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A COMPARISON OF ASSOCIATIVE LEARNING RATES OF INDIAN AND WHITE ADOLESCENTS

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CHAPTER I

INTRODUCTION

This study had its origin in discrepancies in reports concerning learning by Indians and by whites. The question of how and what individuals learn has prompted extensive numbers of instruments for measuring achievement and abilities. In reviewing the literature this investigator found that few studies about Indians and whites used paired-associate techniques. The majority of the studies concerning learning of Indians is bound to research which investigate the intelligence of Indians.

As measured by performance on tests of intelligence or of school achievement, the proportion of so-called slow learners is larger among Indians than it is among whites. This investigator's question regarding these findings is whether or not scores on such tests reflect underlying learning proficiency as accurately for Indians as for whites. This study attempted to distinguish among retarded individuals those persons who have learned relatively little during a given number of years because they are truly slow

learners from those who have learned equally little because of a corresponding deficiency in the actual opportunity to learn.

Related Research

The rationale of relating the review of Indian intelligence research is to point out that studies concerning testing of Indians usually implied that Indians make lower scores than whites. A most comprehensive study and an excellent review of the literature was done by Rupiper (1960). The study related the educational status of the Indian up to 1960 and explained that the Indian children differed from white children as measured by achievement test results. Further Rupiper found that the smaller the proportion of full-blooded and non-English speaking children in a specific group of Indian children, the higher the group achieved. He recognized that these differences in educational achievement depended on differences in experiential, environmental and cultural factors and not exactly on innate ability alone. Rupiper (1960) isolated and compared the factor structures and sets of factor patterns obtained from the achievement test scores of the California Achievement Test Battery, Form AA. In grades 4 through 12, 14,888 Indian and white children were included in the population of this study. Rupiper states:

> Since full-blooded Indian children and white children receive their education in American schools, it seems reasonable to assume that

> the Indian children should learn the same basic skills as the white children. The results as shown in this study as well as in other studies cited herein, indicated that significant differences existed between races in educational achievement. Apparently, factors other than school experiences play an important role. These factors could be genetic, environmental, and experiential . . . . American culture perhaps determines very largely that both Indian children and white children develop basic educational skills since these skills are important to both races outside an educational setting. However, the two races undoubtedly place different values on these fundamental skills even though they both function in our American society. Because of a difference in the interaction between the individual's educational environment and his cultural milieu it seems reasonable to assume that Indian children are not as cognizant of the ultimate need for these basic educational skills. Other than cultural differences, slow motivation, level of aspiration, and lack of interest may also account for some of the differences encountered. The question also arises as to whether the tests were equally fair to both groups . . . . (p. 202)

Prior research, dating back for many years, has generally shown Indian performance to be inferior to that of national standardization samples. Cowen (1943) gave all pupils in the 4-6 and 9-12 year ranges on eight Indian reservations the Kuhlmann-Anderson test on achievement and also a nature test. In general, Indian scores fell below white grade group norms. Arithmetic was their poorest subject. Scores on the nature test proved outstandingly high. The study concluded that the Indian compares favorably with whites whenever Indians had experienced similar environmental advantages.

Havinghurst, Gunther, Pratt, (1946) gave the Goodenough Draw-A-Man test to representative samples of children: six to eleven years; Sioux, Navaho, Papago, Hope, Zuni, and Zia communities and a small western white community. The Indian children obtained higher average IQ on the drawing test than on the Arthur Performance Test whereas white children obtained lower average IQ acores on the drawing test. Indian boys did better than girls on the Draw-A-Man test in all communities where artistic expression was encouraged.

Carney and Trowbridge (1962) administering the California Test on Mental Maturity (CTMM) and the Goodenough Draw-A-Man test (GDAM) to thirty-six Indian children in three age ranges found no differences between the sexes and that CTMM language, low for the youngest children, approached the norms with increasing age. CTMM non-language performance, high at youngest age also approached norms at later ages. GDAM scores above norms rose higher in older groups. CTMM findings indicated that the effects of acculturation in school is not uniform, but depends upon specific experience differences.

Aurback and Fuch (1970) reported the educational status of the Indian to date. Cundick (1970) furnished a review of testing to date as well as a valid study on the Indian children in the Southwest United States.

The purpose of the work of Cundick (1970) was to do individual intellectual assessments on some of the younger children to discover how their performance would compare with national standardization samples for the instruments used, and also to determine their readiness for inclusion into a regular classroom. Other intellectual measurement on all Indian students in one elementary school determined if the age of the students significantly related to changes in test performance.

The Wechsler Pre-School Primary Scale of Intelligence (WPPSI) was administered to 27 children and the Wechsler Intelligence Scale for Children was given to 26 others. These children were in a special pre-kindergarten class, a kindergarten class, the first and second grades. A comparison between the WPPSI results of the Indian children and the manual norms show the Indian scores significantly below the expected means on all verbal tasks ($< .001$). Seventy-two Indian children were given the Peabody Picture Vocabulary Tests and the Goodenough-Harris Draw-A-Man Test (GDAM).

The relative normal performance IQs for this group on the Wechsler Scales and the GDAMs suggest that performance tasks can be used with Indian children populations in the Southwest United States and will provide normative data that will roughly approximate standardization samples, provided the children have had at least one year of school.

