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AN EXPERIMENTAL STUDY USING PICTORIAL PAIRED ASSOCIATES TO COMPARE LEARNING RATES OF NORMAL NEGRO AND WHITE CHILDREN

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AN EXPERIMENTAL STUDY USING PICTORIAL PAIRED ASSOCIATES TO COMPARE LEARNING RATES OF NORMAL NEGRO AND WHITE CHILDREN

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CHAPTER I

INTRODUCTION

In the design typically used where two different racial groups of subjects are being compared on intelligence and associate learning tests, it is necessary to match the groups on as many features known or suspected to correlate with intelligence as possible so that the difference between groups, if any, may be attributed to race.

The question of the fairness of present intelligence tests is one of great importance, both to the individual pupils and the society as a whole. If, as many competent educators, psychologists, and sociologists believe, intelligence tests are readily unfair to children from certain kinds of backgrounds, and do not reveal the full abilities of these children, then grave injustices are done to such children when school people base curricular, instructional, and guidance practices on the IQ as determined by such tests. Moreover, a serious loss to

society may continue to result through failure to identify and develop the real talents of all its members. No so-called democratic society in today's world is in such a secure position that it can afford to waste, through nonrecognition, the leadership or other talents of any large group of its people.

Almost since the advent of intelligence testing, educators and psychologists have debated and investigated the relationship of the IQ to environmental factors. The fact that there is a definite and measurable relationship between the social status or cultural background of their parents has been known since the time of Binet.

With respect to the significance and interpretation of these differences however, there is no such agreement. Do the higher test scores of the children from high socio-economic backgrounds reflect genuine superiority in inherited, or genetic equipment, or do the high scores result from superior environment which has brought about real superiority of the child's "Intelligence"? Or do they reflect a bias in the test materials and not any important differences in the children at all? Each of these interpretations has had its supporters, and each has been defended vigorously.

The first line of argument has pointed out that if the intelligence of adults is so distributed socially that the persons of higher intelligence tend to be concentrated in the higher social status levels and if intelligence is

genetically determined, one would expect that children from the higher social status levels would show higher IQ's than those from lower levels. This argument tends to conclude that the observed differences in IQ's are due in large part to hereditary factors.

The second line of argument has pointed out that if the child's intelligence is not fixed by genetic factors but is subject to modification by stimulating or a non-stimulating environment, and if the higher social status levels provide more stimulation for mental growth than do the lower levels, one would expect that children from the higher social status levels would show higher IQ's than those from the lower levels. This argument tends to conclude that the observed differences in IQ's, while real, are due in part to environmental factors.

The third line of argument has pointed out that if the children from different social status levels have different kinds of experiences and have experiences with different kinds of material, and if the intelligence tests contain a disproportionate amount of material drawn from the cultural experiences with which pupils from the higher social status levels are more familiar, one would expect that children from the higher social status levels would show higher IQ's than those from the lower levels. This argument tends to conclude that the observed differences in pupil's IQ's are artifacts dependent upon the specific content of the test

items and do not reflect accurately any important underlying ability in the pupils.[1]

Woodworth has a helpful analogy using a rectangle to symbolize the relations of development to heredity and environment.

> Let heredity be the base of the rectangle, and environment be its altitude. Then development of the individual depends on both heredity and environment, just as the area of the rectangle depends on both the base and the altitude. . . . If we can be sure that two individuals have had the same environment, then we can attribute the actual differences to heredity; or if we can be sure that they have the same heredity; then differences must be due to environment. The difficulty remains of making sure of equal heredity or of equal environment.[2]

"The evidence on learning rates is conflicting, and differences in methodology, learning tasks, etc., makes comparisons difficult."[3]

If it were possible to have an absolutely perfect set-up in which all subjects started from a common point, having had no experience whatsoever with the task assigned, paired associate learning, and no experience with any thing that might transfer to the task, then perhaps, some definite conclusions might be reached as to the potency of heredity.

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[1]Kenneth Eells, Allison Davis, Robert J. Havighurst, Virgil E. Herrick, and Ralph Tyler, Intelligence and Cultural Differences (Chicago: The University of Chicago Press, 1951), pp. 3-5.

[2]R. S. Woodworth, Psychology (New York: Holt Co., 1929), pp. 183-184.

[3]Bernice S. Eisman, "Paired Associate Learning, Generalization, and Retention," American Journal of Mental Deficiency, LXIII (1958), p. 484.

As conditions are, where the ideal set-up is striven after but never attained, where we must be content with choosing task that seem new, and subjects who are young, the results may suggest some factors to be taken into consideration when coping with the heredity-environment question, as it is posed to racial differences, but nothing more definite.

Statement of the Problem

Realizing the mathematical inexactness of the instruments used in this study, this experiment was an attempt to measure the relationship between the learning rates on a Pictorial Paired Associate Learning Test with the performance on the 1960 Stanford-Binet Scale and the Goodenough Draw-A-Man Test of Negro and white children who obtained IQ's within the normal range of intelligence. The relationship between rate and ability is an open question of such importance that research should not stop short of a solution that is substantiated by trustworthy, experimental evidence.

The purpose of the study was to find out if there were demonstrable quantitative differences between normal Negro and white children in their rate of learning on a Pictorial Paired Associate Test.

In order to determine this difference, if any, in the learning rates of Negro and white children, the following null hypotheses were tested:

1. There is no statistically significant difference in the number of trials required to meet the criterion of

learning on a Pictorial Paired Associate Test and scores obtained on the 1960 Stanford-Binet Intelligence Test of normal Negro and white children.

2. There is no statistically significant difference in the number of trials required to meet the criterion of learning on a Pictorial Paired Associate Test and scores obtained on the Goodenough Draw-A-Man Test of normal Negro and white children.

3. There is no statistically significant difference in the IQs obtained on the 1960 Stanford-Binet Intelligence Test and the Goodenough Draw-A-Man Test of normal Negro and white children.

4. There is no statistically significant difference in the means obtained on the 1960 Stanford-Binet Intelligence Test, the Goodenough Draw-A-Man Test and the Pictorial Paired Associate Test of Negro and white children.

Limitations of the Study

The study was confined to one school system in the state of Oklahoma. It was further limited to Elementary Negro and white children of this system; specifically, second and third graders between the chronological ages of eight and nine who obtained IQs between the range of 90 and 110 on the 1960 Stanford-Binet Intelligence Test. These twenty-eight Negro subjects and twenty-seven white subjects used in the study were enrolled during the Spring of 1963.

No assumption was made in the research study that there either are or are not genetic differences in innate ability between Negro and white children who fall into the intelligence range of 90 and 110. It did not provide any direct basis for determining whether such differences did or did not exist. The purpose was to determine how Negro and white children equated on IQ, falling within the normal range of intel-

ligence, compare in rate of learning on a culturally free Pictorial Paired Associate Test, or a test which is less influenced by previous cultural experiences.

Effort was made to suggest possible explanations for such differences, on the basis of internal evidence within the test data, but no attempt was made to attack this phase of the problem experimentally.

The study could not be expected to provide final and conclusive evidence, although on some points it did provide more definite evidence than has heretofore been available relative to rate of learning.

The findings of this study with regard to rate of learning as obtained by the Pictorial Paired Associates Test can have direct applicability only to the specific group of pupils upon which the present study is based. It is believed, however, that many of the more important findings can be generalized at least to other communities of the same general size and socio-economic structure.

The study was limited to the type of individual intelligence test that is in most widespread use in the schools of the United States today.

Instruments Used in the Study

The measures of intelligence used were the 1960 Stanford-Binet Intelligence Test, and the Goodenough Draw-A-Man Test. The instrument used to measure rate of learning was a Pictorial Paired Associate Test.

The 1960 Revision of the Stanford-Binet Intelligence Test is an age scale making use of age standards of performance. It undertakes to measure intelligence regarded as general mental adaptability. The 1960 scale incorporates in a single form, designated as the L-M Form, the best subtest from the 1937 scales. The selection of subtests to be included in the 1960 scale was based on records of test administered during the five-year period from 1950 to 1954. The main assessment group for evaluating the subtests consisted of 4498 white subjects aged two and a half to eighteen years old.[4] This individual intelligence test was used to obtain the IQs of all subjects used in the study.

The Goodenough Draw-A-Man Test is a test of performance as contrasted with the Stanford-Binet Intelligence Scale, or language type. The task is to draw a man. The subject may draw any kind of man he chooses, in any position; but he is told to draw the whole man and to do the best that he can. The subject's score is arrived at in an objective manner which has been demonstrated to be practically free of bias in favor either of artistic talent or merit, on the one hand, or of practice or instruction in drawing, on the other. Scoring depends on the number of details attempted (such as arms, legs, clothing, etc.), on the degree of muscular control (as indicated by line firmness and junctions), and on the correctness

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[4]Lewis M. Terman and Maud A. Merrill, Stanford-Binet Intelligence Scale (Boston: Houghton Mifflin Co, 1960), pp. 20-25.

of relative proportions, within very wide limits. Success in the test of drawing depends on factors which develop side by side with intelligence in the "normal" population. This test was introduced in 1926 by Florence Goodenough as an alternate to the various intelligence tests then in use.[5] As finally developed, the scale consists of fifty-one points, or units of measurement. The points were derived by means of (a) the observation of differences which appeared to be characteristic of the performances of children at successive ages or school grades; (b) the formulation of objective definitions or descriptions of these differences; and (c) their statistical validation based on a comparison between performances of different ages, and also between the performances of children who were accelerated in school and those who were retarded. While no claim of absolute accuracy or finality of rating is made for the scale, the results obtained indicate that it forms a serviceable test of intellectual development, which is useful both for making comparisons between groups and as a supplement to the usual type of intelligence test in the study of individual cases. It is particularly suitable for investigating the mentality of children from foreign homes or of deaf children.[6]

The Goodenough Intelligence Scale acn be briefly characterized as follows:

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[5]Florence Goodenough, Measurement of Intelligence by Drawings (Great Britian: Harcourt, Brace and World, Inc., 1954), pp. iii-xi.

[6]Ibid., p.81.

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1. It utilizes nothing but the child's single drawing of a man.

2. It requires no more than ten minutes for testing an entire class or individual, in addition to about two minutes per child for scoring.

3. It is accordingly nonverbal.

4. It is useful chiefly with children from mental age four to mental age ten.

5. Its reliability for a single unselected age group in this range lies between .80 and .90.

6. For separate age groups in the same range it yields an average correlation of .76 with the Stanford-Binet Intelligence Scale.[7]

The Pictorial Paired Associate Test consists of two Booklets of sixteen five by eight inch cardboard cards bound together by a flexible plastic spiral band. Booklet One contains thirteen cards on each of which there is one pair of outline pictures and three blank cards serving as front, back, and blank page between sample card and stimulus cards. Booklet Two contains thirteen cards on each of which appears the first picture of the stimulus pair. The first picture card serves as a sample card for instructional purposes and the other twelve pictures as test cards. Three blank cards are also included in this booklet.[8]

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[7] Ibid., iii-xi.

[8] Gladys W. Hiner, "A Comparison of Associate Learning Rates of Bright, Normal, and Retarded Children," (Dissertation, Department of Special Education, University of Oklahoma, 1962), p. 15.

(1) The pictures are simple outline drawings of common objects.

