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NORTHWESTERN ONTARIO INDIAN CHILDRENS' SCORES ON THE WISC IN RELATION TO THE NORMATIVE POPULATION

by

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TABLE OF CONTENTS

ABSTRACT

Because Indian children of Northwestern Ontario attend schools designed for children of white, North-American families, they are frequently given the Wechsler Intelligence Scale for Children. This research was undertaken to find out in what ways they differ from the standardisation norms published by Wechsler. One hundred Cree and Ojibwa children between the ages of 6-15 were tested according to the standardized procedure and the following results were found: there was a large discrepancy between the Verbal and Performance Scale scores with the advantage in favour of the Performance Scale; the discrepancy diminishes as the child continues in school; the Performance Scale was in the Normal range with the Verbal Scale being in the Mentally Deficient or Dull-Normal range. The high score of the Verbal Scale was on the Arithmetic subtest while on the Performance Scale it was Block Design, Picture Completion and Coding. Familiarity with the English language affects all scores but the tests are valid indices of their standing in relation to the normative population. Personal information was gathered from a questionnaire filled out at the time of testing.

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

INTRODUCTION

For years the Indian children of Northwestern Ontario schools have been tested on intelligence tests designed for children of a white, middle class North American family. It has been realised that this practice has been unfair and may have little predictive value. Since it has not been possible to construct a test of intelligence for Indians which can be compared on an equal basis with all parts of standardised intelligence tests, this research was undertaken to study the expected standing of Indian students on one popularly used standardised intelligence test, the Wechsler Intelligence Scale for Children (WISC)(Wechsler, 1961).

The WISC was chosen for the present investigation because of the two types of intelligence scores which it presents, the Verbal and Performance I.Q.'s, and because it is so frequently given to Indian children, it being intuitively felt that the Performance Score gives a fair indication of the child's intelligence. While several of the items on the Performance Scale are culturally biased, particularly on the Picture Completion and Picture Arrangement subtests, the Block Design subtest is assumed to measure a type of intellectual process that is applicable to most cultures. Wechsler, in his standardisation sample, found that it correlated .63, .72 and .72 at ages 6½, 10½ and 13½ with general intelligence as measured by the WISC. The Performance Scale correlates .89, .90 and .87 with the Full Scale score. With this amount of correlation it is felt that a fairly good indication of the general intelligence of a child from a non European-American

culture will be obtained, while the Verbal Scale will give a good indication of his current standing in relation to his white contemporaries in regard to the verbal-educational factor.

Review of the Literature.

As the Indian children are placed in integrated schools and will eventually, if they live outside of Indian Reservations, have to compete in a white-dominated world, "it is entirely legitimate", according to Vernon (1965), "to compare their standing with that of Europeans or Americans on tests which are known to sample abilities relevant to Western-type achievement." Vernon's statement is not universally accepted by those in the field of clinical psychology and many argue that this does not give a true picture of the intelligence of any minority group. Those tests which are least affected by cultural differences are "those that are loaded on the reasoning from non-verbal factors", such as Raven's Progressive Matrices (1963) or Safron Culture Reduced Intelligence Test (MacArthur, 1969, Safron, 1960). However, Irvine (1966) in Torrence (1968) warns quite strongly that a measure will by no means be unbiased just because it is based on figural or low verbal content. He says that it will simply be biased in ways that are different and, probably, more difficult to define.

If we accept Vernon's statement that it is legitimate to use tests standardized in European-American society, it is desireable then, to go one step farther and use these tests as predictors

of academic success. MacArthur (1969) has found that "under the current curricular and teaching methods those tests which are the best predictors of future academic achievement are those which are highly loaded on the verbal educational factor." Wesman (1968) agrees. He says that if members of a subculture are to be distinguished from their peers, a test should be developed which samples the verbal skills or factual information peculiar to that subculture, but if "we wish to predict future learnings of the content of the more general culture (e.g. the so-called white, middle-class culture such as typifies what the majority of our schools are organized to transmit), tests designed for the subculture will be less relevant than those which sample from the general culture."

Differences between verbal and performance type tests have been of interest for some time (Bloom, 1959; Davis, 1948; Howell, 1958; Levinson, 1958; Levinson, 1959) and all have agreed that making comparisons is an extremely hazardous undertaking. MacArthur (1965) using group tests on Indian and Metis youths in the Northwest Territories, found a definite ability to score well on performance type tests whereas the score on tests based on language ability was low. Hanna, House and Salisbury (1968), testing Eskimo youth in Alaska, found a very substantial difference on the Wechsler Adult Intelligence Scale (WAIS) between the subtest mean scores and the standard deviations of the minority group, and the standardization population. Small (1969) studying a group of Indian-Eskimo-Metis youths enrolled

in the Canadian Army, found the group did much more poorly on verbal-type tests than on performance tests. Galvan (1968) tested 100 bilingual Spanish-American children, when the primary language in the home was Spanish, and found the same discrepancy. When a Spanish translation of the WISC was given there was a correlation of .97 between the English and Spanish editions on the Performance Scale scores. Since such a nearly perfect correlation was found between the English and Spanish editions, it is speculated that a high correlation may possibly be found between English and Cree or Ojibwa editions, if such existed.

As long ago as 1948 Davis pointed out that because language is slowly assimilated, Indian children who have spoken their native language, or a mixture of English and an Indian language, will be at a disadvantage in school, particularly in the elementary grades and hence the Verbal scores will be lower than the Performance scores.

Other investigators, using a variety of tests, have found children from many Indian tribes to be superior to their white counterparts on performance tasks. (Carney and Trowbridge, 1962; Eels, Davis, Havighurst, Herrick and Tyler, 1951; Evans, 1957; Havighurst, Gunther and Pratt, 1946; MacArthur 1962 and 1967; Telford, 1932). This is due, mainly, Havighurst et al believe, to the fact that hunting, which has been an intimate part of their tribal life, has made minute and accurate observation of details a necessity, and while it is true, as Vernon (1965) says, that the traditional hunting-trapping life is rapidly dis-

appearing and the majority of parents are wage-earners or on welfare, the children are still brought up permissively and encouraged to explore and hunt. In addition, the social life of the tribes stressed skills required for the successful production of arts and crafts (Carney and Trowbridge, 1962). This ability to see and remember accurately may account for the fact that MacArthur (1969) found a relatively high loading on the visual memory for words factor among a group of Eskimo, White and Indian-Metis boys, and for the fact that Vernon's (1965) West Indian boys did well in spelling. Purdy (1968) even goes so far as to say that "Indian children are probably more intelligent than white children despite a cultural handicap." He bases his assumption on the fact that his sample of 72 Indian children of grades 2, 4 and 6 required fewer trials and made fewer errors than did white children when given a paired-associate learning task. This may well have been because of the superior visual memory which Vernon, MacArthur and others have commented on.

Carney and Trowbridge found that on the Goodenough Draw-a-Man Test the scores were higher than the published norms and rose higher with age. These authors felt that this was because the culture of the Tewa Indian reserve of central Iowa stressed arts and crafts, and when a culture values a skill which markedly affects a child's score on a standardized test, the difference will be maintained or increased as that child continues to be a member of that civilization.

Renaud (1958) agrees that Indians in most places have retained

their traditional sharpness of visual discrimination. He feels that superior visual memory may account for finding a slight edge in favour of vocabulary over comprehension in a comparative study he made of WISC subtest patterns. He feels that it might be worthwhile investigating to what extent this points to verbalism and translating.

Lombardi (1970), using the Illinois Test of Psycholinguistic Abilities on Papago children, found that they were lower on all auditory tests than on visual tests. They were significantly higher, at the .05 level, than the standardization group on the subtest for visual sequential memory. Auditory tests seemed to require a degree of sophisticated knowledge of the English language which the Papagos did not possess. He felt that as the child became more acculturated the differences would become less pronounced. Comparing Papago children in integrated schools with those in segregated schools, his investigation found this to be so. When Papago children enrolled in integrated schools were compared to the standardization population the differences became less pronounced and in the expressive processes (verbal expression and manual expression) ceased to exist at a statistically significant level.