Verbal tasks do not yield IQ distributions that are normal even with older children. Although the data in this study are cross-sectional they do not yield a picture of IQ growth in individual children. The failure to increase in verbal IQ after the second grade reveals a problem of significance. It appears that these children may fall further behind in verbal skills as they remain in the school system.

In summarizing the article, the IQ scores on the WPPSI, WISC, PPVT, and Goodenough-Harris Draw-A-Man for Indian children attending the same public elementary school were obtained. Performance tests yielded nearly normal IQs after one year of schooling. Verbal IQs in this school did not significantly increase after the second grade. Possible reasons given by Cundick for the failure to increase may be the result of a combination of increased instructional speed and a greater emphasis on language.

Often deprived children fail to do well on tests of the type generally used in schools (Lucas, 1953, Campbell, 1964, Gray and Klaus, 1965, Bruner, 1964, Voyat, 1969, and Brazziel, 1969). Indians are ranked as much more disadvantaged than any other minority group in the United States (Coleman, 1966). Therefore, Indians' performance on tests may be affected by the lack of familiarity with the tasks.

Familiarity with items on the IQ test is important, but even if a test could be devised that would make

absolutely no discrimination among social class, the factors that cause some of the failure in school and other undesirable outcomes of poor learning would continue to operate. Jensen's (1966) and Deutsch's (1968) studies describe perceptual training experiences as the prerequisite to a learning task. Jensen found the lower class children lacked the training in perceptual experiences. If the child has little opportunity to get this training by the time he enters high school these children often average 20-30 points lower in IQ than children from middle-class homes.

An examination of the items in intelligence tests, such as the Stanford-Binet Intelligence Scale, shows that as the child grows older, the questions that are asked him require an increasing amount of verbal ability for responses (Buros, 1958). An Indian child, perhaps more than other minority groups, has little opportunity to verbalize his thoughts and feelings. Typically, in an Indian home, conversation between adults and children is not encouraged. Often the tribal language is spoken more than English. It is noticeable that Indian children in the classroom do not engage in conversation with the teachers (Idaho State Department of Education, 1968).

Michelson and Galloway (1968) support Deutsch (1965) in his hypotheses that language deficiencies tend to blight the verbal repertoire of the child unless corrected. The

importance of the study is stated by Deutsch, "If language cannot be used as an elaborating form of communication, school loses much of its socializing and teaching capabilities, regardless of the curriculum content." (p. 78)

Another restricting influence on many cultural minority groups, such as the Indian, is the lack of variety of experiences to which the child has been exposed. Many children have been limited to the proximity of the immediate family setting. Their homes may contain no books or magazines, crayons or pencils, televisions or toys, and even very little space in which to move.

Because of deprivation of variety of experiences, the Indian may not acquire the basic knowledge vital to success for testing situations. As a result, frustrations occur and the Indian develops a negative attitude toward self and school. Whereas a non-deprived environment can foster a positive attitude toward self and testing situations, the result may produce better scores.

Theoretical Background

The procedure of this study was to administer a simple learning task to Indians and whites to determine whether or not the two groups differ in learning rate. To accomplish the comparison this investigator tested the groups with the 16-Picture Paired-Associate Learning Task (PALT). The paired-associate task provided structural patterns that could be employed in the study of learning.

Many learning psychologists have used paired-associate tasks to observe how and what individuals learn.

Guthrie (1938) established his theoretical basis for associative learning by offering a description of learning in which new associations occur in a single trial. In 1890 William James wrote that associative learning concerns itself with acquiring and retaining materials learned. Theoretically, James analyzed learning as the more other facts a fact is associated with in the mind, the better the memory retains the fact. Constantly individuals are learning and unlearning these associations so that there is a continuous fluctuation of behavior.

At present there isn't an accepted theory that explains learning processes. One basic underlying assumption for this study is that associative learning offers a description of learning and that paired-associate techniques offers a method for studying learning. Deese and Hulse (1958) state:

> The paired-associate technique has also been important for theoretical reasons: it is the model example of the associative process. One item of a pair serves as the stimulus for the response which is learned. In much of the contemporary psychological theory, learning is thought of as a process of acquiring new responses to stimuli. The stimuli are sometimes events in the external world and sometimes ideas or internal events which prompt us to respond in a particular way. Forgetting, transfer of training, problem solving, and concept learning have all been viewed as special cases of the associative process. Therefore, the study of discrete associations, as in paired-associate learning has had some important theoretical consequences.

The review of paired-associate learning in Keppel's (1964) study is inclusive to 1964.

Goulet (1968), who has done extensive research with paired-associate learning, concluded:

> The paired-associate task may be modified to study associative learning, either by the use of associative matching task or the available techniques for a stage analysis . . . . The paired-associate task is also one which permits stimuli and responses to be functionally differentiated to the experimenter and to the subjects, something which is not possible with many other tasks typically used in learning laboratories. And, not the least important, the paired-associate task may be constructed so as to capitalize on the effects of extra-experimental habits or it may be designed to minimize the effects of such prior learning.
>
> Two other comments of general theoretical interest should be made. First, any experiment involving the learning of a single task may be considered to involve a certain degree of extraexperimental transfer from nonspecific sources, such as learning to learn. This comment is particularly relevant in studies where age is varied in that the positive transfer reflected from learning to learn would be expected to vary concomitantly with the age variable. Any obvious suggestion by which to avoid, at least in part, the confounding of nonspecific sources of transfer with learning on the experimental task would be to provide some PA practice on an unrelated PA task. This would give a certain degree of task-related practice for even the youngest of the age groups studied. Again, the PA task is easily adapted to this procedure. (p. 371)

Krech, Crutchfield, and Linton (1969) have done conclusive research for descriptive and informative reviews of paired-associate learning. Palermo's (1970) study provided relatively recent data on individual learning rates, using paired-associate learning tasks.