(2) Booklet One consists of the following cards with pictures indicated

Car and Fork	Bird and Lamp
Box and Pig	Duck and Saw
Chair and Dress	Coat and Sun
Leaf and House	Kite and Fish
Comb and Drum	Tree and Shoe
Hat and Cup	Bread and Clock
Skate and Ring (sample)	

(3) The pictures are immediately recognizable and consistently identifiable.

(4) The words represented by the pictures are one syllable nouns.

(5) Scoring is determined by the total number of trials taken by a subject to learn in one trial all correct associations.[9]

Control Variables

Four types of control information regarding the subjects seemed desirable to obtain: age of the child, socio-economic status, general intelligence, and race.

Age: The age of each subject was established from school records to the nearest month as of the date on which the subject took the three tests. For the entire sample, mean age was 8 years and 3 months. For the Negro children, the mean age was 8 years and 4 months. For the white children the mean age was 8 years and 7 months.

General Intelligence: General Intelligence scores for Negro and white children were obtained from the 1960 Stanford-Binet Intelligence Scale and the Goodenough Draw-A

[9] Ibid., 46-59.

Man Test. For the entire sample. mean IQ on the Stanford-Binet was 98, with a mental age of 8 years and 3 months. For the Negro children, the mean age was 8 years and 4 months with an obtained IQ of 98. For the white children the mean mental age was 8 years and 8 months with an obtained IQ of 99.

For the entire sample, mean IQ on the Goodenough Draw-A-Man Test was 98 with a mental age of 8 years and 2 months. For the Negro children, the mean IQ was 105 with a mental age of 8 years and 9 months. For the white children, the mean IQ was 94 with a mental age of 7 years and 9 months.

Socio-economic Status: Socio-economic status was inferred from the listing of father's occupation available in the school records. A distinction was drawn between two occupational strata, defined as follows:

1. Any occupation implying a college education -- included doctor, executive, lawyer, manager, sales representative, scientist, teacher, etc.
2. Any occupation not implying a college education-- included clerk, skilled and unskilled laborer, store-keeper, welfare dependents, etc.

The former stratum may be broadly described as "higher" and the latter as "lower" socio-economic status. The Negro and white children included in this study fell without exception in the lower socio-economic group.

Race: The criteria used in this study tc determine race was as follows:

1. Negroes -- African Negroes and those mixed with white and Indian.
2. Whites -- Only the white children were used in

the study even though the Indian is classified as white in Oklahoma.

Operational Definitions

Definitions pertaining to the following terms seemed practical:

1. Intelligence -- refers to the ability to understand and deal with verbal and mathematical symbols, and abstract ideas.

2. Intelligence Quotient -- corresponds in a general way to the concept of average ability. Between IQs 90 and 110 will be found approximately 46 per cent of the cases making up the group on which the Stanford-Binet Intelligence Scale was standardized. It carrys no implications of diagnostic significance; it has statistical meaning as designating the middle range of Intelligence Quotients.

3. Rate of Learning -- refers to the number of trials required to meet the criterion of learning in a paired associate learning task.

Summary

In the design typically used where two different racial groups of subjects are being compared on intelligence and rate of learning, it is necessary to match the groups on as many features known or suspected to correlate with intelligence as possible so that difference between groups, if any, may be attributed to race.

Arguments are advanced relative to the fairness of present intelligence tests to children from different environmental backgrounds.

The evidence on learning rates is conflicting, and differences in methodology, learning tasks, etc., makes com-

parisons difficult.

The purpose of the study was to find out if there were demonstrable quantitative differences between Negro and white children in their rate of learning in a meaningful and familiar type of learning situation.

In order to determine the difference, if any, in the learning rates of Negro and white children, the following null hypotheses were tested:

1. There is no statistically significant difference in the number of trials required to meet the criterion of learning in a paired associate learning task of normal, Negro and white children whose IQs fall within the range of 90 and 110.

2. There is no statistically significant difference in the number of trials required to meet the criterion of learning in a paired associate learning task of Negro and white children and scores obtained on the 1960 Stanford-Binet Intelligence Test and the Goodenough Draw-A-Man Test.

The study was confined to one school system in the state of Oklahoma. It was further limited to Elementary Negro and white children between the ages of eight and nine who obtained IQs between the range of 90 and 110 on the 1960 Stanford-Binet Intelligence Scale.

The measures of intelligence used in this study were the 1960 Stanford-Binet Intelligence Scale and the Goodenough Draw-A-Man Scale. The instrument used to measure rate of learning was a Pictorial Paired Associate Test.

It seemed desirable to secure four types of control information regarding the subjects: age of the child, socio-economic status, general intelligence, and race.

REVIEW OF EXPERIMENTAL LITERATURE

CHAPTER II

The question as to whether Negroes and whites differ significantly in mental ability and rate of learning has been a subject of much debate since the middle of the eighteenth century. Unfortunately, the subject has been confused with social and political issues of racial inferiority, desegregation, foreign policy, and uninformed writers.

Two difficulties arise when Negroes and whites are compared in mental-test performance in the United States. In the first place, the American Negro is generally below the white in social and economic status and his work opportunities are more limited. Inequalities in environmental factors make it difficult to effect a fair comparison of many Negro and white groups. A second stems from the fact that many American Negroes have white ancestry.[10]

The general difficulty which is involved in any comparison of Negro and white subjects, probably still holds for this present study as it does for many others, as Dreger and Miller wrote:

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[10]Audrey M. Shuey, The Testing of Negro Intelligence (Virginia: J. P. Bell and Company, 1958), p. vii.

> One suspects that in a number of cases so-called racial comparisons are being carried out between one group designated as "white" and another designated as "black" which consist of many who are partly or even largely white.[11]

Racial intermixture, however, should render Negro-white differences in the United States, if found, even more significant. For racial differences would then very probably be much greater if American whites and African Negroes or Africans were fairly compared.

It appears that before hypotheses advanced can be accepted or rejected relative to structural or intellectual differences between Negro and white subjects, the same heredity criteria for the selection of white subjects should be applied in the selection of Negro subjects.

This review of typical studies furnishes a picture of the present status of the question, the chief features of which are uncertainty and contradiction, with an increasing realization of the necessity for authentic knowledge of the true relationship between intelligence and rate of learning between Negro and white subjects. The lack of harmony in views may be explained in part at least by the lack of agreement on what constitutes a valid measure of each of the two traits. It is quite evident in any unselected list of studies that there has been inconsistency among experimenters in the accepted measure of either intelligence or rate of learning.

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[11]Ralph M. Dreger and Kent S. Miller, "Comparative Studies of Negroes and Whites in the United States," Psychological Bulletin, LVII (September, 1960), p. 372.

The more significant results of earlier experiments in comparison of performance of Negro and white subjects on intelligence and rate of learning tests are cited, more specifically, the Stanford-Binet Intelligence Test, the Good-enough Draw-A-Man Test, and Pictorial Paired Associate Test.

Racial Studies Using the Goddard-Binet Intelligence Test

Goddard's Revision of the Binet-Simon Test was the first translation and adaptation of the Binet-Simon to be extensively used in the United States. Goddard shifted the age location of several of the tests, introduced a few new tests into the 15 year group, and adapted the terminology and content for use with American children. This scale was widely used until 1916 when it was supplanted by the Stanford Revision.[12]

Five early studies of Negro intelligence made use of the Goddard Revision. In these studies the percentages of mental retardation and advancement were computed or estimated for the several groups of Negro and white children. In general, the 208 southern Negroes examined by Strong (1913)[13] and Sunne (1917)[14] and 482 northern Negro subjects tested by

[12]H. E. Garrett and M. R. Schneck, Psychological Tests, Methods, and Results (New York: Harper, 1933), p. 372.

[13]A. C. Strong, "Three Hundred Fifty White and Colored Children Measured by Binet Simon Measuring Scale of Intelligence: A Comparative Study." Ped. Sem.XX (1917), pp. 485-515.

[14]A. D. Sunne, "A Comparative Study of White and Negro Children," Journal of Applied Psychology, I, (1917). pp. 71-83.

Odum (1913),[15] Phillips (1914),[16] and Wells (1923)[17] showed considerably more retardation and definitely less acceleration than the white groups. Odum and Wells observed that the Negro children at the younger ages tested about the same as the whites but the older Negro children became progressively inferior with increase in age.

Morse (1914)[18] believed that native factors were responsible for at least part of the Negro-white differences observed or obtained by Strong. Phillips argued that a difference in mentality exists between Negro and white children if the tests are "at all a gauge of mentality;" and raised the question as to whether the two groups should be instructed under the same curriculum.[19] Odum and Wells, on the other hand, were inclined to attribute the mental differences to environmental rather than to native factors. Both cited the smaller incentive for the Negro child to continue in school as a consequence of limitation in occupational opportunities, the lower economic positions of Negro people, the disadvantageous home influences, and the greater percentage of absences from

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[15] H. W. Odum, "Negro Children in the Public Schools of Philadelphia," Annals of the American Academy of Political and Social Science, XLIX (1913), pp. 186-208.

[16] B. A. Phillips, "The Binet Tests Applied to Colored Children," Psychological Clin., VIII (1914), pp. 190-196.

[17] G. R. Wells, "The Application of the Binet Simon Tests to Groups of White and Colored School Children," Psychological Monograph, XXXII (1923), pp. 52-58.

[18] J. A. Morse, "A Comparison of White and Colored Children Measured by the Binet Scale of Intelligence," Popular Science Monthly, LXXXIV (1914), pp. 75-79.

[19] Phillips, loc. cit.

school among the Negro.[20]

The importance of environment was recognized by other investigators and attempts were made even in this early period of testing to equate groups for background factors. Strong, for example, compared cotton mill white children with the total group of Negro subjects after finding that the education and environment of the former were little, if any better than those of the latter group. Phillips matched the Negro and white subjects for home rating; and Sunne compared groups of about the same social and economic status since all of her subjects were living in a very poor district. Sunne even attempted to equate Negro and white children for both age and school grade, an obviously unwarranted procedure which serves to conceal or minimize real differences when they occur.[21]

Stanford Revision of the Binet-Simon Tests, 1916 Form

Studies which made use of the Stanford-Binet may be separated into three categories: (1) those reporting on selected groups of Negro children, (2) those dealing with unselected groups of Negro and white children, and (3) those in which attempts were made to equate Negro-white groups for environmental factors.

In the first classification Long (1933) in Washington, D. C., compared intelligence scores of a group of 100 Negro

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[20]Odum, loc. cit.

[21]Phillips, Op. cit., p. 83.

children from better residential sections, with those of a group of 100 Negro children from underprivileged communities.[22] The mean IQ of the underprivileged group was 15 points below the mean of 112 obtained on those from the better residential sections. The underprivileged group was selected on the basis of opinions of Washington teachers and supervisors, however, it was only selected by these judges as a community. Long did not obtain an estimate of the socio-economic status of the home of the child. He asked principals and teachers to recommend pupils for testing, who, in their judgment, came from better homes of the school community.