Gaddes, McKenzie and Barnsley (1968), in contrast, found no superior spatial imagery when white children and children from the Kwatkiutl and Salish Indian tribes of Western Canada were matched for age, sex, intelligence and socioeconomic background. The socioeconomic factor may well be the deciding factor in this problem for as Katz and Deutsch (in Bruininks, 1970) observed, "excessive back-

ground noise of many lower class homes undoubtedly encourages an orientation toward developing structure and order through concentration upon visual experiences." Bruininks revealed a trend among the disadvantaged toward more efficient learning from visual presentation of material than from an auditory teaching method.

From past studies done on children from various minority groups it is thought that the Indian children of Northwestern Ontario will score higher on the Performance Scale than on the Verbal Scale of the WISC. This study was designed to ascertain if this were in fact so. As well, it is not known if the expected advantage for the Performance Scale will be maintained as the number of years that the child continues in school increases. Nor is it known whether the young child with a good Performance Score can be expected to obtain good marks in academic subjects as he continues in school. In fact, it is not known in what way either the Verbal Scale, the Performance Scale or any subtest score relates to marks received in school, nor if any subtest is a better predictor of school success than another.

A review of the literature suggests that scores on the Coding and Digit Symbol subtests may be higher than those recorded for the standardizing population because of the superior visual memory which researchers have found. It is also possible that the mean scaled score for Block Design may be higher than that given for the normative population because of the emphasis placed on arts and crafts by the

Indian culture.

Lombardi's study would lead one to expect that the child's Verbal I.Q. score will be affected by his exposure to the English language and therefore his school success will be directly influenced. However, Vernon (1965) cautions that this need not be so. Many of these children are quite capable of verbal-type learning, regardless of their exposure to English.

This study should answer the following questions about Indian children in Northwestern Ontario:

1. Do these children score higher on the Performance Scale of the WISC than they do on the Verbal Scale? How do they compare to the standardization population on Verbal, Performance and Full Scale I.Q.'s.
2. Do they score higher on the Picture Completion subtest than children of the standardization population?
3. Do they score higher on the Block Design subtest than children of the standardization population?
4. Do they score higher on the Coding and Digit Symbols subtests than children of the standardization population?
5. Do Northwestern Ontario Indian children's scores change in relationship between Verbal and Performance Scales due to the number of years that have been spent in schools operated on middle-class North-American values?

6. Are I.Q. scores influenced by the child's exposure to the English language?
7. Is there a statistically significant correlation between the Verbal Scale score or the Performance Scale score and end-of-the-year marks recorded on Ontario School Records for academic subjects such as: reading, writing, arithmetic, spelling, social studies and science?
8. Is there a statistically significant correlation between the Verbal Scale score or the Performance Scale score and end-of-the-year marks on Ontario School Records for non-academic subjects such as art, music and physical education?

It is hoped that statistically valid answers to these questions should aid the school systems in educating and counselling these students and in placing older students who are brought off the reserves for secondary schooling in the appropriate type of educational institution.

METHOD

Subjects:

Subjects were 100 Ojibwa and Cree Indian children between the ages of 6 and 15 living on reserves at Sandy Lake, Poplar Point, Mission and at St. Joseph's Boarding Home in Fort William, Ontario, or in the case of the 14 and 15 year olds, in private homes of the Thunder Bay area. These included 33 children between the ages of 6 and 7; 31 between the ages of 9 and 10, and 36 between the ages of 14 and 15. These ages were chosen to correspond to the standardization of Wechsler's population. There were 44 children from Sandy Lake or northern reserves, 37 children from Poplar Point and 19 from Mission reserve.

The children from Sandy Lake had almost no contact with white society, those from Poplar Point had some contact with white society in that their school is about 1½ miles outside the small Northwestern Ontario mill town of Longlac; those from the Mission reserve have a considerable amount of contact with the city of Thunder Bay. The children from St. Joseph's Boarding Home had some contact with white society during their school terms but their pre-school years had been spent in isolated areas of the north. The 14 and 15 year olds had also spent their previous years in isolated areas of the North but had been brought by the Department of Indian Affairs into urban areas for secondary schooling. (See Appendix A)

No effort was made to pre-select children who do or do not do well in school. In some cases, particularly at Sandy Lake and Poplar Point, all the children of the desired age were tested because of the small number of children enrolled in the schools.

As well as the 100 children who made up the main body of subjects, an additional sixty 16 to 20 year olds were also tested using the Wechsler Adult Intelligence Scale. These, too, were students brought by the Department of Indian Affairs from their homes in the North into an urban area. They came from Sandy Lake, Big Trout Lake, Bearskin Lake, Collins, Armstrong, Pikangikum and Osnaberg. Only the Wechsler scores were analyzed on these students, in order to get a clearer picture of the range of scores from an early age through young adulthood. (See Appendix A)

Procedure:

The WISC was administered to each subject according to the standardization procedure outlined in Wechsler's test manual. All tests were administered in the school in which the subject was enrolled and scores were recorded on Ontario School Record (O.S.R.) cards. However, since many people working in the field of school psychology do not like to use the WISC at ages below 8, I.Q. marks for the 6-7 year age group were not recorded. At the same time, end-of-the-year marks for the preceeding year were obtained.

Background information on the subjects was obtained from

a questionnaire which was filled out at the time of testing. (See Appendix B)

Results:

A t test of the difference between the means shows that at all ages the Indian children of Northwestern Ontario score higher on the Performance Scale of the WISC than they do on the Verbal Scale. This difference becomes less as the child grows older but remains significant even among the older students who were given the WAIS. (See Table 1, page 31)

The mean difference ranges from 31.60 at age 6-7 to 12.30 at age 18-21, but it is not a straight line relationship because of an increase in size of difference at age 14-15. (See Figure 1, page 43). This may be due to the fact that this was the first year this group of children had been enrolled in urban schools. Before that they had been enrolled in schools on their home reservations, and now that they were in the city for the first time they were probably suffering from culture shock, i.e., unfamiliarity with the expected response to the language, customs, emotional fibre and attitudes of the prevalent culture.

Even though the difference between the mean Verbal and Performance Scale scores becomes less pronounced as the child advances in school, the maximum and minimum scores at each age remain widely separated. (See Figure 2, page 44)

Table 4 gives the interpolated Verbal, Performance and Full Scale scores in comparison to those of the standardization population.

The means of the subtests for each age group are shown in Tables 2 and 3, (pages 32 and 33). Study of these tables leads one to realize that although the Verbal Scale subtests vary from one to more than five points below the means achieved by the normative population, the mean of the Performance Scale subtests are, in most cases, only a fraction of a point off the published means. Even so, the scores on several of the subtests of this scale were probably depressed because of culturally oriented items, particularly on the Picture Completion and Picture Arrangement subtests.

The second objective of this study was to see if Indian children may score higher on the Picture Completion subtest than children of the standardization population. At ages 6 and 7 the score was 10.82, at 9 and 10 it was 10.03, at 14 and 15 it was 9.17, at 16 and 17 it was 9.08 and at 18 through 20 it was 10.55. Since these scores are almost identical to those Wechsler obtained from his normative sample, one cannot accept the proposition that they are higher than the standardization population. (See Table 5, page 35). Neither can one accept the hypothesis that Indians score higher on the Block Design subtest than do children of the standardization population. Mean scores for this subtest were: age 6 and 7, 10.79; age 9 and 10, 10.32; age 14 and 15, 10.36; age 16 and 17, 11.08; and age 18 through 20, 12.10. (See Table 6, page 35).

Previous research leads one to expect that the mean scores for Coding and Digit Symbols subtests will be higher than the published

means since these children are said to have a superior visual memory. According to the present study the differences are minimal. (See Table 7, page 35).

One is further interested to know if there is a significant correlation between the verbal scale deviation I.Q. and academic and non-academic subjects. Using a Pearson product-moment correlation it was determined that the only significant correlation ($p<.005$) between I.Q. and academic achievement was at the 9 and 10 year level. At 6 and 7, and at 14 and 15, the correlations were non-significant. No significant correlations were found at any age levels between the Verbal Scale score and non-academic subjects. (See Table 8, page 36).