Paired-associate arrangement has been important for several reasons. Commonly paired-associate is viewed as representative of the process people use when they learn verbal materials under normal conditions (Deese and Hulse, 1967). For example, consider the learning of a vocabulary by the traditional methods. The essential feature pairs English words with words in the foreign language so that when the English word is presented its foreign equivalent readily comes to mind.

There are several arrangements for studying paired-associates. Common arrangements (for studying paired-associates) are memory drum, projectors, and flashcards (words or pictures used either for the stimulus or response). The pairs may or may not be related meaningfully. That is, the pictures are learned in pairs, such as a picture of a leaf and a house or leaf-house; car-fork; box-pig; the stimulus is presented and the response must be learned. This study uses flash picture cards.

The studies using picture pairs are too numerous to cite. To add to what Goulet (1968) has said, a list of studies are submitted that have investigated the use of pictures. Studies by Kopstein and Roshal (1954), Wimer and Lambert (1959), Jenkins (1968) and Wicker (1970) have exhibited more acquisition with pictures or objects as stimulus items in PAL.

16-Picture Paired-Associate Learning Task

Many studies done with Indians' performance on tests show a marked difference on scores which can be presumed to occur because of differences in cultural background. The present study emphasized the importance of choosing an instrument for measuring learning rates which could be relatively independent of school experiences and home environments. In order to compare Indians and whites, a task where neither the Indian nor the white subject would be handicapped was imperative. Therefore, one possible way to eliminate some cultural problems which exist in tests, and simultaneously to investigate learning rates of Indian and whites, was to use a simple learning task. The work of Jensen (1963, 1965, 1968) and Rohwer (1968) demonstrated the rates at which subjects learned materials presented as paired-associate tasks were useful assessments of individual differences in learning which were not as culture bound as standard assessments of intelligence.

Consequently this investigator examined the Hiner (1962) paired picture test which was developed as a doctoral dissertation. Hiner used pictures rather than words for the paired-associative task in order

> . . . to avoid (1) subject variation in the amount of time needed to recognize words; (2) the variation in reading ability among school children; (3) certain words that might arouse sufficient affect, thus inhibiting the

> learning process; (4) tasks that might arouse negative feelings if the subject had had unpleasant experiences in reading; and (5) words of one or more than one syllable in the same list that might present a variable in the difficulty of the learning lists. (p. 11)

Other criteria for the pictures were:

> (1) the pictures must be simple outline drawings of common objects; (2) the words represented by the pictures must be one-syllable nouns; (3) the pictures must be immediately recognizable; (4) the pictures must be readily and consistently identifiable; that is, if a picture of a horse was sometimes called "pony" and sometimes "horse" the picture was eliminated; and (5) pictures must not be obviously potentially affect arousing; for example, a picture of a gun or of a snake. In order to insure immediate recognition and consistent identification, the pictures were shown to groups of seventy-five kindergarten children and to forty fourth-grade children. Pictures which did not meet the above criteria were eliminated. (p. 11 and 12)

Welsh (1967) researched a 16-picture-pair list and a 20-pair list of common objects in addition to the same 12-pair list utilized by Hiner. The basic assumption underlying the procedure was that an increase in list length increased the difficulty of the learning task. Furthermore, it was proposed that an increase in task difficulty discriminated between the learning rate performances of bright, normal and retarded children.

No significant difference was found among Welsh's bright, normal, or retarded groups on the 12-pair list. The retardates learned at a significantly slower pace in each of the two longer length lists. Therefore, the 16-pair list, having more discrimination power than the shorter

list, was used in the present study. Hiner copy-righted the 16-Picture Paired Associate Learning Task (PALT).

One objective of this study was to administer the PALT task to subjects on the secondary school level. In reviewing the literature, this investigator found extensive research done using whites (Keppel, 1964, Goulet, 1968, Cole and Kanak, in press, and McCullers, in press). However, studies concerning Indian adults are scarce. Because of the lack of research comparing the learning rates of Indian and white subjects, the assumption might possibly be made that the research done with whites can be generalized to include the Indian.

McCullers' comparison of the performance of children and adults in learning PA under conditions of comparable methodological and procedural details is some indication of the learning rates of adults and children. The subjects were 110 sixth-grade public school girls and 110 freshmen and sophomore women; all were of average to above average intelligence from predominantly white, middle-class backgrounds. In random fashion each was assigned to one of 11 different conditions of the study. Learning was assessed in three conditions by means of the anticipation method; in the remaining eight conditions the whole-list technique was employed. Four whole-list methods involved recognition procedures and four involved recall.