Beckham's large number of 1000 Negro adolescents, 753 of whom were from Washington, cannot be considered as an unselected sample of Negro adolescents from the areas represented. He did not mention how the Negro subjects were selected, but he observed that in addition to some Baltimore adolescents who were referred to the laboratory by parents or teachers, all of the Washington subjects; and, presumably some of the Baltimore subjects; were brought to the Howard University laboratory by psychology students as part of a course project. Although these Negro youths, whose IQs ranged from a mean of 95.7 in Baltimore to one of 104.7 in New York City, may have represented a random sampling of their respective populations,

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[22] H. H. Long, "Analysis of Test Results from Third Grade Children Selected on the Basis of Socio-economic Status," (Unpublished Ph. D. dissertation, Harvard University, 1933).

there is no assurance that they did.[23]

Some studies in which the samples for the Stanford-Binet testing were apparently chosen at random are as follows: the work of V. T. Graham (1926)[24] and Lambeth and Lanier (1933) in the South,[25] the research of Lacy[26] and Strachan (1926)[27] in the border states, the investigations of Schwegler and Winn (1920)[28] and Klineberg (1935) in the North.[29]

The highest IQ obtained was 99, earned by the Atlanta children (Graham), while the lowest mean of 77.5 was made by the Nashville boys (Lambeth and Lanier). The large numbers tested in Oklahoma City and Kansas City averaged about 89,

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[23]A. S. Beckham, "A Study of the Intelligence of Negro Adolescents of Different Social-Economic Status in Typical Metropolitan Areas," Journal of Social Psychology, IV (1933), pp. 70-91.

[24]V. T. Graham, "Health Studies of Negro Children; Intelligence Studies of Negro Children in Atlanta, Georgia," Public Health Report, XLI (1926), pp. 2759-2783.

[25]M. Lambeth and L. H. Lanier, "Race Differences in Speed of Reaction," Journal of Genetic Psychology, XLII (1933), pp. 2555-2970.

[26]L. D. Lacy, "Relative Intelligence of White and Negro Children," Elementary School Journal, XXVI (1926), pp. 342-546.

[27]L. Strachan, "Distribution of Intelligence Quotients of Twenty-Two Thousand Primary-School Children," Journal of Education Research, XIV (1926), pp. 169-177.

[28]R. A. Schwegler and E. Winn, "A Comparative Study of the Intelligence of White and Negro Children," Journal of Education Research, II (1920), pp. 838-848.

[29]O. Klineberg, Negro Intelligence and Selective Migration (New York: Columbia University Press, 1935), p. 66.

which placed them from 10 to 11 points below the means of white children in the same cities. The 479 Negro children tested in the North, 421 of whom were included in Klineberg's report, averaged 87.2. From these data there seems to be no evidence that the Negro in the northern cities score consistently higher than the Negro in the border and southern cities on the Stanford-Binet. Probably these groups are not directly comparable, however, since different age groups predominated in the several localities. "The higher scoring Negro children, i. e., those from Atlanta, Oklahoma City, and Kansas City, were all young children, drawn from the first grades."[30]

Attempts were made by Arlitt (1921),[31] Pinter and Keller (1922),[32] Sunne (1925),[33] and Bruce (1940)[34] to compare groups of underprivileged white and Negro children by means of the Stanford-Binet.

Pinter and Keller made a beginning in this direction

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[30]Shuey, Op.cit., p. 36.

[31]A. H. Arlitt, "Further Data on the Influence of Race and Social Status on the Intelligence Quotient," Psychological Bulletin, XVIII (1921), pp. 95-96.

[32]R. Pinter and J. B. Keller, "Intelligence Test of Foreign Children," Journal of Educational Psychology, XIII (1922), pp. 214-222.

[33]D. Sunne, "Comparison of White and Negro Children by the Terman and Yerkes Bridge Revision of the Binet Tests," Journal of Comparative Psychology, V (1925), pp. 209-219.

[34]M. Bruce, "Factors Affecting Intelligence Test Performance of Whites and Negroes in the Rural South," Archives of Psychology, CCLII (1940), p.99.

by selecting three schools in Youngstown, Ohio which were located in sections of foreign speaking populations. The white children of native parents in these areas secured an average IQ of 95; the Negro, a mean of 88. Sunne similarly eliminated from her survey both white and Negro pupils from the best schools and residential districts and likely overweighted the retarded element among the whites by taking a school which had special classes for retarded children. The resulting mean IQ for the whites was 91.2, for the Negro, 80.56.[35]

Arlitt went further in her attempt to secure children of comparable backgrounds when she eliminated from a group of 191 white children of native parents, American, all whose fathers were above the semi-skilled laboring class then compared the 43 remaining subjects with 81 children of Italian born parents and the 71 Negro children. Twelve per cent of these two latter groups were from families above the semi-skilled laboring class, and to this extent were given advantage over the children of native white parents. The median IQs of the 43 white subjects of native parents was 92; the median IQs of the total Italian and Negro groups were 84.3 and 83.4 respectively. Arlitt observed that "The curve of distribution of Intelligence Quotients of the Italian and Negro groups is skewed markedly to the side of inferior ability as compared with that of native-born white children of the

[35]Pinter and Keller, loc. cit.

same social status. This difference seems to be racial."[36]

The 1937 Revision of the Stanford-Binet Scale

The 1937 Revision of the Stanford-Binet has two equivalent forms (L and M), each of which contains 129 test items; the scale extends from the level of age 2 through 3 levels of superior adult. Forms L and M were found to correlate from .90 to .98 with one another.[37]

According to McCandless:

> . . . Its fairness to the urban Eastern, the rural, the academically retarded, or the minority group is questionable. The Stanford-Binet is so verbally weighted that a performance scale must be administered in addition for valid assessment.[38]

Tomlinson (1944)[39] attempted to locate and test with either Form L or Form M all available pairs of Negro siblings living in Austin, Texas, provided one of each pair was between 4 and 6 years. Records were obtained on 75 pairs of siblings; the mean IQ of the 7-9 year group; determined by a composite of L and M IQs; was reported to be 86.7, or about 6 points below that of the 4-6 year group. For successive ages of 7,8,9 respectively, the mean IQs obtained were: 88.1, 85.8, and 83.7. The Standard Deviation of the distribution for

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[36]Arlitt, Op. cit., p. 94.

[37]Lewis M. Terman and Maud Merrill, Stanford-Binet Intelligence Scale (Boston: Houghton Mifflin Co., 1937), p.57.

[38]O. K. Buros, The Nineteen Forty Mental Measurement Year-Book (New Jersey: Gryphon, 1953), p.358.

[39]H. Tomlinson, "Differences Between Pre-School Negro Children and Their Older Siblings on the Stanford-Binet Scales," Journal of Negro Education, XIII (1944), pp. 474-479.

the 7-9 group was 11.5 as compared with one of 16.4 reported by Terman and Merrill on their standardization group. Tomlinson was unable to determine the cause of the apparent deterioration in IQ, neither could she explain to her satisfaction the greater homogeneity among her subjects as compared with the Terman-Merrill norms. However, she was cognizant of the probable cumulative effect of a restrictive environment on the IQ of an underprivileged child.[40]

A similar decrease in IQ of Negro children between the ages of 7-9 was reported by Arlitt (1922) on the 1916 Form of the Stanford-Binet. Arlitt attributed the decline in part to the presence of fewer rote memory tests at the upper age levels.[41]

Racial Studies Using Other Intelligence Tests

Several studies of race differences in intelligence employing a variety of tests were reviewed. Of particular interest is the intelligence tests performance of Army personnel.

Garrett (1918), reports that:

> . . . By stressing different relations between group means, the Army Alpha scores of Negroes and whites in Northern and Southern states can be interpreted to show Negro inferiority in Southern states. . . . It is assumed that the whites suffer from inferior schooling in Southern states as much as the Negroes.[42]

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[40] Ibid.

[41] Arlitt, Op. cit., p. 97.

[42] H. E. Garrett, "A Note on the Intelligence Scores of Negroes and Whites in 1918," Journal of Abnormal Psychology XL (1945), pp. 344-346.

Montagu (1945) comments on the results obtained from the Army Alpha, Army Beta (individual examinations) in the First World War on Northern Negroes and Southern whites.

> The median scores of Negroes from 23 states were computed from the First World War data for the Army Alpha, Army Beta, and individual examinations. It was found that the median white score exceeds the median Negro score from the same state on every test except Beta (in Kentucky and Ohio, Negroes' scores were higher). But the median scores of Negroes in a number of states exceeded the median scores of whites in certain other states, e. g., the median Negro score on Beta in Ohio exceeded the median white scores on Beta in 27 states. The results are interpreted as evidence of the part played by socio-economic factors in determining test scores.[43]

The following study by Fulk and Harrel (1952) was undertaken in order to compare the performance of Negroes and whites on the Army General Classification Test (AGCT) in World War II.

> AGCT scores used in the study were obtained from manning and informational rosters of various organizations of the Army Air Force Service Command. Included were such organizations as Headquarters Squadrons, Service Squadrons, Chemical Sections, Signal Companies, Quartermaster Companies and other organizations concerned with air base activities other than actual flying.[44]

A white sample of 2,174 scores is compared in terms of the means, the standard deviations, and the per cent of over-lap. The groups were subdivided in terms of school

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[43] F. A. Montagu, "Intelligence of Northern Negroes and Southern Whites in the First World War," American Journal of Psychology, LVIII (1945), pp. 161-188.

[44] Byron E. Fulk and Thomas W. Harrel, "Negro-White Army Test Scores and Last School Grade," Journal of Applied Psychology, XXXVI (1952), p. 96.

grade completed and comparisons made at each level. The results of the comparisons were that mean scores of the whites exceeded those of the Negroes at each grade level. All of the differences are statistically significant. The lowest critical ratio for a difference was 9.1. The percantage of Negroes whose scores exceeded the median score for the whites by years of school completed overlap varies from 17 per cent at grade 12 to two per cent at grade five. Overlap is higher at the higher grades beginning with school grade ten than it is at lower school grades.[45]

It was not suggested that because two individuals have attended school for an equivalent period of time that the factor of schooling is thus controlled. This method of keeping last school grade constant can be expected to cancel out some of the differences which are usually attributed to educational background.

The rosters which provided the data contained no indication of the soldiers place of birth or home address, consequently no information concerning possible differences due to regional or quality of schooling was derived.[46]

From June 1943, through October 1944 approximately 180,000 men were placed in Army special training units as functional illiterates. Of this number about 150,000 (85 per cent) successfully completed their training and attained a

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[45] Ibid.

[46] Ibid.

basic degree of literacy. Among the 150,000, 86,670 were Negroes. Eighty-four and two tenths per cent of the whites successfully completed the training, whereas 15.8 per cent failed and were discharged from the army. However, 87.1 per cent of the Negroes who entered these units during the same period successfully completed training and 12.9 per cent failed. A slightly higher percentage of Negroes than whites successfully completed the Special Training Program, that is, achieved fourth grade level in reading, language, and arithmetic. Seventy-one per cent of the Negroes completed the training in less than 60 days, while the comparable figure for whites was 75.6 per cent. It is concluded that where socio-economic and cultural conditions are held equal, there is no distinction in the learning accomplishments of whites and Negroes.[47]

Erickson implies that "Special Training Units results allow no comparison of Negro-white ability because the Negroes represented a superior selection within their group."[48] The Special Training Unit results were reexamined with emphasis on the similarity of trends of educational opportunity and rejection rates for Negroes and whites. Witty repeats his contention that "intelligence tests do not predict learn-

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[47] H. Aptheker, "Literacy, the Negro and World War II," Journal of Negro Education, XV (1946), pp. 595-602.