The failure to find a significant correlation between the Verbal Scale and end-of-the-year marks in academic subjects for ages 6-7 and 14-15, and yet to find a highly significant relationship at ages 9-10 is thought to result from the fact that school tests are given infrequently to the youngest children, and so at the end of the year the teacher is forced to make a subjective judgement on the child's ability. As well, these children were now forced for the first time to adjust to the rules and regulations of a white man's world. The 14-15 year old children were facing the attractions of the city for the first time and very probably were not putting as much energy into school work as they were capable of doing, whereas the 9-10 year olds were in a fairly stable environment, in regard to both home and school. They were not suffering from the culture shock which was bothering the

younger and the older children.

Concerning the relationship between the Performance Scale deviation I.Q. and academic subjects, a significant correlation ($p<.005$) was found at the 9 and 10 year age level, but at the 6-7 and 14-15 year age levels the correlations were non-significant. For non-academic subjects a non-significant correlation existed at the 6-7 year age level, but at the 9-10 and 14-15 year age levels they were significant at the .05 level. (See Table 9, page 36).

This study shows that the difference between the Verbal and Performance Scores diminishes as the number of years spent in school increases but the relationship stays the same, i.e. the Performance score is higher than the Verbal score. This was true of all but 7 of the 160 students tested.

An analysis of variance for groups with unequal frequencies was computed from the data. The between subjects variables were the five age groups (6-7, 9-10, 14-15, 16-17, 18-21), while the within subjects variables were the Verbal and Performance I.Q. scores. The variation between Verbal and Performance scores was highly significant ($F=204.22$, d.f.:1,310, $p<.01$). The difference between age groups is also significant beyond the .01 level of confidence ($F=619$, d.f.:4,310) meaning that there is a difference between the scores obtained at one age to those obtained at another age. As well, there is a significant interaction between age and I.Q. score ($F=5.60$, d.f.:4,310, $p<.01$). This leads to the supposition that as the children get older there is

a significant rise in their I.Q.'s. (See Table 10, page 37). A Neuman-Keuls (Winer, 1971) comparison between Verbal Scale I.Q. scores and age groups revealed a significant ($p<.01$) rise between age groups 1 (6-7), 2 (9-10), 4 (16-17) and 5 (18-20). The difference between group 1 and group 3 (14-15) was significant at the .05 level but between group 3 and group 5 the difference was significant at the .01 level. These statistics show that groups 1 and 3 have the lowest mean I.Q. scores and it seems reasonable to interpret this as being attributable to culture shock, since group 1 was facing the school environment for the first time and group 3 was facing urban civilization for the first time. (See Table 11, page 37).

When a Neuman-Keuls comparison between Performance Scale I.Q. scores and Age Groups was made, it was found that the difference was non-significant at all age levels. (See Table 11, page 38).

It is realized that since age 16 is the legal school-leaving age, a representative sample may not have been obtained for the older age groups. However, those in charge of the Indian Education program in the Thunder Bay area have said that nearly all of the 16-17 year olds availed themselves of the government sponsored opportunity to attend city schools, so that it is felt that a reasonably representative sample was measured.

To find out if a child's scores are influenced by his exposure to the English language, an analysis of variance was computed for each age group, i.e. 6 and 7, 9 and 10, and 14 and 15. A 3x3 analysis was used with the A factor, the within source of variation,

being the Verbal, Performance and Full Scale scores. The questionnaire given each child yielded information on whether he spoke English at home, only Indian, or a mixture of both languages, and this then provided the B factor, the between groups source of variation. English was assigned a value of 3, both languages a value of 2, and Indian a value of 1.

At age 6 and 7, with 33 observations, the difference between Verbal, Performance and Full Scale I.Q. scores is highly significant. Language is also very significant but there is no interaction between language and I.Q. scores.

Variation between the three classes of I.Q. scores was significant for the 9 and 10 year age group, with 31 observations. The B factor, language, was non-significant for these subjects at this age level. The interaction between language and I.Q. scores was non-significant.

I.Q. scores were significantly different at the 14 and 15 year age level (36 observations), and at this age the language spoken was also significant. As with the other two groups no significant interaction between language and I.Q. score was found. (See Table 13, page 39).

The data was further analyzed to study the relationship of age and language spoken in the home to mean Verbal Scale I.Q. score. Using a Neuman-Keuls multiple comparison, nine groups were formed, three age groups (6-7, 9-10, 14-15) and three language groups, English,

Mixture, Indian) in each age group. This resulted in small numbers in each group, particularly the 14-15 year group who spoke a mixture of the two languages. Nevertheless, the findings seemed to point to the fact that those children who spoke English were superior at the 6-7 year level and at the 14-15 year level. Children who spoke a mixture were superior to those who spoke only Indian and at the 9-10 year level surpassed the English speaking children. From that age to the 14-15 year level there was a significant ($p<.01$) drop. This may be attributed to the numerical size of the group, as the difference between English speaking children and Indian speaking children at the 14-15 year age level is non-significant. (See Table 14, page 40, and Figure 4, page 48).

When the same computation was performed, using Mean Performance Scale I.Q. marks the difference was non-significant for all age groups, except at ages 6-7 of English and English-Indian speaking children, compared to the 14-15 year old English-Indian speaking children. At this point significance was just reached at the .05 level. (See Table 15, page 41, and Figure 5, page 49).

The questionnaire yielded some interesting personal information. The average number of children in a family was 7.1 (ranging from 2 to 17). Fifteen children were the oldest, 12 the youngest, with the average being the 4th child. The types of work listed for the father were: 44 outdoor; 17 indoor; 12 unemployed; and 4 deceased or missing. This number differs from the total number of children because some of the children were siblings. Outdoor work was primarily work

in the bush or operating a trap line. Indoor work included such occupations as cooking or operating machinery in a lumber mill. The mothers were overwhelmingly at home. One child said her mother was a welfare worker and another said his mother was a cook at a drive-in restaurant. However, almost all of them said that their mothers, and most of their fathers, did bead work on leather articles for sale. Apparently, from information gathered from the children and from personal observation, this is a full-time occupation which leaves little time or energy for other pursuits.

The children were asked whether they preferred an indoor or outdoor leisure time activity. Two-thirds of them, girls as well as boys, preferred outdoor activity, both in winter and in summer. Twenty-seven little girls listed an indoor preference. Only seven stated that they preferred to watch television. This is partly because television is not available at the isolated reserves but for the children on the Poplar Point and Mission reserves where it is available, they seemed to indicate a desire to do something themselves rather than to watch someone else do something.

For their favourite school subject 19 children listed mathematics, 16 art, 9 play, 7 English, 5 music, 5 history, 5 science, 5 geography, 3 reading, 3 shops, 2 homemaking, 2 typing, 1 physical education, 1 spelling and 1 printing. Sixteen declared they did not know.

Thirty-four children said they had not yet made a choice of occupation for the future but of those who had 14 hoped to become nurses, 8 teachers, 4 secretaries, 4 policemen, 4 hockey players, 3 railroad engineers, 3 nuns, 2 mechanics, 2 bush pilots, and one each

for wood cutter, fireman, writer, composer, doctor, veterinarian, Lands and Forests, carpenter, and Indian Affairs worker. Asked if they had hopes of achieving these occupations, two gave frankly negative answers, 54 had serious doubts, 20 said they hoped so and 14 were quite sure they would achieve their goals.

The picture emerging from information gathered on the questionnaire is of a large family, the father engaged in outdoor activity and often away from home and the mother concentrating on earning money through a limited type of craftwork. Many of the children prefer an outdoor activity and the stories told by a number of them suggests that this is an organized type of activity which furthers the traditional way of life of the tribe. The girls gather berries, carry water from lakes or streams, or fish. The boys are taken, two or three at a time, and taught the way of the bush and the signs of nature by the father or an uncle. They are taught the mechanics of guns but are not allowed to shoot until they are about 12 years old, and only two are allowed to go with other adult males on a hunting party.