Although college students learned significantly faster than sixth graders, an examination of the data suggests that difference between sixth graders and adults was of little practical importance:

> Differences in performance between adults (high school seniors and college students) and children in grades 6 to 8 are often not significant while differences between adults and children in grades 5 and below are significant. This trend has been obtained in pair-associate learning. . . . These findings make it tempting to suggest that the mature level of functioning in these verbal tasks may be reached about the time of puberty. . . . (McCullers, in press)

Cole and Kanak (in press) did a study using 14 pictures randomly selected to serve as S and R terms from 20 pictures below the third-year level of the Peabody Picture Vocabulary Test. From this subset, a randomization procedure was used to generate the seven S-R pairs of List 1A. List B was constructed by reversing the S and R functions of List 1A pairs. Each list was used equally often, in a counterbalanced manner, within each grade level. The subjects were 64 first, third, fifth, and seventh graders, 16 per grade level. In agreement with other studies (Gladis, 1960, Kausler and Gotway, 1969) Cole and Kanak found that PA learning proceeds at a faster rate beyond the third grade and, in conjunction with the results of the above authors, the present results imply that PA learning by kindergarteners through third-graders proceeds at approximately the same rate, with more rapid learning characterizing fourth-through seventh graders. First- and third-graders failed to differ

significantly on any of the acquisition measures.

Purpose of the Study

The research comparing the learning rates of Indians and whites and using paired-associate tasks is scarce. The most relevant research to this study comes from Purdy (1968). Purdy's study used the 16-picture PALT to test 216 Indian and white pupils in the second, fourth, and sixth grades. The Indian subjects at each grade level learned the task with fewer total trials and fewer total errors than the white subjects. Moreover, the Indians in the sixth grade learned the task even with statistically significant fewer trials than did the whites. Further, Purdy's study concludes:

> (1) that to the degree that intelligence is defined as the ability to learn, the sixth grade Indians are innately more intelligent than are the sixth grade whites in this sample, even though their IQ scores on the Otis Quick Scoring Mental Ability Test are the same. (2) The sixth grade Indians' deprived environmental background and their attitudes towards themselves and towards their ability to learn caused the Indians to score no better on the Otis Quick Scoring Mental Ability Test than their white counterparts scored, even though their ability to learn the 16-picture PALT in statistically significant fewer trials than did their white counterparts, gives evidence that the Indians are innately brighter.

Ample evidence is gleaned from a review of the literature that testing with the 16-picture PALT can serve as a guide to further studies in the learning area, (Hiner,

1962, Welsh, 1967, Purdy, 1968, and Prickett, 1970). However, to this date little attempt has been made to observe systematically the associative learning rates using the 16-picture PALT of Indians and whites in the secondary school setting. Because there is no research comparing Indian and white secondary school pupils on the PALT, this investigator's major purpose in the present study was to add such an observation. Also, this study aimed to ascertain whether as Purdy's findings possibly suggested, that a comparison of Indian and white secondary students would show that the Indians trial and error scores would be lower than the whites on the PALT. The better trial and error scores were expected because the IQ test might have failed to measure accurately the Indians IQ. On the other hand, do Indians learn at a slower rate than do whites? Does this support research that suggests Indians are somehow inferior?

CHAPTER II

STATEMENT OF THE PROBLEM

Learning rates of Indians and whites using the 16-Picture Paired-Associate Learning Task have received little empirical attention. This study was an attempt to compare and observe whether a statistically significant difference existed between the learning rates of Indians and whites on the PALT.

The investigator presents the problem: Do the learning rates of Indian pupils of normal intelligence on the ninth and the tenth grade levels in selected Bureau of Indian Affairs Boarding Schools differ from learning rates of white pupils of normal intelligence on the ninth and tenth grade levels in public schools on the paired-associate learning task (PALT)?

Two specific sub-problems are considered: (1) Are there statistically significant differences between the two groups in the number of trials necessary to learn the PALT? (2) Are there statistically significant differences between the two groups in the number of errors made to learn the PALT?

Hypotheses to be Tested

The experiment was carried out to test the following null hypotheses.

Hypothesis tested concerning the trials-to-criterion scores:

H_o: There will be no statistically significant difference in the number of trials needed by subjects from the two different groups in learning the 16-picture PALT.

The following hypothesis was tested concerning the error scores of participating Ss:

H_o: There will be no statistically significant difference in the number of errors committed by subjects from the two different groups in learning the 16-picture PALT.

Operational Definitions

Learning. A relatively permanent change in behavior brought about by reinforced practice.

Associative Learning. The spatial and temporal linking of two events.

Paired-Associate Material. Material used in verbal learning, consisting of a list of pairs of items in which one item of the pair serves as a stimulus and the other as a response.

Stimulus Item. The first of two items presented to a subject in paired-associates material.

Response Item. The second of two items presented to a subject (S) in paired-associate material.

Paired-Associate Learning. Learning to respond with a second item of a pair when the first item of paired-associate material is presented.

Normal Intelligence. A resultant intelligence quotient (IQ) within the 90-110 range as measured by the Stanford-Binet Individual Intelligence Scale (1960 revision; Form L-M).

Student Error. The result of the S's failure to respond to a simulus item within five seconds after presentation, or the response to a stimulus with the wrong "response" item.

Student Trial. The result of the cumulative presentation and evocation of responses for all 16 pairs of the 16-Picture Paired-Associate Learning Task (PALT). If the S is presented the 16 pairs, the result is considered one trial. (Note: Several errors can occur during one trial.)

Trials to Criterion. The cumulative total of trials necessary for the S being tested to achieve two successive, correct repetitions of the 16-picture PALT.