[48] R. W. Erickson, "On Special Training Units Performance as an Index of Negro Ability," Journal of Abnormal Psychology (Social), XL (1946), p. 481.

ing ability of persons with restrictive educational opportunity." Negroes and whites classified in each four educational groups made essentially similar progress in training and were much more educable in Special Training Units than had been assumed by outsiders."[49]

According to a study made by Witty (1945), average scores for the Army General Classification Tests for both Negroes and whites from various districts are closely related to the local educational opportunities. This suggest that test differences between Negroes and whites are environmental rather than inherent. Better evidence of the mental capacity of Negroes comes from the Special Training Unit where illiterates were given an eight week course to develop basic fourth grade skills. The minimum essentials were attained by 87 per cent of the Negroes and by 84 per cent of the whites. This demonstrated the view that Negroes are equal to whites in ability to learn, which is the best criterion of intelligence.[50]

Roen (1960) states that:

> The Negro group scored lower on the Army Classification Battery than did the whites . . . although statements of causality cannot be made from the data . . . the evidence can be seen as warranty further research on the proposition that Negroes, as a group, lacking support from pride in significant historical environment, and developing in an environment of negative experiences, incorporate intellectually defeating

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[49] Ibid.

[50] P. Witty, "New Evidence on the Learning Ability of the Negro," Journal of Abnormal and Social Psychology, XL (1945), pp. 401-404.

personality traits that play a significant role in their ability to score on measures of intelligence.[51]

The argument of McGurk in support of the innate intellectual inferiority of the Negro as developed in the September 21, 1956 issue of U. S. News and World Report was examined critically and the conclusions found to be undemonstrated. Analysis of data of a new study of a Massachusetts sample of 362 white and Negro boys, predominantly lower and middle-class, revealed no significant differences in Kuhlman-Anderson test scores. Additionally,scores on the Stanford-Binet of 217 whites and 21 Negroes in the same group were not significantly different. All subjects attended urban integrated schools. In a further comparative study of 20 matched pairs of Negroes and whites equated on the basis of social class, father's occupation, nationality, generation of entry to America, personality, and emotional climate of the home, no significant differences in intelligence appeared.[52]

Woods (1958) made a study of matched groups of Negro and white adolescents on the Revised Beta Test. Among the findings was the fact that Negroes did better on some subtests and whites did better on others. "Whites perform better on subtests (3) Detection of Errors, (4) Paper Form Board, (5) Drawing Completion. All of these differences exceed a 95 in

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[51] S. R. Roen, "Personality and Negro-White Intelligence," Journal of Abnormal and Social Psychology," LXI (1960), pp. 148-150.

[52] W. M. McCord and N. J. Demerath, "Negro Versus White Intelligence: A Continuing Controversy," Harvard Educational Review, XXVIII (1958), pp. 120-135.

100 chance expectancy. Negroes perform better than whites on subtests (2) Digit Symbol, and (6) Visual Comparisons. These differences also exceed those expected by chance at the 95 per cent level." One interpretation of these findings is that "it appears that Negroes, when compared with whites of equal ability are most deficient in culturally loaded items and in items which require ability to visualize spatially. They seem superior to whites in items requiring perceptual speed and accuracy."

According to Dreger and Miller, in the areas of psycho-physical, psychomotor, and intellectual functions as well as temperament traits, the problem of separating genetic and environmental contributions to performance have not been solved. In terms of the first three functions studies published between 1943-1958 reveal a general superiority of whites in comparison with Negroes, though the differences are smaller among young children. Likenesses, on temperament traits appear more extensive than differences, although on certain tests Negroes have displayed a greater tendency toward neuroticism.[54]

Examinations of a variety of studies leads to the con-

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[53]W. A. Woods, "Subtest Disparity of Negro and White Groups Matched for IQs on the Revised Beta Test," Journal of Consulting Psychology, XXI (1957), pp. 136-138.

[54]R. M. Dreger and K. S. Miller, "Comparative Psychological Studies of Negroes and Whites in the United States," Psychological Bulletin, LVII (1960), pp. 361-402.

clusion that "in some population groups there is to be found a "normal" proportion of Negro subjects of very superior ability (psychometric intelligence), and the extreme deviates reach the upper limits attained by whites. Although the incidence of superior cases is much lower among Negroes than whites, a phenomenon which might well be accounted for by differential environmental factors, we may conclude that race per se (at least as it represented in the American Negro) is not limited as a factor in psychometric intelligence."[55]

"The question has again risen as to the existence of innate differences in intelligence between Negroes and Whites." Following a recognition of summary statements on this subject by expert groups and with current problems in integration in mind, these social scientists conclude:

> . . . Any decision to use differences in the average achievement of the two racial groups as a basis for classifying in advance any individual child, Negro or white, is scientifically unjustified.[56]

Racial Studies Using the Goodenough Draw-A-Man Test

The Goodenough Draw-A-Man Test purports to evaluate a child's intelligence by means of his drawings of a man; it is intended for ages 3 years to 13 years. The child is instructed

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[55]Martin D. Jenkins, "The Upper Limit of Ability Among American Negroes," Science Monthly, VII (1959), pp. 87-89.

[56]Otto Klineberg, "On Race and Intelligence," World Mental Health, VII (1959), pp. 87-89.

to make a picture of a man as best he can. He is told to work carefully and to take his time. Scoring is based not upon esthetic quality, but, rather upon the presence of essentially the important details which presumably indicate the individual's level of perceptual differentiation of an object that is familiar in his environment.

Comparative studies between Negro and white children on the Goodenough Draw-A-Man Test are limited. An extensive review of the literature reveals the following: Reporting on the Draw-A-Man Test as administered to 613 Negro children in three cities in Louisiana and Tennessee, Goodenough (1926) gives an obtained mean of 78.7 on these subjects in grades 1 to 4.

> . . .Sixty-nine Negro children in grades 1 to 3 who were living in various California cities achieved a mean IQ of 85.8. The California whites, the California Negroes, and the Southern Negroes were about equally variable on this test.[57]

According to Peterson and Telford (1930):

> . . . The St. Helena Negroes made their best showing on the Draw-A-Man Test. The mean IQs ranged from 98 to 60, resulting in a "weighted" average IQ of 79. None of the 9 age groups secured an average IQ of more than 80. The Draw-A-Man Test is sometimes preferred by psychologists, who are testing racial groups of widely differing backgrounds, to other measures on the assumption that it is considered to be less subject to environmental influences. The St. Helena results give support to those opinions, not only because these island Negroes did their best on the Draw-A-Man Test, but also because their mean IQ in this test

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[57] F. L. Goodenough, "Racial Differences in the Intelligence of School Children," Journal of Exceptional Psychology, IX (1926), pp. 388-397.

> is identical with that of southern Negro children obtained by Goodenough.[58]

D'Angelo (1950) investigated the language development of 50 white and 50 Negro preschool children and compared the results with those obtained on the Draw-A-Man Test. All of the children were in attendance in eleven Department of Welfare nurseries, five of them in unmixed neighborhoods, and six in mixed neighborhoods, located in the New York City boroughs of Manhattan, Bronx, Brooklyn, and Queens. The children were within six months of their fifth birthdays and came from homes where no foreign language was spoken.

> On the Draw-A-Man Test, the white and Negro children scored almost identically, the respective IQs averaging 101.8 and 101.5. Unfortunately these results permit no generalization due to the fact that the directors of the nurseries were asked to provide the subjects for testing and the fact that the author did not indicate how many children in each nursery would have qualified, had she decided to test all who were within six months of 5 years and who heard nothing but English spoken at home.[59]

> The Goodenough Draw-A-Man Test was given to representative samples of children, 6 to 11 years old, in Sioux, Navaho, Papago, Hopi, Zuni, and Tia communities, and in a small western white community. Indian children obtained higher IQs on the drawing than on the Arthur Performance.[60]

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[58] J. Peterson and C. W. Telford, "Results of Group and of Individual Tests Applied to the Practically Pure-Blood Negro Children on St. Helena Island," Journal of Comparative Psychology, II ( ), pp. 115-144.

[59] R. Y. D'Angelo, "A Comparison of White and Negro Pre-School Children in Goodenough IQ and Language Development," (Unpublished Master's Thesis, Fordham University, 1950).

[60] R. J. Havighurst, M. K. Gunther and L. E. Pratt, "Environmental Influences and the Draw-A-Man Test: The Performance of Indian Children," Journal of Abnormal and Social Psychology, XLI (1946), pp. 50-63.

Studies Using Paired Associates To Determine Rate of Learning

The method of paired associates may be used for testing immediate or delayed memory in addition to rate of learning. Both auditory and visual presentations are employed.

In the visual method, a series of cards containing a list of paired words, terms or pictures are presented to the subject one at a time. Directly after the presentation, which may be repeated several times before the test proper, immediate memory is tested for by exhibiting in succession the first item of every pair which has been shown. The subject's task is to write down, or give orally, the term paired with each stimulus in the original presentation. The score is the number of paired associates which are correctly reproduced.

To test for immediate or delayed memory using the auditory presentation, the pairs of items are read to the subject, one pair at a time. The subject is then required to write down the second word of each pair upon hearing the first. In order to prevent the learning of associates in serial order, the cards are shown in a different order in the test proper from that employed in the presentation series. Not only words but nonsense syllables, digits, or pictures may be used as memory material; or a word may be paired against a number.[61]

The following review of the literature pertaining to

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[61]H. E. Garrett and M. R. Schneck, Psychological Tests, Methods and Results, (New York: Harper, 1933), pp. 124-125.

paired associate learning is not concerned with the use of paired associates for testing immediate or delayed memory but rate of learning.

The role of repetition in the formation of verbal associations has recently become the focus of considerable discussion. The issue has been joined between two conceptions of the associative process - growth by successive increments versus all-or-none change. The incremental theory asserts that each successive trial adds to the strength of an association, provided the conditions required for the reinforcement of a habit are met. If frequency of exposure is considered a sufficient condition of learning, the associations between stimuli and responses should be strengthened during repeated presentations of a list. By contrast, the all-or-none theory asserts that on any one trial associations are either fully formed or do not grow at all.[62]

Estes identifies reinforcement of a habit with "the operation that is supplied by the experimenter in order to produce learning." Under this definition, paired presentation of a stimulus and response constitutes a reinforcement regardless of the subject's response. The apparent beneficial effects of repetition apply to the acquisition of a series, but not to the formation of individual associations. Only a limited number of associations can be established on

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[62]W. K. Estes, "Learning Theory and the New Mental Chemistry," Psychological Review, LXVII (1960), pp. 207-223.

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on a given trial, and successive exposures to the series provide opportunities for increasing numbers of associations to be established.[63]

Tacitly in the functional approach (McGeoch and Irion, 1952), and explicitly in the more formalized theories (Estes, 1959a; Gibson, 1940; Hull, 1943; Hull, Hovland, Rose, Hall, Perkins, and Fitch, 1940; Spence, 1955), it has been assumed that simple associative learning proceeds by a gradual increase in the strengths of stimulus-response associations over a series of reinforced trials. This "incremental" assumption with its implication that the probability of a correct response on the part of an individual subject should be increased by each reinforcement, seems to incorporate almost routinely into each new learning model that appears (e.g., Bourne and Restle, 1959; Bush and Mosteller, 1955; Luce,1959).[64]

As might be expected in the case of such widely held conception, the empirical basis of the incremental assumption does not lack breadth. Nevertheless, it may not be quite solid, for at both the theoretical and experimental levels, small fissures have appeared.