The future of the Indian people coloured the choice of a life goal for many of these young people. Almost all of them spoke about wanting to work with their people. Few of them stated a goal which would primarily benefit them as individuals. The fact that over half the children had serious doubts about achieving their goals may be supportive of Sydiaha and Rempel's finding that they realize the barriers which they will have to surmount and doubt that they can overcome them. On the other hand, they may simply be expressing an uncertainty about the future which all people share.

DISCUSSION

The data collected for this study results in information which may usefully be applied to individual Indian children tested in schools of Northwestern Ontario. It can be expected that there will be a sizeable discrepancy between Verbal and Performance I.Q. scores at all age levels. Both scores will have to be considered separately when an Indian child is discussed, since to note only the Full Scale score would give a very erroneous impression of the child's ability. If only the Full Scale score is examined it will show that an average 6-7 year old child has an I.Q. in the Mentally Deficient range, whereas the mean Performance Scale score at this age is 101, which is in the Normal range. As he grows older and becomes more acculturated, this difference will decrease, but the advantage will remain with the Performance score.

The finding of a discrepancy between these two types of scores agrees with the findings of other investigators for the last 25 years. All have agreed that a child of a different culture will score better on a Performance test than on a Verbal test.

Although the sample size is relatively small, the information contained in Table 16, page 42, may be used as an estimate of what may be expected from other Northwestern Ontario Indian children who are given the WISC. Table 4, page 34, has been interpolated and may be used as a comparison of Indian scores with scores received by the normative population. It is believed that the sample studied was representative of the school population of Indians of Northwestern Ontario,

as, in the case of the 6 and 7 year olds and the 9 and 10 year olds, all children of the required age registered in schools in the designated areas, were tested. For the older children, all those who were sent by the Department of Indian Affairs to Thunder Bay were tested. (See also pages 16, 23 and 27)

This study, along with Carney and Trowbridge's study in 1962 and Lombardi's (1970) study, found that as the child remains in school longer his Verbal Scale score rises. In contrast, MacArthur (1967) noted a decline in verbal-educational abilities by native pupils in adolescence. Vernon (1965) says that "in some North American Indian tribes and other cultures children show a fairly normal intellectual development until adolescence, but then, when they realize the depressed state of their minority culture, the absence of opportunity for progress and advancement, apathy sets in." Sydiaha and Rempel (1964) were aware, also, of this decline in adolescence, but studied the problem from responses to the Thematic Apperception Test. They declare that Metis and Indian children are more aware of their poverty than non-Indian children but do not display any particular pattern of conflict. Ethnicity does not appear to relate to any special problem to work or attitude toward society. It is only when the Indian youth realizes the barriers he has to surmount in order to use the knowledge which he has gained in school that he becomes discouraged. Gold, from her study in 1967 of Indians in Saskatchewan, would agree with Sydiaha and Rempel's findings. She says there is no difference in motivation or levels of aspiration between Indians and whites as such, but claims

that any observed differences are due to the degree of urbanization rather than ethnic or cultural variations. Reboussin and Goldstein (1966) found this same effect among the Navajo children.

The government regulation that 16 is the legal school-leaving age was probably instrumental in obtaining for this study what may have been a biased sample of students in the 16-20 year age range. If, in fact, only the brighter students elected to continue their secondary education the rise in I.Q. at this age level would be explained and the disagreement of this study with those of MacArthur et al, would be dissipated. Another, more nebulous, point of discussion might be the time factor. It is only within the last two or three years that there has been a tremendous upsurge in Indian consciousness and a desire to fight for the rights and privileges of Northwestern Ontario Indians, and this may have caused a lessening in the amount of apathy of which MacArthur and others have spoken.

This study found that at the 9-10 year level both the Verbal and Performance Scales are significantly correlated with end-of-the-year marks for academic and non-academic subjects. However, failure to find a significant correlation between I.Q. score or school mark at the 6-7 year age level is thought to be because of the terrific upheaval in adjustment which these children must make on beginning school, or again at 14-15 when they are brought off the reserves. At this upper age the Performance score correlates ($p<.01$) with non-academic marks but neither I.Q. scale score correlates with academic marks.

The Soviet technique for overcoming the handicap of culture

shock is reported by Hendry (1969) and Mowat (1970). Children of the native peoples of Siberia are started in school in their native tongue, later taught the language of the country as a school subject and after the sixth year, the language of the country is used as the language of instruction. This same method has been found successful with the Eskimos in the Danish held territory of Greenland, with the Hiligaynon and T'bolis tribes of the Philippines (MacLeish, 1971), some groups in Mexico, the Eskimos of northern Quebec and some Navajos in the United States, (Hendry, 1969). Hendry states that "numerous psychological studies indicate undeniably that if a child does not master one language, that is to say his mother tongue, at a certain stage of his/her growth, and master it fully, permanent damage results in subsequent intellectual development."

If children of Northwestern Ontario could start school using their native language and preferrably under native teachers the strain of having to adjust to Western type civilization would be greatly alleviated. The adjustment necessary is greater by far than that experienced by a child of a Central European background, for example, and having to learn a second language.

Significant correlations between WISC scores and O.S.R. marks might have been found for other age groups in which the effect of culture shock was not so pronounced.

Since all subtests of the Performance Scale are virtually the same as those of the standardization population it is possible to say that the Indian children of Northwestern Ontario are on a par with

their white contemporaries in this area. This scale, however, is not culturally unbiased. Several items on the Picture Completion and the Picture Arrangement subtests of both the WISC and WAIS are culturally oriented and hence scores for these subtests were depressed. This same culturally slanted depression was found by Ferron (1965), Hewitt and Massey (1969), and Hicks (1949). Despite this depression, however, the Performance Scale was found to correlate significantly at the 9 and 10 year level with both academic and non-academic marks and with non-academic marks at ages 14 and 15, whereas the Verbal Scale was only found to correlate significantly with the academic marks at the 9 and 10 year old level. (See Tables 8 and 9, page 36).

The comparison of subtest means with the means of the standardising population leads to some interesting speculation. At all age levels Information seems to be one of the lowest scores. This gives rise to the question of the quality of education in schools on reserves (Renaud, 1958) as well as pointing to the lack of a stimulating, academically oriented home background. One can expect that Comprehension, Similarities and Vocabulary will be low because of a lack of facility with the English language and because of cultural background. Arithmetic, while far below the level achieved by the standardization population, is generally the highest subtest of the Verbal Scale. Wechsler maintains this indicates mental alertness and measures the ability to concentrate and select previously acquired skills. In the case of these children it is believed that they pos-

sibly get more practise in school in arithmetic because it is a subject which lends itself quite readily to teaching via concrete material.

On the Performance Scale Block Design runs near the top of all age levels. This is thought to be because the children take an active part in the traditional crafts and bead-work designs of the tribe which are somewhat similar to the block designs.

On the Coding and Digit Symbols subtests the mean score was above the published mean only at the upper age levels. Since the majority of the younger age children failed to complete this task within the allotted two minutes, it is thought that the time factor was of primary importance. The lives of these children are not dictated by the clock as are the lives of children of North American society in general. After they have been in school a number of years they respond to time, but if, after schooling they go back to the reserves, they return to a life dictated by the sun and their own bodily needs.

Picture Completion, despite the culturally oriented items, had virtually the same mean score as did the standardization population. It is interesting to note that many of the children at all ages were able to tell that the man in item #15 was missing an eyebrow, whereas most children of a white culture find this one of the most difficult items of the subtest. (See Figure 3, page 45).

Each age group yielded a highly significant ($p<.01$) difference between Verbal, Performance and Full Scale I.Q. scores. For

the subjects in this sample, the language used was significantly important at the 6-7, and 14-15 year age levels. This leads one to wonder why non-significance was found for this factor at age 9-10. It may have been because children of this age had been in a relatively stable environment, both at home and at school, for a number of years and hence were not as vulnerable to culture shock as the little ones who were just beginning school, or the older ones who were encountering urban civilization for the first time. On the other hand, it may have been because more of the 9 and 10 year olds habitually spoke English than did the proportion of children of either of the other two age groups.

A non-significant interaction between language spoken and I.Q. scores was found at all age levels. It appears that as the knowledge and familiarity with the English language increases so does the I.Q. score. An analysis of variance also shows that the I.Q. increases with age, but as the youngster becomes older he is exposed to more English and age may therefore be coincidental.