Indian Students.* Those students who were enrolled in the Bureau of Indian Affairs Boarding Schools at Fort Sill (Lawton, Oklahoma) and Riverside (Anadarko, Oklahoma)

during the time in which the study occurred. (*Further defined in Appendix A.)

White Students. Those students who were enrolled in the Public School Systems of Chickasha, Oklahoma and Norman, Oklahoma, and who had been judged to be non-Indian by their school counselor and/or principal.

Major Assumptions

For the purpose of the study, the following assumptions were made:

1. Associative learning is a legitimate area of study.
2. Associative learning can be measured.
3. Associative learning can be measured using the 16-picture PALT for an instrument.
4. The 16-picture PALT is an adequate instrument for measuring associative learning.
5. Normal intelligence is a legitimate category.
6. Normal intelligence can be measured with the Stanford-Binet Intelligence Scale, Form L-M, when administered to ninth and tenth grade students.
7. The sample of schools and students may be considered of adequate size from which to generalize.

CHAPTER III

PROCEDURE OF THE STUDY

Introduction

This study was an attempt to disclose any statistically significant difference in the learning rates of Indians and whites in the secondary level. This part of the study is related to the identification of associative learning rates of the participants involved in the individual testing sessions. These sessions required two testers in order to test the fifty-six students from the four schools representing two different groups; Indians and whites (See Table 1).

TABLE I

ENROLLMENT FIGURES FOR FORT SILL, RIVERSIDE, CHICKASHA, NORMAN

School	Enrollment 9th Grade	10th Grade	Total
1. Fort Sill	31	42	73
2. Riverside	37	57	94
3. Chickasha	107	114	221
4. Norman	281	590	871
		TOTAL	1,259

The Instrument

A paired-associate learning task was selected for this investigation as it is a common method of measuring learning. Educational procedures rely heavily upon associative technique in order to teach nearly every subject, therefore students are relatively familiar with the paired-associate learning tasks. The PALT has been found effective in measuring associative learning by Hiner (1962), Welsh (1967), Purdy (1968), and Prickett (1970). For this study the Hiner 16-Picture Paired-Associate Learning Task was chosen.

In Hiner's investigation a 12-pair list was used. She was unable to find significant differences in the ability levels of retarded, normal, and bright children. Therefore a 16-pair list was used by Welsh (1967). He found this list to be a significant discriminator between bright and retarded children ($< .01$). Since the 16-pair list was shown to have more discrimination power than the shorter list, it was used in this study. (Hiner's 16-Picture Paired-Associate Learning Task; PALT.)

Sample

For this study two Indian Boarding Schools in western Oklahoma were selected; Riverside at Anadarko and Fort Sill at Lawton. Attendance in BIA Schools is defined in Appendix A. White subjects were selected from two

public schools in Chickasha and Norman, Oklahoma. The investigator arbitrarily selected the 9th and 10th grades for this study. The Bureau of Indian Affairs (BIA) Schools' ninth and tenth grade students who measured normal intelligence on the Otis-Lennon Mental Abilities Test were included on a master list by grade for selection as participants in this study. White participants, ninth and tenth grade, in the normal IQ range on the California Mental Maturity Test were placed on a master list. A table of random numbers (Walker and Lev, 1958) was used to select the subjects from the master lists of students until seven subjects from each of the ninth and tenth grades had met the selection criteria of normal intelligence on the Stanford-Binet Intelligence Scale.

A total of sixty-four boys and girls was tested on the Stanford-Binet. From these sixty-four pupils the examiner utilized fifty-six of the students as participants in the study. Eight students were eliminated because they did not score in the normal (90-110) IQ range on the Stanford-Binet.

Each subject was tested individually in a room isolated from the interference of school activity. The subject was asked to sit to the left of, and at a right angle to the examiner at the end of the table. Each subject was administered a Stanford-Binet and a 16-Picture PALT. The entire subjects' testing was completed within

approximately three months.

Directions for Administration

The following instructions were given to each subject:

> . . . Here are a number of cards (the examiner opens Booklet One). Each card in this set has two pictures on it (the Examiner shows the subject the sample pair). Look at both pictures carefully and try to remember which two pictures go together. (The Examiner then closes Booklet One and shows the subject Booklet Two.) Then I will show you another set of cards like these with only the first picture showing (the Examiner shows the sample card). I want you to tell me what picture went with this picture. (The Examiner pauses for the answer.) So, as you see the two pictures together, try to remember what two pictures went together (Welsh, 1967, p. 18).

After an explanation was made, a trial run was conducted to illustrate the complete procedure. If the subject failed to answer the sample card correctly, the examiner restated the appropriate instructions, repeating the example until he or she was satisfied the subject understood the nature of the task.

Then the paired pictures were presented singly to each subject at the rate of one every three seconds in the same order. Following this, Booklet Two was opened and the first picture of each pair was presented singly at the rate of one every five seconds. The examiner scored each oral response made by the subject. Additional trials were then administered until the subject reached the learning criterion of two successive, correct repetitions

of the list. (No ceiling was placed on the number of trials or errors Ss could experience.) Intertrial intervals were ten seconds in length. Between trials the examiner said: "Now we will look at the pictures again. Try to remember what two pictures were together" (Welsh, p. 19). If the subject questioned the examiner about the test, he or she added: "We will keep looking at the pairs of pictures until you learn all of them" (Welsh, p. 19).