Rock (1957) has recently brought forward data which appears to challenge the incremental assumption, at least for paired associate learning. Roch used a novel procedure in

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[63]W. K. Estes, "All-or-None and Conservation Effects in the Learning and Retention of Paired Associates," Journal of Experimental Psychology, VI (1960).

[64]Ibid.

which incorrect items were dropped from the list and replaced with new ones following each presentation cycle. If the missed items were "partially learned," then the subject learning under this condition would be handicapped in comparison with conventional controls, but Rock found no difference in rate of learning under the two conditions. However, the interpretations of Rock;s findings is complicated by the fact that the items eliminated under his procedure are probably more difficult to learn on the average than the items that replaced them.[65]

Although repetition has long been regarded as essential in associative learning, there is some doubt as to how it achieves its beneficial effects. One possibility is that, in learning a list of items, the strength of association between each pair develops gradually, with each repetition adding an increment to the bond, until it is so strong that the first item produces recall of the second. According to this interpretation, repetition is essential because only a limited number of associations can be formed in one trial, and improvement with repetition is only an artifact of work with long lists of items. Typical behavior in experiments on rate learning and in examples from everyday life indicate that some associations are formed by a process of gradual strengthening.[66]

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[65]Irvin Rock, "The Role of Repetition in Associate Learning," American Journal of Psychology, LXX (1957).p.70.

[66]Ibid.

If associations are formed by a process of gradual strengthening based on repetition it should be easier to form an association between items presented together for the first time. There are several ways of testing this assumption, but the method used in the experiments to be reported here seems most direct. A control group is given the task of learning a list of paired associates to a criterion of one errorless trial. An experimental group is handicapped by removing all pairs which the subjects fail to get right after every trial and substituting new pairs for them. The new pairs are randomly selected from a pool of pairs prepared in advance and from which the initial lists for the two groups also are randomly selected. This means that the experimental group always has the same number of pairs to learn on any given trial, the same number as the control group has, but only some of them will have been previously presented (those already learned) and some will never have been previously presented. Training of the experimental group also is continued to a criterion of one errorless trial.

For the experimental group then a pair is either learned the first time it is seen or it is removed, and the subject does not, therefore, have what might be presumed to be the benefit or repetition in forming associations. If a pair is learned on that first occasion, it will remain in the list as long as the subject continues to get it right.

Thus pairs successfully mastered on one trial are repeated, but the repetition does not affect the formation of associations, although the subject gains whatever benefit may accrue from repetition after associations are formed.

Two groups of 25 students each were required to learn a list of 12 letter-number pairs which were printed on 3 x 5 inch cards. The left-hand member of each pair was either a letter of the alphabet or a double letter. The right hand member was a number from 1 - 50, since 50 such card-pairs were prepared corresponding to the 25 letters and double letters, excluding the letter I.

In the two experiments, the learning of paired associates was studied. In each case the traditional procedure was used for a control group, while for the experimental group unlearned pairs were removed and new ones submitted after each trial. No significant differences in rate of learning were found. This result suggests that repetition plays no role in the formation, as distinct from the strengthening of associations, other than that of providing the occasion for new ones to be formed, each on a single trial.[67]

There are certain objections which can be made to the technique referred to above. One is that if any wrong associations should be made (formed) subjects on the control group have to overcome them. Subjects in the experimental group do not since all pairs which they fail to get right on any one trial are eliminated. A second is that the technique

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[67]Rock, Op. cit.,p.69.

is not sufficiently sensitive to reveal a possible advantage for pairs experienced previously. A third is that the subject who get pairs substituted for wrong ones has a possible advantage because many of these may be, for him, easier than the old, unlearned ones are for the subject who learns by the traditional method, if so, the disadvantage of difficulty may offset the advantage of repetition for the control group.[68]

It may be argued that when learned pairs are eliminated the subject is left with pairs which are for him more difficult. Consequently, he may learn randomly selected new ones somewhat more easily, thus off setting the advantage which the repeated pairs might otherwise be expected to have. This objection is plausible in the respect that it is no doubt true that for each subject, even with nonsense material, but possibly more so with other material, there are certain pairs which are easily associated because they suggest a mnemonic device and no doubt these are always among the first learned. It is difficult to test this objection because ease of learning is defined idiosyncratically.[69]

Only three studies of paired associate learning in normal and educable mentally retarded children appear in the literature since McPherson's 1958 review. Eisman used the

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[68]Irvin Rock and Walter Heiner, "Further Evidence of One Trial Associative Learning," American Journal of Psychology, VII (1959), p. 7.

[69]Ibid.

paired-associate technique for studying the difference in learning generalization, and retention between retarded, average, and superior groups of children. The learning task consisted of a series of seven pairs of pictures to be learned to a criterion of four consecutive, correct trials. Group I consisted of twenty-three intellectually average children. Group II consisted of twenty-three educable mentally retarded children, and Group III consisted of twenty-three intellectively superior children. Eisman found: "a comparison of Group I, II, III, on number of trials to learn . . . revealed no significant differences."[70]

Berkson and Cantor used the paired-associates method for comparing learning ability between normal and retarded children. They used thirty normal children whose IQs ranged from 86-115, and twenty-four retarded children ranging between 55 and 85 in IQ. The material to be learned was three lists of paired stimuli consisting of various arrangements of arabic numerals, pictures of common objects, and hexagons varying in color. The lists were learned to a criterion of five successive correct repetitions. Berkson and Cantor report:

> The analysis of variance reveal no significant differences in the learning of List I either for trials to criterion or number of errors. . . . The results of List II show a slightly different pattern

[70] Bernice S. Eisman, "Paired Associate Learning Generalization, and Retention," American Journal of Mental Deficiency, LXIII (1958), p. 484.

> than did those of List I. . . . While for the trials measure there were again no significant differences between any groups, the normal Ss did make significantly fewer errors than did the control group. It may also be seen that on both measures the normals were more efficient than were the retarded Ss.[71]

Ring and Palermo attempted to investigate further the relationship between intellective level and the ability to learn paired associates while introducing greater control in the experimental design. Their stimulus materials consisted of eight pairs of Stanford-Binet vocabulary pictures reproduced by the Thermo-Fax process. They matched a group of fourteen mentally retarded adolescents with fourteen normal adolescents according to chronological age, and with a group of normal elementary school children according to mental age. Ring and Palermo write:

> The results of the present study differ from Eisman's finding that retarded Ss were not significantly inferior in performance on this learning task, although her results were in the same direction. The findings of this study supported the hypothesis that retarded Ss would perform less well than normal individuals of the same C.A. The two groups of matched mental age did not differ significantly, and when two normal groups were compared, the older group was superior to the younger in performance. These results would be expected if mental age is a variable affecting performance on this task.[72]

The factors of length and meaningfulness affect not only the form of the acquisition curve, but also the overall

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[71]Gershon Berkson and Gordon N. Cantor, "A Study of Mediation in Mentally Retarded and Normal School Children," Journal of Educational Psychology, LI (1960), p. 85.

[72]Elizabeth M. Ring and David S. Palermo, "Paired Associate Learning of Retarded and Normal Children," American Journal of Mental Deficiency, LXVI (July, 1959), p. 105.

ease or difficulty of learning. Meaningfulness is an obvious factor affecting ease of learning. A typical experiment compares the number of repetitions required to learn the same number of nonsense syllables and three letter words. Illustrative results obtained by Guilford (1934) are presented in the following table:[73]

Number of Trials Required to Learn Various Kinds of Verbal Material

Material	Number of Trials
15 nonsense syllables	20.4
15 unrelated words	8.1
15 related words	3.5

It is further known that, if analysis is restricted to relatively meaningless material (e.g., nonsense syllables) those units that are more"meaningful" in the sense of calling forth more related associations are learned more rapidly than those evoking few associations.[74]

The following study by Fay Teague was instigated primarily to investigate the differences, if any, in the rate of learning and in the number of errors made in reaching the criterion of learning by average first grade children on four variables of stimuli presentation: visual, visual-auditory, visual-vocalized, and visual kinaesthetic.

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[73]Carl I. Hovland, "Factors Influencing Time Required for Learning," Journal of Abnormal Psychology, X (1952), p. 260.

[74]Ibid.

The subjects of this study were one hundred twenty boys and girls between the ages of seventy and eighty-three months who had intelligence quotient scores between 90 and 110 on the Goodenough Draw-A-Man Test, and who were enrolled in the first grade classes of the Linsay, Oklahoma Public Schools. Each subject participated in one of the four experimental groups. He was given the twelve-paired associates by one of the stimuli presentation methods until he reached the criterion of learning which was one correct repetition of the twelve-paired associates. The number of trials necessary to reach the criterion and the number of errors made were recorded for each subject.

The results of the experiment were as follows: there were no significant differences in the number of trials required to meet the criterion of learning in a paired-associative learning task of average first grade children who received stimuli presentation on the variables of visual and auditory stimulation, combined visual and kinaesthetic stimulation.

Significant differences were found in the number of errors made in reaching the criterion of learning on a paired-associative learning task by average first grade children who received stimuli presentations on the variables of visual stimulation, combined visual and auditory stimulation, combined visual and vocalized stimulation, and combined visual and kinaesthetic stimulation.

The results also showed that no significant differences were found in the number of errors made between the following groups: visual and visual-auditory, visual and visual vocalized, visual and visual kinaesthetic, visual-auditory and visual kinaesthetic. Significant differences in the number of errors made were found between these two sets of groups: visual-auditory and visual-vocalized, visual-vocalized and visual kinaesthetic.

The evidence in this study does not point to a preferred method of stimuli presentation as far as number of trials required for learning; any one of the four methods seem to be equally effective in this respect.[75]

Summary

In reviewing the literature pertaining to comparative racial studies relative to intelligence, the scope was limited primarily to studies dealing with Negro and white intelligence as measured by the Goddard-Binet Intelligence Scale, 1916 and 1937 Revisions of the Stanford Binet-Simon, and Goodenough Draw-A-Man Tests. However, studies using other intelligence tests were included.

Misconceptions regarding intelligence result either from ignorance of research in the field or confused notions of the meaning of test scores and what intelligence tests should measure. The nature of the operations employed in

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[75]Fay M. Teague, "An Experimental Study Using Single Sensory Stimuli in a Paired-Associative Learning Task," (Dissertation, University of Oklahoma, 1962), pp. 40-41.

the measuring of general intelligence will depend upon the definition accepted. Since the IQ is a reflection of the child's opportunities as well as his capacity, it is a common misconception to regard the IQ as impervious to experience.

Comparative studies on Negroes and whites relative to rate of learning on paired-associate material (tests) were not found by the researcher. The available evidence on learning rates using paired-associative material (tests) is conflicting, and differences in methodology, learning tasks, etc., make comparisons difficult.

Most of the studies consider the racial results to be inconclusive, some of the experimenters admit the plausibility of different interpretations; but though their statements are frequently qualified, they appear to favor the environmental interpretation.

PROCEDURE AND METHOD

CHAPTER III

A Pictorial Paired Associate Test was the instrument used to determine the rate of learning between Negro and white children between the ages of eight and nine who obtained IQs on the 1960 Stanford Binet Intelligence Scale within the range of 90 and 110 (normal range of intelligence).

Individual record sheets were provided for each subject on which appeared the name of the subject, chronological and mental ages, intelligence quotient as obtained on the 1960 Stanford Binet Intelligence Scale, school attended, the record of each response made by the subject, the total number of trials for reaching the criterion of learning, and the total number of errors made by the subject in reaching that criterion of mastery.