A multiple comparison between age, language and mean I.Q. scores that neither language nor age effect the Performance scale but on the Verbal Scale score the use of English is of benefit to the 6-7 and 14-15 year olds. A mixture of the two languages seems to be more beneficial to the 9-10 year age group. Mixed languages are a draw-back to the 14-15 year olds, however, and in all age groups the use of Indian at home is a detriment. (See Figures 4 and 5, pages 48 and 49)

SUMMARY

This study of the Indian children of Northwestern Ontario leads one to the conclusion that these children may be given a WISC with the following expected results: there will be a large discrepancy between the Verbal and Performance scores with the advantage in favour of the Performance Scale; the discrepancy will diminish as the child continues in school; the Performance Scale I.Q. will be in the Normal range of intelligence as compared to the normative population; the Verbal Scale I.Q. will probably be in the Mentally Deficient or Dull-Normal bracket; the high score of the Verbal Scale will be on the Arithmetic subtest while on the Performance Scale high scores will be on the Block Design, Picture Completion and Coding subtests; familiarity with the English language will affect the scores but the tests are valid indices of their standing in relation to the normative population.

Study of the data leads to the hypothesis that these children suffer cultural shock when they first enter school, and again when they are brought from their homes on the reserves to urban centres for secondary education.

Data from a questionnaire makes one realize the vital concern which these children have for the future of their people and the rather bleak outcome to which they look forward.

FUTURE RESEARCH SUGGESTIONS

Future research in this area of study might well concentrate on the effect that exposure to urbanization has on I.Q. scores. It would be interesting to know if children from a reserve close to a city suffered the same degree of culture shock, both at beginning school and at beginning high school, as the children from remote northern reserves. Ideally, of course, one should study the effect of introducing school in an Indian language, but the lack of qualified teachers who speak Cree or Ojibwa is a limiting factor at present. Hopefully, this may soon be a possibility.

This study would have been improved by studying an equal number of children from a reserve close to urban civilization, such as the Mission reserve, one far removed from any city, such as Sandy Lake, and one at a middle distance, such as Poplar Point. It would have been interesting then to observe the variations between each age group at the three places and the effect the degree of urbanization had, not only on WISC scores, but also on O.S.R. card marks and future aspirations. As well, it might be interesting to find out if there were significant correlations between WISC scores and O.S.R. card marks at other ages. Unfortunately there were not enough Ss available at these centres to permit the proposed analysis by groups.

Also, it would be interesting to know whether the exposure to English was alone responsible for the apparent rise in I.Q. with age or whether age was a necessary concommitant factor. It would then be imperative to compare Indian children who spoke only English with those who spoke an Indian language as well.

Another factor which might well be investigated is the size of the family. Children of small families might receive different I.Q. scores from those of large families.

As well, it is suspected that the parental attitude toward academic work and their aspirations, not only for their child's future but the future of their tribe, may affect the child's I.Q. score.

Table 1. Differences Between Mean Verbal and Performance Scale I.Q. Scores of Indian Students.

Age	Sample	$\bar{X}_{VS}$	SD	$\bar{X}_{PS}$	SD	DF	t	Sig.	Difference
6-7	33	69.70	13.00	101.30	10.89	64	-10.706	.005	31.60
9-10	31	81.00	13.83	99.81	14.43	60	- 5.237	.005	18.81
14-15	36	77.89	12.80	100.69	13.89	70	- 7.244	.005	22.80
16-17	40	84.23	9.74	99.58	10.18	78	- 6.887	.005	15.35
18-20	20	91.10	12.62	103.40	10.87	38	- 3.303	.005	12.30

Table 2. WISC Subtest Means and Standard Deviations.

	Indian Students			Wechsler Standardization			
Subtest	Age	$\bar{X}$	S.D.	Age	$\bar{X}$	S.D.	Difference Between $\bar{X}$s
Information	6-7	4.79	2.48	7½	10.0	2.9	5.21
Comprehension		5.09	2.34		10.0	2.8	4.91
Arithmetic		6.58	1.98		10.1	2.7	3.52
Similarities		4.42	2.14		9.9	2.8	5.48
Vocabulary		4.55	3.17		10.1	2.6	5.55
Picture Completion		10.82	3.64		10.0	2.8	.22
Picture Arrangement		8.45	1.92		10.1	2.9	1.65
Block Design		10.79	2.60		10.1	2.8	.89
Object Assembly		10.88	2.03		9.9	3.0	.98
Coding A		10.06	3.72		10.1	3.1	.04

Subtest	Age	$\bar{X}$	S.D.	Age	$\bar{X}$	S.D.	Difference Between $\bar{X}$s
Information	9-10	6.39	2.23	10½	9.9	2.9	3.51
Comprehension		6.55	2.53		10.1	3.1	3.55
Arithmetic		7.74	3.17		10.2	3.1	2.46
Similarities		7.32	3.51		10.0	3.0	2.68
Vocabulary		7.10	2.34		10.1	3.1	3.00
Picture Completion		10.03	2.54		10.0	3.0	.07
Picture Arrangement		9.29	3.35		9.9	3.1	.61
Block Design		10.32	2.51		10.1	3.0	.22
Object Assembly		10.48	2.32		10.0	2.9	.48
Coding B		9.84	2.67		10.0	3.1	.16

Subtest	Age	$\bar{X}$	S.D.	Age	$\bar{X}$	S.D.	Difference Between $\bar{X}$s
Information	14-15	6.31	2.19	13½	9.9	3.0	3.58
Comprehension		5.14	2.60		10.2	3.2	5.06
Arithmetic		7.22	2.80		10.0	2.8	2.78
Similarities		7.31	2.83		10.0	2.9	2.69
Vocabulary		6.47	3.06		10.0	3.2	3.53
Picture Completion		9.17	3.21		10.1	2.9	.93
Picture Arrangement		9.78	2.90		10.0	3.1	.22
Block Design		10.36	2.81		9.8	3.1	.56
Object Assembly		9.89	4.17		10.0	3.0	.11
Coding B		10.97	2.29		9.9	3.1	1.07

Table 3. WAIS Subtest Means and Standardization Means

	Indian Students			Wechsler Standardization			
Subtest	Age	$\bar{X}$	S.D.	Age	$\bar{X}$	S.D.	Difference Between $\bar{X}$s
Information	16-17	6.25	2.39	18-19	9.7	2.9	3.45
Comprehension		6.48	2.63		9.7	3.0	3.22
Arithmetic		7.13	1.85		9.5	3.0	2.37
Similarities		6.33	2.84		9.5	3.1	3.17
Digit Span		7.15	2.30		9.7	3.0	2.55
Vocabulary		5.10	2.09		9.3	2.8	4.20
Digit Symbol		10.17	2.36		9.8	3.0	.37
Picture Completion		9.08	1.75		9.7	2.8	.62
Block Design		11.08	2.77		9.8	3.1	1.28
Picture Arrangement		8.45	2.55		10.1	2.9	1.65
Object Assembly		9.95	2.49		10.0	2.8	.05

Subtest	Age	$\bar{X}$	S.D.	Age	$\bar{X}$	S.D.	Difference Between $\bar{X}$s
Information	18-20	7.85	3.25	18-19	9.7	2.9	1.85
Comprehension		8.10	2.75		9.7	3.0	1.60
Arithmetic		8.10	2.40		9.5	3.0	1.40
Similarities		8.15	3.00		9.5	3.1	1.35
Digit Span		8.90	2.57		9.7	3.0	.80
Vocabulary		7.25	3.29		9.3	2.8	2.05
Digit Symbol		10.05	2.56		9.8	3.0	.25
Picture Completion		10.55	2.04		9.7	2.8	.85
Block Design		12.10	2.57		9.8	3.1	2.30
Picture Arrangement		9.35	2.08		10.1	2.9	.75
Object Assembly		10.30	3.05		10.0	2.8	.30

Table 4. Comparative I.Q. Norms.

