"		0 1 2 3 4 5 — 6 (31-180) — 7 (21-30) — 8 (16-20) — 9 (1-15)
Face 180"		0 1 2 3 4 5 — 6 (71-180) — 7 (46-70) — 8 (36-45) — 9 (1-35)
Auto 180"		0 1 2 3 4 5 — 6 (46-180) — 7 (31-45) — 8 (26-30) — 9 (1-25)

Notes:

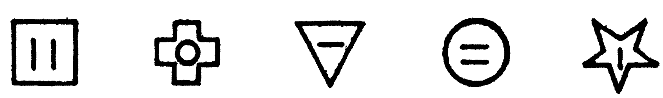
TIME (120") ________ NO. RIGHT ________ SCORE ________



SAMPLE

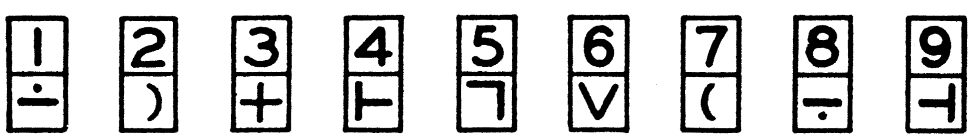
CODING A

(5-7)



CODING B

(8-15)



SAMPLE

2	1	4	6	3	5	2	1	3	4	2	1	3	1	2	3	1	4	2	6	3	1	2	5	1

3	1	5	4	2	7	4	6	9	2	5	8	4	7	6	1	8	7	5	4	8	6	9	4	3

1	8	2	9	7	6	2	5	4	7	3	6	8	5	9	4	1	6	8	9	3	7	5	1	4

9	1	5	8	7	6	9	7	8	2	4	8	3	5	6	7	1	9	4	3	6	2	7	9	3

TIME (120") ________ SCORE (NO. RIGHT) ________