Each examiner was instructed to use a typed instruction sheet each time the test was administered and to record the trials to criterion and errors committed on the individual record sheet. This record sheet also contained the subject's grade level, school, date of examination, trials to criterion, number of errors per trial, cumulative total of errors committed, and the subject's chronological age (See Appendix C).

Analysis of the Data

The Mann-Whitney U Test for two independent samples was used to compare mean trials and errors of Indians and whites using the PALT as the testing instrument. Rank was assigned to the raw scores (Appendix B) of the participants thus the rank value of each observation was considered. The Mann-Whitney U Test is one of the most powerful of non-parametric tests (Siegel, 1956, p. 116).

Using the procedure as shown in this chapter the examiner was able to determine the learning rates on the PALT. The results of this procedure are presented in the following chapter.

CHAPTER IV

RESULTS

Fifty-six Indian and white children from four schools were tested on the 16-Picture Paired-Associate Learning Task to compare the rate of learning of the two groups. The 28 subjects in each group scored in the normal IQ range (90-110) as measured on the Stanford-Binet Intelligence Scale.

The trials and errors were copied directly from the subject's score sheet. A subject was considered to have learned the 16-Picture Paired-Associate Task when he was able successfully to repeat the paired-associations twice in succession without making an error. For example, if the subject successfully repeated the paired-association on trials nine and ten, he was given a trial score of ten.

An error was recorded when the subject failed to give the correct response when shown the stimulus. When he failed to respond within five seconds after being shown the stimulus, an error was recorded: for example, if the subject was shown a picture of a leaf and responded with the wrong answer, or did not respond within five seconds, his response or non-response was recorded as an error.

The statistical technique chosen for treatment of the data was the Mann-Whitney U Test. The data constituted a form of ordinal measures, the assumptions for using the "t" test could not be clearly satisfied, and because of small samples the use of the U test was justified.

Analysis of Trials to Criterion

The first test compared the groups on number of trials required to master the task. The hypothesis stated: There will be no statistically significant difference in the number of trials needed by subjects from the two different groups in learning the 16-picture PALT.

In order to afford a statistical analysis of differences, the samples were pooled and ranked from 1 to 56. The criterion for ranking was the number of trials (or errors) the individual used before achieving the criterion of learning. The smallest number of trials received the rank of 1. The notation n_1 was assigned the number of cases in the Indian group, and n_2 was assigned to the number of cases in the white group. The sums of ranks were tallied across the cases and these sums were assigned the notation R_1 and R_2 for the sample n_1 and n_2 cases, respectively. To determine the value of U, the corresponding values were placed into the formula (Siegel, 1956, p. 124). n_1 = 28 = the number of Indian adolescents, n_2 = 28 = the number of white adolescents, n_1 and n_2

constituted the two independent samples in this study. The significance level was $\alpha = .05$. Ties occurred in both samples in two or more observations, therefore, the correction for ties was applied to the data. It has been shown (Mann and Whitney, 1957) that as n_1 and n_2 increase in size ($N_2 > 20$), the sampling distribution of U rapidly approaches the normal distribution. If n_2 is greater than 20 the following formula yielded the value of Z (Siegel, 1956, p. 125).

$$Z = \frac{U - \frac{n_1 n_2}{2}}{\sqrt{\left(\frac{n_1 n_2}{N(N-1)}\right)\left(\frac{N^3 - N}{12} - \Sigma T\right)}}$$

The value of Z was computed. Reference to the Z table reveals that Z = .041, has a two-tailed probability under H_o of $p > .05$ (Siegel, 1956, p. 247). Since the p is greater than $\alpha = .05$, the null hypothesis was accepted as stated: There was no statistically significant difference in the number of trials needed by subjects from the two different groups in learning the 16-picture PALT, at the .05 level.

Analysis of Errors Recorded

The same statistical procedure was used for errors. The samples were pooled. The smallest number of errors (3) received the rank of 1. The next to the smallest number received a 2 and so on. The notation n_1 was assigned the

number of cases in the white group and n_2 was assigned to the Indian group. The significance of the observed U was determined through the use of the Z test which was corrected for tied ranks. The Z = .581 for errors has a two-tailed probability under H_o of $p > .05$ (Siegel, 1956, p. 247). Since the p is greater than α .05 the decision was made to accept the H_o: There was no statistically significant difference in the number of errors made by the subjects from the two different groups in learning the 16-picture PALT at the .05 level.

Summary

The Indians and whites learning rates were assessed and a comparison was made. As evidenced by the data contained in Table 2 there were no statistically significant differences in the performance of the two groups to learn the paired-associate task.

TABLE 2

MANN-WHITNEY U TEST FOR DIFFERENCES IN INDIANS AND WHITES TOTAL TRIALS AND ERRORS

	Trials	Errors
n_1	28	28
n_2	28	28
N	56	56
R_1	795.5 (Indian)	762.5 (White)
U	394.5	427.5
Z	.041	.581
p	.05	.05

CHAPTER V

DISCUSSION AND SUMMARY

Introduction

The present investigator found that it is difficult to make broad general theories of learning a productive task because so little is known or understood about learning. This study has attacked a specific bit of behavior, collected data, and presented the results as an addition to the evidence available concerning the learning processes.