A stop watch was used as an aid in the timing of the intertrial period, and the timing of the response period.

Each subject was tested individually in a small,comfortable, quiet, well ventilated, and well lighted room arranged by the principals of the respective schools included

in the study. Each subject was brought by a teacher,as directed,to the experimental room.

The following instructions were given to each subject in the Negro and white sample:

> Here are a number of cards. Each card has two pictures on it. Look at both pictures on each card carefully. (The examiner shows the subject Booklet Two then, and says:) Then I will show you another set of cards like these. (The examiner shows the subject the sample card with only the first picture of the stimulus pair.) You are to tell me what picture was with this first picture. What you are to do is remember which two pictures go together. Now as you see the two pictures together, try to remember what two pictures were together.

The twelve paired pictures were presented to each subject visually at the rate of one every three seconds. Next, Booklet Two was opened and the first picture of each pair was presented singly at the rate of one every three seconds. Each oral response was recorded that was made by the subject. A second trial was given following the same procedure and additional trials followed until the subject was able to make the twelve correct resopnses. Intertrial intervals were ten seconds in length. Between trials, the examiner said:

> Now we shall look at the pictures again. Try to remember what two pictures were together.

If the subject questioned the examiner about the test, she added:

> We shall keep looking at the pairs of pictures until you remember all of them.

To find out if there were demonstrable quantitative differences between Negro and white children in their rate of learning on a Pictorial Paired Associate Test, a non-parametric statistic, The Wald-Wolfowitz Runs Test, was chosen. This test was applicable because of its use to test the null hypotheses that two independent samples have been drawn from the same population against the alternative hypothesis that the two groups differ in any respect whatsoever. This test is addressed to any type of difference between two groups.

In order to determine the relationship between the scores obtained on the 1960 Stanford Binet and the Good-enough Draw-A-Man Test and trials required to meet the criterion of learning on a paired-associate learning task, the following statistics were employed: The Spearman Rank Correlation Coefficient and the *t* test.

Summary

A Pictorial Paired Associate Test was the instrument used to determine the rate of learning between Negro and white children between the ages of eight and nine years. These children obtained IQs on the 1960 Stanford Binet Intelligence Scale within the range of 90 and 110.

The statistics chosen to analyze the data obtained were the Wald-Wolfowitz Runs Test, The Spearman Rank Correlation Coefficient and the *t* Test.

STATISTICAL RESULTS

CHAPTER IV

The sample of this study included fifty-five subjects who scored within the normal range of intelligence on the 1960 Stanford Binet Intelligence Scale. Specifically, twenty-eight Negro children, with Stanford Binet IQs ranging from 90 to 105, and twenty-seven white, with Stanford Binet IQs ranging from 90 to 110, comprised the sample of this study. The Pictorial Paired Associate Test was administered to these subjects.

The measures of intelligence used to determine normalcy were the 1960 Stanford Binet Intelligence Scale and the Goodenough Draw-A-Man Test. For the entire sample, mean IQ on the Stanford Binet Intelligence Scale was 98, with a chronological age of 8 years and 3 months, and a mental age of 8 years and 3 months. For the Negro children, the mean IQ was 98 with a chronological age of 8 years and 4 months and a mental age of 8 years and 4 months. For the white children, the mean IQ was 99, with a chronological age of 8 years and 7 months, and a mental age of 8 years and 8 months.

The percentage of Negro and white children scoring

in the upper and lower ranges of normal intelligence were as follows: 78.6 per cent of the Negro children and 51.9 per cent of the white children obtained IQs between the range of 90 and 100; 21.4 per cent of the Negro children and 48.1 per cent of the white children obtained IQs between the range of 101 and 110. Table I indicates the percentage of Negro and white children scoring in the upper and lower ranges of normal intelligence.

TABLE 1.--Percentages of Negro and white children scoring in the upper and lower ranges of normal intelligence on the 1960 Stanford-Binet Intelligence Test

Group	IQ Range	Percentage	Group	IQ Range	Percentage
Negro	90 - 100	78.6	Negro	101 - 100	21.4
White	90 - 100	51.9	White	101 - 100	48.1

On the Goodenough Draw-A-Man Test the sample IQ was 98 with a mental age of 8 years and 2 months. For the Negro children the obtained mean IQ was 105, with the mental age of 8 years and 9 months. For the white sample the obtained IQ was 94 with a mental age of 7 years and 9 months. Intelligence Quotients obtained on the Goodenough Draw-A-Man Test ranged from 55 to 150. From the Negro sample, 67.8 per cent obtained IQs of 90 and above, and 32.2 per cent obtained IQs of 89 and below. From the white sample, 48.1 per cent obtained IQs of 90 and above, and 51.8 per cent obtained

IQs of 89 and below. Table 2 indicates the percentage of Negro and white children who obtained IQs on the Goodenough Draw-A-Man Test according to Binet's classification.

TABLE 2.-- Intelligence Quotients obtained on the Goodenough Draw-A-Man Test by normal Negro and white children

Group	IQ Range	Percentage	Group	IQ Range	Percentage
Negro	140-160	10.7	White	140-160	3.7
	120-139	14.3		120-139	3.7
	110-119	10.7		110-119	14.8
	90-109	32.1		90-109	25.9
	80-89	28.6		80-89	22.2
	70-79	3.6		70-79	11.1
	0-69	0.0		0-69	18.5

The results for the comparison made between IQs obtained on the 1960 Stanford-Binet Intelligence Test and the Goodenough Draw-A-Man Test were as follows: 37 per cent of the Negro children and 63 per cent of the white children scored higher on the Stanford-Binet Intelligence Scale than they did on the Goodenough Draw-A-Man Test. The reverse prevailed relative to IQs obtained on the Goodenough Draw-A-Man Test; 60.7 per cent of the Negro children and 37 per cent of the white children obtained IQs higher on the Goodenough Draw-A-Man Test.

The purposes of the study were to find out if there were demonstrable quantitative differences between Negro and white children in their rate of learning on a Pictorial Paired Associate Test; and to determine the relationship between the IQs obtained on the 1960 Stanford-Binet Intelligence Scale and the Goodenough Draw-A-Man Test, and trials required to meet the criterion of learning on the Pictorial Paired Associate Test.

In order to determine the difference, if any, in the learning rates of Negro and white children, the following null hypothesis was tested:

1. There is no statistically significant difference in the number of trials required to meet the criterion of learning in a paired associate learning task of normal Negro and white children whose IQs fall within the range of 90 to 110.

The statistical technique chosen for treatment of the data was a nonparametric statistic, The Wald-Wolfowitz Runs Test. This test was applicable because of its use to test the null hypothesis that two independent samples have been drawn from the same population against the alternative hypothesis that the two groups differ in any respect whatsoever. This test is addressed to any type of difference between two groups.

The Wald-Wolfowitz test assumes that the variable under consideration has an underlying distribution which is continuous. It requires that the measurement of that variable

be in at least an ordinal scale.[76]

To apply the test to data obtained from two independent samples of size n_{27} and n_{28}, the scores are ranked in order of increasing size n_1 plus n_2. That is, the scores of all subjects (Negro and white) are cast into one ordering. The number of runs are determined in this ordered series. A run is defined as any scores in sequence from the same group. Table 3 indicates the trial results of Negro and white children on the Pictorial Paired Associate Test. Table 4 indicates the cast for runs test.

TABLE 3.-- Results of Negro sample and white sample on Pictorial Paired Associate Test

Trials	Negro	White
1		
2		
3	4	1
4	5	7
5	5	2
6	7	3
7	4	1
8	3	1
9		2
10		4
11		3
12		1
13		1
14		1

The identity of each score is retained by accompanying that score with the sign of the group to which it belongs. The order of occurrence of the signs,Negro and white, are

[76]Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences (New York: McGraw-Hill Book Co., Inc, 1956), p.136.

observed to determine the number of runs. Twelve runs occurred in this series. The six lowest scores were made by both Negro and white groups and thus constituted five runs of white subjects and six runs of Negro subjects. The seven highest scores were made by the white group; 9, 10, 11, 12, 13, and 14; and constituted the final run.

TABLE 4.-- Cast for Runs Test

Score	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4
Group	N	N	N	N	W	N	N	N	N	N	W	W	W	W	W	W	W	W
Run			1		2			3						4				
Score	5	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	6	
Group	N	N	N	N	N	W	W	N	N	N	N	N	N	N	W	W	W	
Run			5			6					7					8		
Score	7	7	7	7	7	8	8	8	8	9	9	10	10	10	10	11		
Group	N	N	N	N	W	N	N	N	W	W	W	W	W	W	W	W		
Run			9		10		11					12						
Score	12		13		14													
Group	W		W		W													
Run																		

If the two samples had been from the same population, that is, if H_o was true, the scores of the Negro children and white children would have been well mixed. In that case the r, the number of runs, would have been relatively large. It

is when the H_o is false that r is small.

If the two samples were drawn from populations having different medians, r would be small. If the population from which the Negro children were drawn was highly dispersed, whereas the population from which the white subjects were drawn was homogeneous or compact, a long run of Negro children would have been expected.

A correction for continuity was used - n_{27} plus n_{28} was considered as large. It was approximated that the sampling distribution was by the normal curve, a continuous curve. This approximation was improved by correcting for continuity. The correction was achieved by subtracting .5 from the absolute difference between r and $_r$.

$$z \quad \frac{r - {}_r - .5}{r}$$

Thus to compute the value of z with the correction for continuity incorporated, formula (6.14) was used. Computation of formula (6.14) yielded a z of -4.35 whose associated tabular value(in Table A) when doubled, gave the probability under H_o of a value as small as the observed value of r (p = 0.001).

The first hypothesis stated that:

1. There is no statistically significant difference in the number of trials required to meet the criterion of learning on a Pictorial Paired Associate Test of normal Negro and

white children whose IQs fall within the range of 90 and 110. This hypothesis was rejected. It was concluded that Negro and white children differ significantly in their rate of learning.

In order to determine the relationship between the Intelligent Quotients obtained by the Negro and white children on the 1960 Stanford-Binet Intelligence Test and the Goodenough Draw-A-Man Test, and the number of trials required to meet the criterion of learning on a Pictorial Paired Associate Test, the following null hypotheses were tested:

1. There is no statistically significant difference in the number of trials required to meet the criterion of learning on a Pictorial Paired Associate Test and scores obtained on the 1960 Stanford-Binet Intelligence Test of normal Negro and white children.

2. There is no statistically significant difference in the number of trials required to meet the criterion of learning on a Pictorial Paired Associate Test and scores obtained on the Goodenough Draw-A-Man Test of normal Negro and white children.

3. There is no statistically significant difference in the Intelligent Quotients obtained on the 1960 Stanford-Binet Intelligence Test and the Goodenough Draw-A-Man Test of normal Negro and white children.

4. There is no statistically significant difference in the means obtained on the 1960 Stanford-Binet Intelligence

Test, the Goodenough Draw-A-Man Test and the Pictorial Paired Associate Test of Negro and white children.