Age 6-7						Age 9-10						Age 14-15					
Verbal Scale		Performance Scale		Full Scale		Verbal Scale		Performance Scale		Full Scale		Verbal Scale		Performance Scale		Full Scale	
Ind.	Wh.	Ind.	Wh.	Ind.	Wh.	Ind.	Wh.	Ind.	Wh.	Ind.	Wh.	Ind.	Wh.	Ind.	Wh.	Ind.	Wh.
						67	85	86	85					87	85		
56	85					68	86	87	86	76	85	65	85	88	86	75	85
57	86					69	87	88	87	77	86	66	86	89	87	76	86
58	87	90	85	72	85	70	88	89	88	78	87	67	87	90	88	77	87
59	88	91	87	73	87	71	90	90	89	79	88	68	88	91	89	78	88
60	90	92	88	74	88	72	91	91	90	80	90	69	90	92	90	79	90
61	91	93	89	75	89	73	92	92	91	81	91	70	91	93	91	80	91
62	92	94	90	76	90	74	93	93	92	82	92	71	92	94	92	81	92
63	93	95	92	77	92	75	94	94	94	83	93	72	93	95	94	82	93
64	94	96	93	78	93	76	95	95	95	84	94	73	94	96	95	83	94
65	95	97	94	79	94	77	96	96	96	85	95	74	95	97	96	84	95
66	97	98	96	80	96	78	97	97	97	86	97	75	97	98	97	85	97
67	98	99	97	81	97	79	98	98	98	87	98	76	98	99	98	86	98
68	99	100	98	82	98	80	99	99	99	88	99	77	99	100	99	87	99
69	100	101	100	83	100	81	100	100	100	89	100	78	100	101	100	88	100
70	101	102	101	84	101	82	101	101	101	90	101	79	101	102	101	89	101
71	102	103	103	85	103	83	102	102	102	91	102	80	102	103	102	90	102
72	103	104	104	86	104	84	103	103	103	92	103	81	103	104	103	91	103
73	105	105	106	87	106	85	104	104	104	93	105	82	105	105	104	92	105
74	106	106	108	88	108	86	105	105	105	94	106	83	106	106	105	93	106
75	107	107	109	89	109	87	106	106	106	95	107	84	107	107	106	94	107
76	108	108	111	90	111	88	107	107	107	96	108	85	108	108	107	95	108
77	109	109	112	91	112	89	108	108	109	97	109	86	109	109	109	96	109
78	110	110	113	92	113	90	109	109	110	98	110	87	110	110	110	97	110
79	112	111	114	93	114	91	110	110	111	99	112	88	112	111	111	98	112
80	113	112	115	94	115	92	112	111	112	100	113	89	113	112	112	99	113
81	114					93	113	112	113	101	114	90	114	113	113	100	114
82	115					94	114	113	114	102	115	91	115	114	114	101	115
						95	115	114	115					115	115		

Ind. = Indian
Wh. = White Standardization

Table 5. Mean Scores for Picture Completion Subtest.

Age	$\bar{X}$ Score	S.D.	Max.	Min.	Standardization $\bar{X}$ Score	Standardization S.D.	Difference Between $\bar{X}$s
6-7	10.82	3.64	17.0	1.0	10.0	2.8	- .82
9-10	10.03	2.53	15.0	5.0	10.0	3.0	- .50
14-15	9.17	3.21	16.0	4.0	10.1	2.9	- .93
16-17	9.08	1.75	14.0	4.0	9.7	2.8	+ .01
18-20	10.55	2.04	15.0	7.0	9.7	2.8	+ .85

Table 6. Mean Scores for Block Design Subtest.

Age	$\bar{X}$ Score	S.D.	Max.	Min.	Standardization $\bar{X}$ Score	Standardization S.D.	Difference Between $\bar{X}$s
6-7	10.79	2.60	17.0	4.0	10.1	2.8	+ .78
9-10	10.32	2.50	16.0	6.0	10.1	3.0	+ .22
14-15	10.36	2.81	15.0	2.0	9.8	3.1	+ .56
16-17	11.08	2.76	16.0	4.0	9.8	3.1	+1.28
18-20	12.10	2.57	17.0	8.0	9.8	3.1	+2.30

Table 7. Mean Scores for Coding and Digit Symbols Subtests.

Age	$\bar{X}$ Score	S.D.	Max.	Min.	Standardization $\bar{X}$ Score	Standardization S.D.	Difference Between $\bar{X}$s
6-7	10.06	3.72	17.0	1.0	10.1	3.1	- .04
9-10	9.84	2.67	15.0	3.0	10.0	3.1	- .16
14-15	10.97	2.29	17.0	7.0	9.9	3.1	+1.07
16-17	10.17	2.36	18.0	6.0	9.8	3.0	+ .37
18-20	10.05	2.56	15.0	6.0	9.8	3.0	+ .25

Table 8. Correlation of Verbal Scale Deviation I.Q. with Average of Marks in Academic and Non-Academic Subjects.

Ages	Academic	Significance	Non-Academic	Significance
6-7	.1395	ns	-.0642	ns
9-10	.5417	.005	.1720	ns
14-15	.1918	ns	.0920	ns

Table 9. Correlation of Performance Scale Deviation I.Q. With Average of Marks in Academic and Non-Academic Subjects.

Ages	Academic	Significance	Non-Academic	Significance
6-7	.0205	ns	-.1797	ns
9-10	.6686	.005	.3435	.05
14-15	.2560	ns	.3211	.05

Table 10. Summary of Analysis of Variance Between Age and I.Q. Scores.

Source	ss	df	ms	f	p
Age groups	3734.2	4	933.33	6.191	.01
I.Q. scores	3081.5	1	308.42	204.220	.01
Interaction	3387.6	4	843.79	5.600	.01
Error	4673.5	310	1.50		

Table 11. Comparison Between Verbal Scale I.Q. Means and Age Groups (Neuman-Keuls)

Age Groups		1	3	2	4	5
	Means	69.70	77.90	81.00	84.23	91.10
1	69.70	-	8.19*	11.30**	14.53**	21.40**
3	77.90		-	3.11	6.34	13.21**
2	81.00			-	3.23	10.10*
4	84.23				-	6.88
5	91.10					-

Age Group 1 = 6 & 7 year olds
2 = 9 & 10 year olds
3 = 14 & 15 year olds
4 = 16 & 17 year olds
5 = 18 & 20 year olds

* <.05
** <.01

Table 12. Comparison Between Performance Scale I.Q. Means and Age Groups (Neuman-Keuls)

Age Groups		4	2	3	1	5
	Means	99.58	99.81	100.69	101.30	103.40
4	99.58	-	0.23	1.12	1.73	3.81
2	99.81		-	0.89	1.50	3.60
3	100.69			-	0.61	2.71
1	101.30				-	2.10
5	103.40					-

Age Group 1 = 6 & 7 year olds
2 = 9 & 10 year olds
3 = 14 & 15 year olds
4 = 16 & 17 year olds
5 = 18 & 20 year olds

* <.05
** <.01

Table 13. Summary of Analysis of Variance Between Language and I.Q. Scores

Age 6-7

Source	ss	df	ms	f	p
I.Q. scores	1359.91	2	679.953	60.534	.01
Language	2837.06	2	141.853	12.629	.01
Interaction	6843.75	4	171.094	0.152	ns
Error	1010.93	90	11.232		

Age 9-10

Source	ss	df	ms	f	p
I.Q. scores	4760.19	2	238.009	12.030	.01
Language	3876.25	2	193.813	0.980	ns
Interaction	3475.00	4	868.750	0.439	ns
Error	1661.82	84	19.783		

Age 14-15

Source	ss	df	ms	f	p
I.Q. scores	5215.44	2	260.772	16.837	.01
Language	2008.81	2	100.441	6.485	.01
Interaction	7486.88	4	187.172	1.209	ns
Error	1533.32	99	15.487		

Table 14. Multiple Comparison Between Language, Age and Verbal I.Q. Means (Neuman-Keuls)