This study had its origin in discrepancies in reports about learning of Indians. The majority of research compared the Indians and whites on intelligence and achievement tests. Often this sampling would be inappropriate for children who have not had much exposure to the Anglo-American culture. The results have shown the Indian to perform poorly in some areas, for example verbal tasks. It would seem that a better way to measure learning potential would be to give the subject a standard task and observe how fast he learns it, whereby experimentally it can be noted how readily the participant's behavior changes through trials and errors of experience. In order to compensate for the cultural bias the standardized tests may

have, a paired-associate task was administered to determine if secondary Indian children differed in learning rates from white students.

The purpose of this study was not only to clarify some of the conflicting evidence concerning the learning of Indians, but also represented an attempt to extend the findings of earlier studies. More specifically, this study was concerned with giving a paired-associate learning task to secondary school Indian and white students.

Twenty-eight Indian students attending two Indian boarding schools at Fort Sill, Oklahoma and Riverside, Oklahoma, and twenty-eight white students attending the public schools of Chickasha, Oklahoma and Norman, Oklahoma were randomly selected from the ninth and tenth grades. The Hiner (1962) 16-picture PALT was given to the fifty-six subjects after they had participated in the screening tests and the Stanford-Binet Intelligence Test for measurement of normal IQ (90-110). A trial and error score was recorded for each pupil given the 16-picture PALT.

The procedure of the present study was to observe the learning rates of Indians and whites using the 16-picture PALT as a data collection instrument. The number of trials and number of errors made in learning the PALT were observed to determine whether there was a statistically significant difference in learning rates between the two groups on the secondary level.

The Mann-Whitney U Test was used to compare the trial and error scores taken from the individual performance sheets of the participants. The value of Z = .041 was computed for trials. Reference to the Z table reveals that the $p > .05$. The value of Z = .581 for errors has a probability under H_o of $> .05$. The resulting analyses from the Mann-Whitney test showed that none of the hypotheses tested was statistically significant at the .05 level. The result of the study led to the conclusion: (1) There was no statistically significant difference in the number of trials needed by subjects from the two different groups in learning the 16-picture PALT. (2) There was no statistically significant difference in the number of errors committed by subjects from the two different groups in learning the 16-picture PALT.

Purdy (1968) found that the sixth grade pupils in his study learned the PALT with statistically fewer trials than their counterparts. Purdy's second and fourth grade pupils however, did not. Therefore, the present study was to determine whether Indians on the secondary level showed a statistically significant difference. Nevertheless, the present investigation did not support this suggestion. Further, since these findings reveal no significant differences in learning rates and number of errors to reach the learning criterion, research stating that Indians are intellectually inferior was not supported. Many previous

studies have implied or stated that the Indian is basically inferior to whites. However, most, if not all, of these studies can be explained. The plausible explanation for the Indian's poor performance and lower scores on a particular test is his lack of acculturation to the way of life, set of values, and the general jargon of the tests, i.e., the Indian child lacks the basic language or response repertoire necessary to score well on tests.

The following discussion submits possible reasons for failure to reject the hypotheses stated in this study: (1) Perhaps, the Stanford-Binet is a more cultural free IQ test than the Otis. According to Purdy (1968), the Indian was downgraded on the Otis more than the white. The PALT scored the Indian with relative accuracy. According to this researcher, the assumption can be made that the Stanford-Binet is giving a relatively accurate IQ score for the Indian, i.e., the Indian and whites are relatively equated on IQ. In the event that it is not, both the Stanford-Binet and the PALT are downgrading the Indian. Perhaps Purdy's Indian sample was a more deprived group than the Indian sample in the present experiment. Consequently they scored lower on the IQ test. (2) By the time the Indian reached the secondary level in schools he may have absorbed the impact of his deprived background to such an extent that he does not perform on any testing instrument as well as whites. Deprived environments do not allow the

individual to perform well on any test instrument and furthermore perpetrates an increasingly low evaluation of the individual's competencies and of his abilities to learn.

Jensen's (1961), (1963) and (1968a) studies offered a possible explanation of the Indians in Purdy's research having completed the PALT with fewer trials and supporting his conclusions. Jensen (1961) tested low and high IQ Mexican American and Anglo-American children. The test task was to learn which of several button switches were matched with each of a set of different colored forms. When low IQ Mexican-American children were instructed to name the objects they were shown, their performance was noticeably improved, whereas a similar instruction given to middle-class Anglo-American children was virtually ineffective in improving their performance. Improvement will come about for those whose learning deficiencies result from a previous deprivation in training. Purdy's Indian sample could have possibly acquired learning skills from the instructions given with the test.

No statistically significant differences occurred in this study. Could it possibly be that the Indian has accepted failure to perform on testing instruments in any situation by the time he reaches high school? Both the work of Clark (1965) and Rosenthal and Jacobson (1968) suggest the presence of a "self fulfilling" prophecy where

children tend to perform as they are expected to perform once they have internalized the expectancies of those around them. The work of Saslow and Harrover (1968) document that school experiences of Indian children tend to accentuate their identity problems. Between the 4th and 7th grades a decline in academic achievement sets in and the majority of Indian students fall progressively behind his Anglo-American counterpart.