The statistical techniques chosen to analyze the obtained data were the Spearman Rank Correlation Coefficient[77] and the t Test.[78]

Computations with formula (9.4) using the Spearman Rank Correlation Coefficient revealed the following results:

Corrected for ties, the correlations between the Intelligence Quotients obtained on the 1960 Stanford-Binet Intelligence Test and the number of trials required to meet the criterion of learning on a Pictorial Paired Associate Test of normal Negro children was .3913; for the white children the correlation was .2231. The result obtained on the Negro children was significant at the .05 level. For the white children the correlation was not significant. The null H_{o_2} was rejected and it was concluded that Intelligence Quotients obtained on the 1960 Stanford-Binet Intelligence Test and the number of trials required to meet the criterion of learning on a Pictorial Paired Associate Test of normal Negro children was significant.

Corrected for ties, the correlation between the Intelligence Quotients obtained on the Goodenough Draw-A-Man Test and the number of trials required to meet the criterion

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[77] Op. cit., p. 207.

[78] Robert H. Koenker, Simplified Statistics (Illinois: McKnight and McKnight Publishing Co., 1961), pp. 87-88.

of learning on a Pictorial Paired Associate Test of normal Negro and white children was .2077; for the white children, the correlation was -.1623. Therefore the null H_{o3} was accepted. It was concluded that there was no statistically significant difference between Intelligence Quotients obtained on the Goodenough Draw-A-Man Test and the number of trials required to meet the criterion of learning on a Pictorial Paired Associate Test of Negro and white children.

Corrected for ties, the correlation between Intelligence Quotients obtained on the 1960 Stanford-Binet Intelligence Test and the Goodenough Draw-A-Man Test of normal Negro children was .1135; for the white children the correlation was .2476. In view of the results, the null H_{o4} was accepted and it was concluded that there is no statistically significant difference between Intelligence Quotients obtained on the Stanford-Binet Intelligence Test and the Goodenough Draw-A-Man Test.

Using the t Test to determine the difference between the means obtained on the 1960 Stanford-Binet Intelligence Test and the Goodenough Draw-A-Man Test, the following results were revealed: On the Goodenough Draw-A-Man Test, with 53 degrees of freedom, interpolation at the .01 level of probability was 2.415, at the .05 level of probability 1.671. Since the observed value of t, 1.5, was less than the .01 level or .05 level of probability, it was concluded that there was no statistically significant difference in the intelligence quotients

obtained on the Goodenough Draw-A-Man Test. The H_{o_5} was accepted.

On the 1960 Stanford-Binet Intelligence Test, with 53 degrees of freedom, interpolation at the .01 level of probability was 2.415, at the .05 level of probability 1.671. Since the observed value of t, .807, was less than the .01 or the .05 level of probability, it was concluded that there was no statistically significant difference in the means obtained, by Negro and white children, on the Stanford-Binet Intelligence Test. Hence, H_{o_5} was accepted.

Summary

Twenty-eight normal Negro children with Stanford-Binet Intelligence Quotients ranging from 90 to 105, and twenty-seven normal white children with Stanford-Binet Intelligence Quotients ranging from 90 to 110 constituted the sample to whom the Pictorial Paired Associate Test was administered.

The instrument used to determine normalcy was the 1960 Stanford-Binet Intelligence Test. Seventy-eight and six tenths per cent of the Negro children and 51.9 per cent of the white population obtained IQs between the range of 90 and 100. Twenty-one and four tenths per cent of the Negro children and 48.1 per cent of the white children obtained IQs between the range of 101 and 110.

The findings relative to the comparison made between

IQs obtained on the 1960 Stanford-Binet Test and the Goodenough Draw-A-Man Test were as follows: 37 per cent of the Negro children and 63 per cent of the white children scored higher on the Stanford-Binet Intelligence Test than they did on the Goodenough Draw-A-Man Test. The reverse prevailed relative to IQs obtained on the Goodenough Draw-A-Man Test; 60.7 per cent of the Negro children and 37 per cent of the white children obtained IQs higher on the Goodenough Draw-A-Man Test.

The purposes of the study were to find if there were demonstrable quantitative differences between Negro and white children in their rate of learning on a Pictorial Paired Associate Test; to determine the relationship between the IQs obtained on the 1960 Stanford-Binet Intelligence Test and the Goodenough Draw-A-Man Test, and the number of trials required to meet the criterion of learning on a Paired Associate Test.

The statistical techniques used to analyze the obtained data were the Wald-Wolfowitz Runs Test, the Spearman Rank Correlation Coneficient, and the t Test.

The following hypotheses were rejected:

1. H_{o_1} - There is no statistically significant difference in the number of trials required to meet the criterion of learning on a Pictorial Paired Associate Test of normal Negro and white children whose IQs fall within the range of 90 to 110.

Computation with formula (614) using the Wald-Wolfowitz Runs Test yielded a z of -4.35 whose associated tabular value, when doubled, gave the probability under H_{o_1} of a value as small as the observed value of r ($p = 0.001$).

2. H_{o_2} - There is no statistically significant difference in the number of trials required to meet the criterion of learning on a Pictorial Paired Associate Test and scores obtained on the 1960 Stanford-Binet Intelligence Test of normal Negro and white children.

Computation with formula (9.4) using the Spearman Rank Correlation Coefficient and corrected for ties, yielded a correlation of .3913 for the Negro children and a correlation of .2231 for the white children. The result obtained for the Negro children was significant at the .05 level.

The following hypotheses were accepted:

3. H_{o_3} - There is no statistically significant difference in the number of trials required to meet the criterion of learning on a Pictorial Paired Associate Test and scores obtained on the Goodenough Draw-A-Man Test of normal Negro and white shildren.

Computation with formula (9.4) using the Spearman Rank Correlation Coefficient and corrected for ties, yielded a correlation of .2077 for the Negro children and -.1623 for the white children. The results obtained was not significant.

4. H_{o_4} - There is no statistically significant difference in the Intelligence Quotients obtained on the 1960

Stanford-Binet Intelligence Test and the Goodenough Draw-A-Man Test of normal Negro and white children.

Computation with formula (9.4) using the Spearman Rank Correlation and corrected for ties, yielded a correlation of .1135 for the Negro children and .2476 for the white children. The results obtained was not significant.

5. H_{O5} - There is no statistically significant difference in the means obtained on the 1960 Stanford-Binet Intelligence Test and the Goodenough Draw-A-Man Test.

Using the t Test to determine the difference between the means obtained on the two tests the following results were obtained: On the Goodenough Draw-A-Man Test with 35 degrees of freedom, it was interpolated at the .01 level of probability to be (1.671). Since the observed value of t was less than the .01 level or .05 level of probability, it was concluded that there was no statistically significant difference in the Intelligence Quotients on the two tests. On the 1960 Stanford-Binet Intelligence Test, with 53 degrees of freedom, it was interpolated at the .01 level of probability to be 2.415, and at the .05 level of probability to be 1.671. Since the observed value of t, .807, was less than the .01 or the .05 level of probability, it was concluded that there was no statistically significant difference in the means obtained on the 1960 Stanford-Binet Intelligence Test of Negro and white children.

SUMMARY AND CONCLUSIONS

CHAPTER V

In the design typically used where two different racial groups are being compared on intelligence and rate of learning, it is necessary to match the groups on as many features known or suspected to correlate with intelligence as possible so that the difference between groups, if any, may be attributed to race.

The question of the fairness of present intelligence tests is one of great importance, both to the individual pupils and the society as a whole. If, as many competent educators, psychologists, and sociologists believe, intelligence tests are readily unfair to children from certain kinds of backgrounds and do not reveal the full abilities of these children, then grave injustices are done to such children when school people base curricular, instructional, and guidance practices on the IQ as determined by such tests. Moreover, a serious loss to society may continue to result through failure to identify and develop the real talents of all its members. No so-called democratic society in today's world is in such a secure position that it can afford to waste, through non-recognition, the leadership or other talents of

any large group of its people.

Almost since the advent of intelligence testing, educators and psychologists have debated and investigated the relationship of the IQ to environmental factors. The fact that there is a definite and measureable relationship between the social status, or cultural background of people has been known since the time of Binet. With respect to the significance and interpretation of these differences, however, there is no such agreement.

The evidence on learning rates is conflicting, and differences in methodology, learning tasks, etc., make comparisons difficult.

Realizing the mathematical inexactness of the instruments used, this experiment was an attempt to measure the relation between the learning rates on a Pictorial Paired Associate Test with the performance on the 1960 Stanford-Binet Scale and the Goodenough Draw-A-Man Test of Negro and white children. The relationship between rate and ability is an open question of such importance that research should not stop short of a solution that is substantiated by trustworthy, experimental evidence.

In order to determine this difference, if any, in the learning rates of Negro and white children, the following null hypotheses were tested:

1. There is no statistically significant difference in the number of trials required to meet the criterion of learn-

ing on a Pictorial Paired Associate Test and the scores obtained on the 1960 Stanford-Binet Intelligence Test of normal Negro and white children.

2. There is no statistically significant difference in the number of trials required to meet the criterion of learning on a Pictorial Paired Associate Test and scores obtained on the Goodenough Draw-A-Man Test of normal Negro and white children.

3. There is no statistically significant difference in the IQs obtained on the 1960 Stanford-Binet Intelligence Test and the Goodenough Draw-A-Man Test of normal Negro and white children.

4. There is no statistically significant difference in the means obtained on the 1960 Stanford-Binet Intelligence Test, and the Goodenough Draw-A-Man Test and the Pictorial Paired Associate Test of Negro and white children.

The study was confined to one school system in the state of Oklahoma. It was further limited to Elementary Negro and white children of this system; specifically second and third graders between the chronological ages of eight and nine who obtained IQs between the range of 90 and 110 on the 1960 Stanford-Binet Intelligence Test. These twenty-eight Negro and twenty-seven white subjects used in the study were enrolled during the Spring of 1963.

No assumptions were made that there either were or were not genetic differences in innate ability between Negro

and white children who fell into the intelligence range of 90 and 110. This study did not provide any basis for determining whether such differences did or did not exist. It has as its primary purpose the identification of the difference, if any, between responses made by Negroes and whites on a culturally weighted test, 1960 Stanford-Binet Intelligence Test as contrasted with one which is culture free, or is less influenced by previous cultural experiences, a Pictorial Paired Associate Test. The learning of the material took place within the testing situation and dependency on previously learned material for success was nil.

Effort was made to suggest possible explanations for such difference, on the basis of internal evidence within the test data, but no attempt was made to attack this phase experimentally.

The instrument of intelligence used to determine normalcy was the 1960 Stanford-Binet Intelligence Test. Comparisons were made with IQs obtained on the Goodenough Draw-A-Man Test. For the entire sample, mean IQ on the Stanford-Binet Intelligence Test was 98, with a chronological age of 8 years and 3 months, and a mental age of 8 years and 3 months. For the Negro sample, the mean IQ was 98 with a chronological age of 8 years and 4 months and a mental age of 8 years and 4 months. For the white sample, the mean IQ was 99, with a chronological age of 8 years and 7 months, and a mental age of 8 years and 8 months.

The result of the comparison made between IQs obtained on the 1960 Stanford-Binet Intelligence Test and the Goodenough Draw-A-Man Test is indicated as follows: 37 per cent of Negro children and 63 per cent of the white children scored higher on the Stanford-Binet Intelligence Test than they did on the Goodenough Draw-A-Man Test. The reverse prevailed relative to IQs obtained on the Goodenough Draw-A- Man Test, 60.7 per cent of the Negro children and 37 per cent of the white children obtained IQs higher on the Goodenough Draw-A-Man Test. These findings are in accord with those cited in Chapter II in the studies using the Goodenough Draw-A-Man Test; that Negro children do better on tests that are less subject to environmantal influences, or less culturally oriented.