Age and Language		C2	A1	A2	C1	B1	A3	B3	C3	B2
	Means	66.33	63.56	74.18	75.14	75.40	77.83	82.07	86.33	86.86
C2	63.33	-	0.22	10.84	11.81	12.07	14.50	18.74*	23.00**	23.52**
A1	63.56		-	10.62	11.58	11.84	14.27	18.51*	22.77**	23.30**
A2	74.18			-	0.96	1.22	3.65	7.89	12.15	12.68
C1	75.14				-	0.28	2.69	6.93	11.19	11.71
B1	75.40					-	2.43	6.67	10.93	11.48
A3	77.83						-	4.24	8.50	9.02
B3	82.07							-	4.26	4.79
C3	86.33								-	0.52
B2	86.86									-

a Age Groups A = 6 & 7 year olds
B = 9 & 10 year olds
C = 14 & 15 year olds

b Language Groups 1 = Indian
2 = Mixture
3 = English

* $p<.05$
** $p<.01$

Table 15. Multiple Comparison Between Language, Age and Performance I.Q. Means (Neuman-Keuls)

Age and Language		C2	A1	B2	B1	C3	B3	C1	A2	A3
	Means	91.67	97.00	98.00	100.00	100.08	100.29	102.33	104.55	106.83
C2	91.67	-	5.33	6.91	8.33	8.42	8.62	10.67	12.88*	15.17**
A1	97.00		-	1.57	3.00	3.08	3.29	5.33	7.55	9.83
B2	98.00			-	1.43	1.51	1.71	3.76	5.97	8.26
B1	100.00				-	0.08	0.29	2.33	4.55	6.83
C3	100.08					-	0.20	2.25	4.62	6.75
B3	100.29						-	2.05	4.26	6.55
C1	102.33							-	2.21	4.50
A2	104.55								-	2.29
A3	106.83									-

a Age groups A = 6 & 7 year olds
B = 9 & 10 year olds
C = 14 & 15 year olds

b Language groups 1 = Indian
2 = Mixture
3 = English

* $p<.05$
** $p<.01$

Table 16. Mean WISC Scaled Scores and Standard Deviations of Northwestern Ontario Indians.

	Age 6-7	S.D.	Age 9-10	S.D.	Age 14-15	S.D.
Verbal Scale	69.70	13.00	81.00	13.83	77.89	12.80
Performance Scale	101.30	10.89	99.81	14.43	100.69	13.89
Full Scale	82.64	10.91	89.16	13.37	87.75	12.65
Information	4.79	2.48	6.39	2.23	6.31	2.19
Comprehension	5.09	2.34	6.55	2.53	5.14	2.60
Arithmetic	6.58	1.98	7.74	3.17	7.22	2.80
Similarities	4.42	2.14	7.32	3.51	7.31	2.83
Vocabulary	4.55	3.17	7.10	2.34	6.47	3.06
Picture Completion	10.82	3.64	10.03	2.54	9.17	3.21
Picture Arrangement	8.45	1.92	9.29	3.35	9.78	2.90
Block Design	10.79	2.60	10.32	2.51	10.36	2.81
Object Assembly	10.88	2.03	10.48	2.32	9.89	4.17
Coding	10.06	3.72	9.84	2.67	10.97	2.29

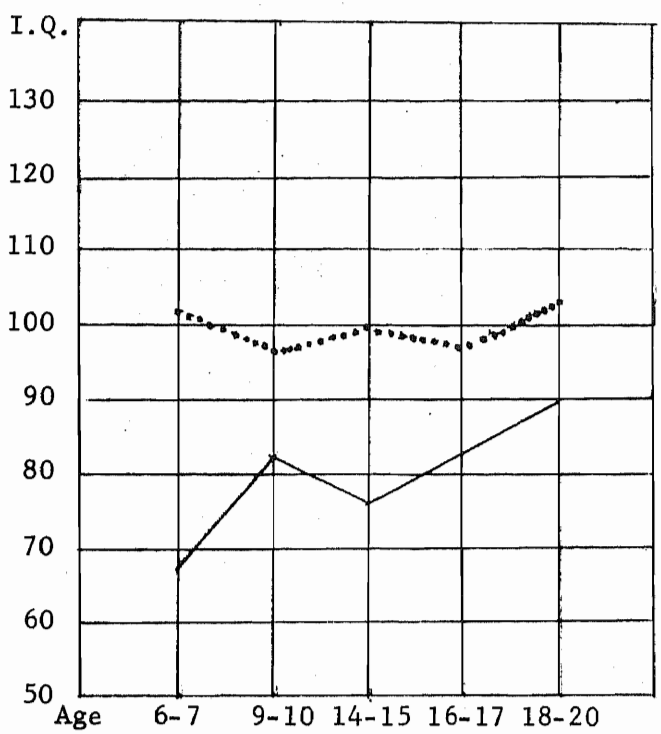


Figure 1. Relative Position of Verbal and Performance Mean Deviation I.Q. Scores at Different Age Levels

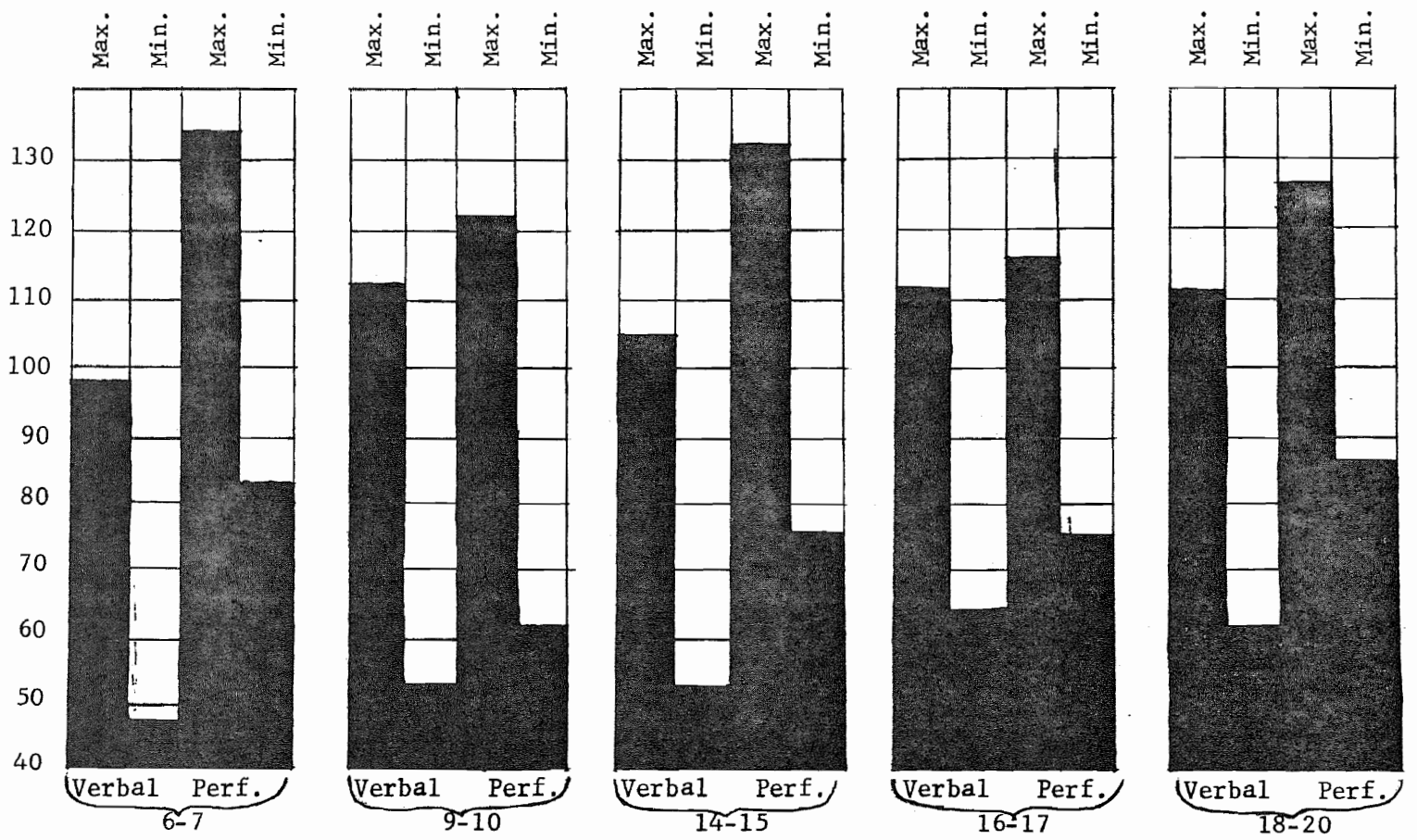


Figure 2. Maximum and Minimum Verbal and Performance Deviation I.Q. Scores at Different Age Levels