Indian subjects in the present sample were older than the whites, which supports the assumption that Indians often fail to acclimate to the learning environment (Boyer, 1967). The mean age of the BIA student is often higher than the mean age for Indians attending public schools (Aurback and Fuchs, 1970). As a result of his failure to adjust to the conventional school some BIA pupils have failed one or more grades before entering BIA schools. Once this occurs, tenth grade BIA students are older than their public school counterparts, i.e., tenth grade BIA students would be the same age as eleventh grade public school students. The difference can in part be explained by the large number of less accelerated children in the BIA school who require special attention. For example, sometimes the entering pupils must spend a year learning social and English skills before commencing with the school work.

Jensen (1966) describes this as "verbally underprivileged" rather than "culturally deprived." His research emphasized the importance of early perceptual experiences. The lower socio-economic class children have fewer opportunities than middle-class children to develop perceptual skills. (3) The test performance and consequently the results could have been altered by the fact that the testors for the Indians were white. Research studies disclose that invalid test performances are obtained from testors of a different race than that of the Ss tested (Whyte, 1943, Klineberg, 1958). Brazziel (1969) noted that until recently almost no psychometrists gave attention to the fact that an examiner of one race was giving a test to a subject of another race and that their report might be invalid test performance. Further research is recommended in which both testor and subjects are of the same race.

Implications

The Indian exhibited no deficiency in general capacity for learning in this study. However, the Indian performs poorly on some of the school tests. The researcher's could ask: What is the successful learner doing that the Indian is not? The question is not one that can be answered with an overt performance of Indians and whites. Research is needed that points out what the

successful child does do that the unsuccessful child does not do.

Rohwer's papers (1967, 1968) on learning points out how a child can improve on the more complex processes of problem solving and even creativity by learning certain skills. One such skill is giving names to objects. Berstein (1960) states that children from lower class homes may be in an environment that rarely hears adults engaging in the ritual of naming objects and events. The child receives no encouragement to engage in naming, himself and has not acquired the skills necessary to perform these tasks.

An attempt could be made to establish good learning habits for the participants before tests are conducted. The failure to teach study skills penalizes and deprives many children of the opportunity to be successful learners. Further research with adolescents may provide information with regard to new learning, that is, learning which may be considered to have occurred for the first time rather than being based on previously learned mediators or association.

In summary, Purdy (1968) reported the Indian as a result of cultural deprivation scored no better than 90-110 on the Otis Intelligence Test. Consequently the Indian learned the PALT with fewer trials. According to Purdy, the Indian in his sample was innately more intelligent than the white. No differences were found in the present study;

this leads one to believe that the Stanford-Binet may be a more culture free intelligence test than the Otis and that the Indians and whites were more intellectually equated in the present study. A study similar to Purdy's, an investigation of learning rates of second, fourth, and sixth grade Indians and whites, might be enlightening if the Stanford-Binet were used to intellectually equate the two groups instead of the Otis Mental Test.

Another study that might be revealing would compare the PALT scores of white students whose scores are above 110 on the Otis IQ test with Indian students who have normal (90-110) Otis IQ scores. It would find out whether or not there are any differences in learning the task. If there were no differences in learning rates, it might be assumed that the intelligence test is downgrading the Indian pupils.

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APPENDIX A

CRITERIA FOR BIA STUDENTS

.2 Eligibility for Admission. Children otherwise eligible meet one or more of the criteria listed below may be admitted to Federal boarding schools:

A. Education Criteria

1. Those for whom a public or Federal day school is not available. Walking distance to school or bus transportation is defined as one mile for elementary children and 1½ miles for high school.

2. Those who need special vocational or preparatory courses, not available to them locally, to fit them for gainful employment. Eligibility under this criterion is limited to students of high school grades 9 through 12, and post-high school grades 13 through 14.

3. Those retarded scholastically three or more years or those having pronounced bilingual difficulties, for whom no provision is made in available schools.

B. Social Criteria

1. Those who are rejected or neglected for whom no suitable plan can be made.

2. Those who belong to large families with no suitable home and whose separation from each other is undesirable.

3. Those whose behavior problems are too difficult for solution by their families or through existing community facilities and who can benefit from the controlled environment of a boarding school without harming other children.

4. Those whose health or proper care is jeopardized by illness of other members of the household.

APPENDIX B

RAW SCORES

TABLE 3

RAW SCORES

Indian Subjects

Subject	Trials	Errors
1	4	8
2	14	82
3	13	81
4	15	89
5	6	25
6	4	9
7	6	20
8	6	25
9	5	22
10	5	30
11	7	32
12	7	39
13	5	12
14	7	24
15	7	20
16	5	25
17	9	49
18	5	23
19	6	35
20	9	55
21	7	23
22	6	30
23	7	39
24	9	48
25	8	52
26	6	20
27	6	29
28	10	68

TABLE 4

RAW SCORES

White Subjects

Subject	Trials	Errors
1	8	31
2	7	40
3	11	67
4	9	50
5	6	21
6	10	58
7	8	33
8	7	30
9	6	23
10	8	41
11	5	16
12	8	36
13	8	37
14	8	21
15	5	33
16	4	14
17	3	3
18	8	35
19	5	13
20	10	51
21	7	32
22	5	4
23	5	10
24	5	15
25	5	21
26	6	25
27	7	26
28	9	70

APPENDIX C

INDIVIDUAL RECORD SHEET

INDIVIDUAL RECORD SHEET

Name:_____ Grade Level:_____

Age:_____ School:_____

Examiner:_____ Date:_____

PAIRS