The review of the literature was limited to comparative racial studies relative to intelligence. More specifically studies using the Goddard Binet, 1916 and 1937 Revisions of the Stanford-Binet Simon, and the Goodenough Draw-A-Man Tests. However, studies using other intelligence tests were included.

Comparative studies of Negroes and whites with regard to rate of learning on paired associate tests were not found. The available evidence on learning rates using paired associate test is conflicting, and difference in methodology, learning tasks, etc., makes comparisons difficult.

Most of the studies consider the racial results to be

inconclusive; some of the experimenters admit the plausibility of different interpretations, but though their statements are frequently qualified they appear to favor environmental interpretation.

Misconceptions regarding intelligence result either from ignorance of research in the field or confused notions of the meaning of test scores and what intelligence tests should measure. The nature of the operations employed in the measuring of general intelligence will depend upon the definition accepted since IQ is a reflection of the child's opportunities as well as his capacity. It is a common misconception to regard IQ as impervious to experience.

A Pictorial Paired Associate Test was the instrument used to measure or determine rate of learning between Negro and white children who obtained IQs within the range of 90 and 110 on the Stanford-Binet Intelligence Test.

Each subject was tested individually in a small, comfortable, quiet, well ventilated, and well lighted room arranged by the principals of the respective cooperating schools.

The statistics used to analyze the data obtained were the Wald-Wolfowitz Runs Test, the Spearman Rank Correlation Coefficient and the t Test.

From the statistical data, the following findings were drawn:

1. Negro children obtained higher IQs on the Good-

enough Draw-A-Man Test than the white children who obtained IQs within the normal range of intelligence on the 1960 Stanford-Binet Intelligence Test.

Specifically, 35.7 per cent of the Negro children and 22.2 per cent of the white children obtained IQs of 110 and above on the Goodenough Draw-A-Man Test.

2. Negro children obtained lower IQs, within the normal range of intelligence, on the 1960 Stanford-Binet Intelligence Test than white children.

Specifically, 78.6 per cent of the Negro children and 51.9 per cent of the white children obtained IQs within the range of 90 and 100. Twenty-one and four tenths per cent of the Negro children and 48.1 per cent of the white children obtained IQs within the range of 101 and 110.

3. On the Pictorial Paired Associate Test, the Negro children took fewer trials to reach the criterion of mastery. Mean trials for the Negro children was 5.4, while for the white children mean trials was 7.6.

4. The Negro children made fewer errors in meeting the criterion of mastery on the Pictorial Paired Associate Test. Mean error for the Negro children was 24.5, while for the white children mean error was 36.3.

5. There is a significant statistical difference in the number of trials required to meet the criterion of learning on a Pictorial Paired Associate Test of normal Negro and white children who fall within the range of intelligence of 90 to 110.

6. There is a statistically significant difference in the number of trials required to meet the criterion of learning on a Pictorial Paired Associate Test and scores obtained on the 1960 Stanford-Binet Intelligence Test of normal Negro children.

7. There is no statistically significant difference in the number of trials required to meet the criterion of learning on a Pictorial Paired Associate Test and scores obtained on the Goodenough Draw-A-Man Test of normal Negro and white children.

8. There is no statistically significant difference in the Intelligence Quotients obtained on the 1960 Stanford-Binet Intelligence Test and the Goodenough Draw-A-Man Test of normal Negro and white children.

9. There is no statistically significant difference in the means obtained on the 1960 Stanford-Binet Intelligence Test and the Goodenough Draw-A-Man Test.

The statistical analyses show that Negro children who obtain Intelligence Quotients within the normal range of intelligence on a culturally oriented test, the 1960 Stanford-Binet Intelligence Test, obtain higher Intelligence Quotients on an intelligence test that is less culturally influenced, the Goodenough Draw-A-Man Test. Also on a Pictorial Paired Associate Test where the rate of learning is determined by the number of trials taken to master the criterion of learning, Negro children took fewer trials and made fewer errors

in reaching the criterion than the white children. It is of importance that the rate of learning for Negro and white children was determined within the testing situation, and previous experience needed for mastery was nil. The white children obtained higher Intelligence Quotients within the normal range of intelligence on the Stanford-Binet Intelligence Test than the Negro children.

The findings of this study with regard to rate of learning as obtained by the Pictorial Paired Associate Test can have direct applicability only to the specific group of pupils upon which the present study is based. It is believed, however, that many of the more important findings revealed from this study can be generalized at least to other communities of the same general size and socio-economic structure.

The study could not be expected to provide final and conclusive evidence, although on some points it did provide more definite evidence than has heretofore been available relative to rate of learning between Negro and white who fall within the range of normal intelligence.

The purpose of this study was to determine how Negro and white children equated on IQ, falling within the normal range of intelligence, compare in rate of learning on a culturally free Pictorial Paired Associate Test, or a test which is less influenced by previous cultural experiences.

The researcher concluded that Negro children, when equated on intelligence according to the 1960 Stanford-Binet

Intelligence Test, obtained statistically higher results on a test that is culturally free, The Pictorial Paired Associate Test, than white children. The 1960 Stanford-Binet Intelligence Test which was used to determine normalcy relative to intelligence did not determine or tap the true abilities of the Negro children.

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APPENDICES

Pictorial Paired Associate Test

Name:_____ School:_____

Date:_____ Binet IQ:_____

Birthdate:_____ D-A-M IQ:_____

No. of Trials:_____ EXaminer:_____

Trials	Car Fork	Box Pig	Chair Dress	Leaf House	Comb Drum	Hat Cup	Bird Lamp	Duck Saw	Kite Fish
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

TABLE 5.- Number of trials taken to master criterion of learning on the Paired Associate Test, and Intelligence Quotients obtained on the 1960 Stanford-Binet Intelligence Test and the Goodenough Draw-A-Man Test of each white child

Trials	Binet	D-A-M
3	103	147
4	101	82
4	94	95
4	94	92
4	94	110
4	97	105
4	97	58
4	101	78
5	106	122
5	91	113
6	102	65
6	109	118
6	101	75
7	95	82
8	104	101
9	93	83
9	101	79
10	95	64
10	99	110
10	99	82
10	97	55
11	101	109
11	90	87
11	104	103
12	101	106
13	110	69
14	105	85

TABLE 6.-Number of trials taken to master criterion of learning on the Paired Associate Test, and Intelligence Quotients obtained on the 1960 Stanford-Binet Intelligence Test and the Goodenough Draw-A-Man Test of each Negro Child

Trials	Binet	D-A-M
3	96	81
3	98	144
3	99	142
3	103	105
4	97	82
4	102	104
4	95	91
4	93	87
4	94	113
5	97	84
5	105	88
5	102	150
5	99	122
5	95	122
6	90	109
6	96	121
6	101	80
6	100	90
6	91	100
6	93	102
6	94	102
7	97	137
7	92	100
7	95	86
7	90	90
8	96	75
8	93	102
8	92	100

TABLE 7.- Raw data for Spearman Rank Correlation of Intelligence Quotients obtained on the 1960 Stanford-Binet Intelligence Test of Negro and white Children

WHITE			NEGRO		
Student	Score	Rank	Student	Score	Rank
1	110	1	1	105	1
2	109	2	2	103	2
3	106	3	3	102	3.5
4	105	4	4	102	3.5
5	104	5.5	5	101	5
6	104	5.5	6	100	6
7	103	7	7	99	7.5
8	102	8	8	99	7.5
9	101	11.5	9	98	9
10	101	11.5	10	97	11
11	101	11.5	11	97	11
12	101	11.5	12	97	11
13	101	11.5	13	96	14
14	101	11.5	14	96	14
15	99	15.5	15	96	14
16	99	15.5	16	95	17
17	97	18	17	95	17
18	97	18	18	95	17
19	97	18	19	94	19.5
20	95	20.5	20	94	19.5
21	95	20.5	21	93	22
22	94	23	22	93	22
23	94	23	23	93	22
24	94	23	24	92	24.5
25	93	25	25	92	24.5
26	91	26	26	91	26
27	90	27	27	90	27.5
			28	90	27.5

TABLE 8.- Raw date for Spearman Rank Correlation of number of trials required to reach the criterion of mastery on a Pictorial Paired Associate Test of Negro and white children

WHITE			NEGRO		
Student	Trials	Rank	Student	Trials	Rank
1	3	27	1	3	26.5
2	4	23	2	3	26.5
3	4	23	3	3	26.5
4	4	23	4	3	26.5
5	4	23	5	4	22
6	4	23	6	4	22
7	4	23	7	4	22
8	4	23	8	4	22
9	5	18.5	9	4	22
10	5	18.5	10	5	17
11	6	16	11	5	17
12	6	16	12	5	17
13	6	16	13	5	17
14	7	14	14	5	17
15	8	13	15	6	11
16	9	11.5	16	6	11
17	9	11.5	17	6	11
18	10	8.5	18	6	11
19	10	8.5	19	6	11
20	10	8.5	20	6	11
21	10	8.5	21	6	11
22	11	5	22	7	5.5
23	11	5	23	7	5.5
24	11	5	24	7	5.5
25	12	3	25	7	5.5
26	13	2	26	8	5.5
27	14	1	27	8	5.5
			28	8	5.5

TABLE 9.-Raw data for Spearman Correlation of Intelligence Quotients obtained on the Goodenough Draw-A-Man Test of Negro and white children

WHITE			NEGRO		
Student	IQ	Rank	Student	IQ	Rank
1	147	1	1	150	1
2	122	2	2	144	2
3	118	3	3	142	3
4	113	4	4	137	4
5	110	5.5	5	122	5.5
6	110	5.5	6	122	5.5
7	109	7	7	121	7
8	106	8	8	113	8
9	105	9	9	109	9
10	103	10	10	105	10
11	101	11	11	104	11
12	95	12	12	102	13
13	92	13	13	102	13
14	87	14	14	102	13
15	85	15	15	100	16
16	83	16	16	100	16
17	82	18	17	100	16
18	82	18	18	91	18
19	82	18	19	90	19.5
20	79	20	20	90	19.5
21	78	21	21	88	21
22	75	22	22	87	22
23	69	23	23	86	23
24	65	24	24	84	24
25	64	25	25	82	25
26	58	26	26	81	26
27	55	27	27	80	27
			28	75	28

TABLE 10.- Number of trials taken to master criterion of learning on the Pictorial Paired Associate Test and the number of errors made in reaching the criterion of mastery of each Negro and white child

WHITE			NEGRO		
Student	Trials	Errors	Student	Trials	Errors
1	3	8	1	3	9
2	4	25	2	3	10
3	4	11	3	3	9
4	4	22	4	3	8
5	4	14	5	4	15
6	4	19	6	4	16
7	4	12	7	4	15
8	4	14	8	4	10
9	5	12	9	4	15
10	5	22	10	5	28
11	6	23	11	5	23
12	6	28	12	5	16
13	6	29	13	5	18
14	7	32	14	5	19
15	8	42	15	6	27
16	9	37	16	6	27
17	9	47	17	6	26
18	10	54	18	6	38
19	10	65	19	6	25
20	10	41	20	6	29
21	10	44	21	6	23
22	11	62	22	7	36
23	11	41	23	7	28
24	11	50	24	7	41
25	12	68	25	7	37
26	13	65	26	8	59
27	14	62	27	8	45
			28	8	35