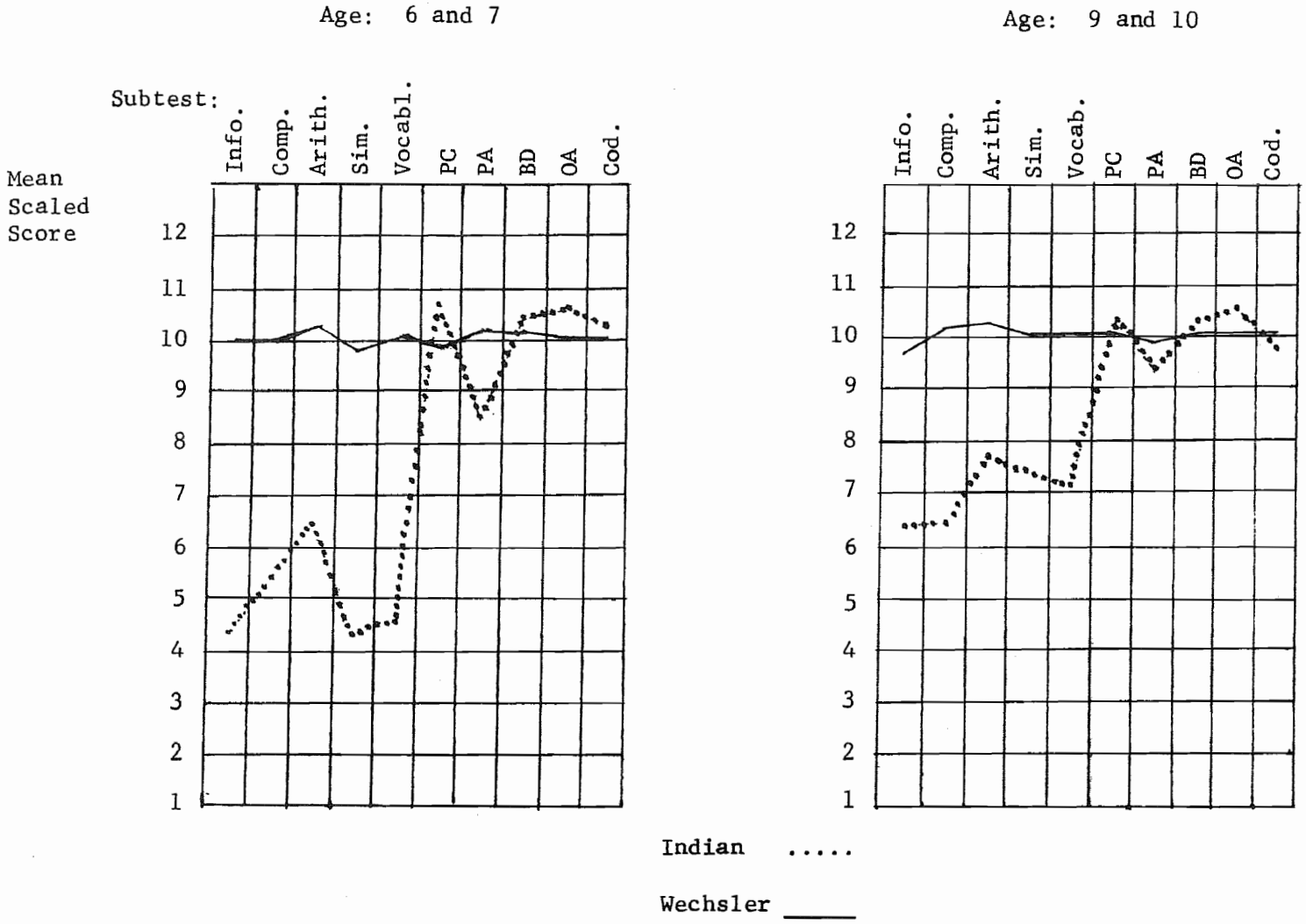
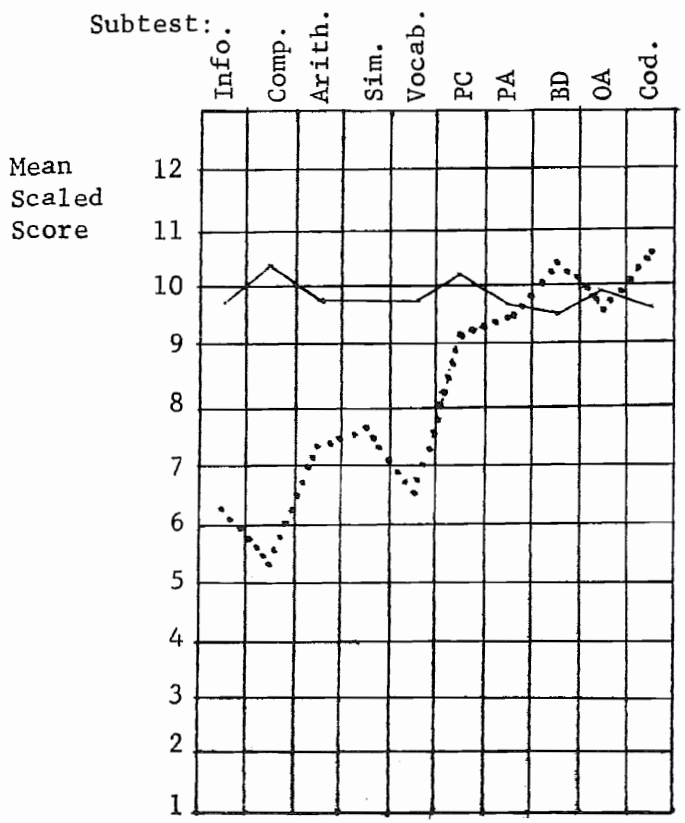
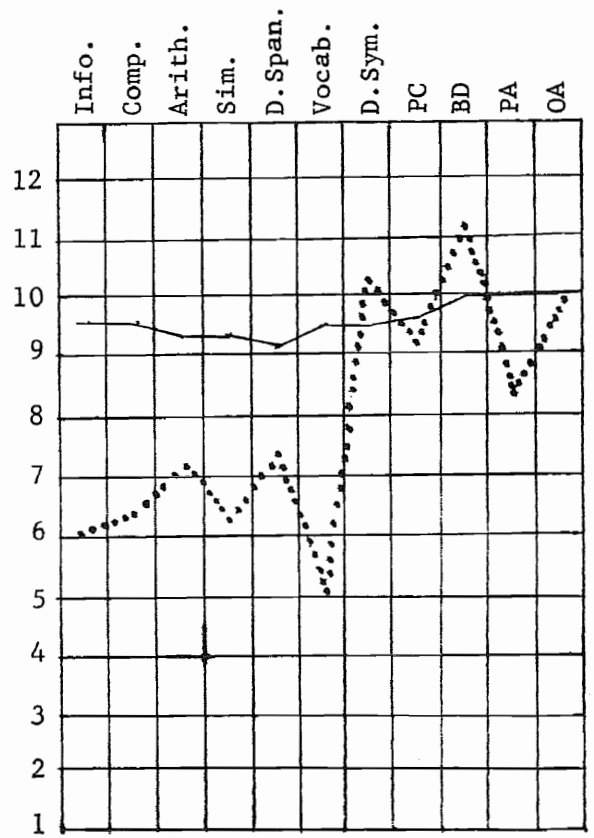


Figure 3. Comparison of Subtest Means with Standardization Subtest Means.

Age: 14 and 15



Age: 16 and 17



Indian .....

Wechsler _____

Figure 3 (continued)

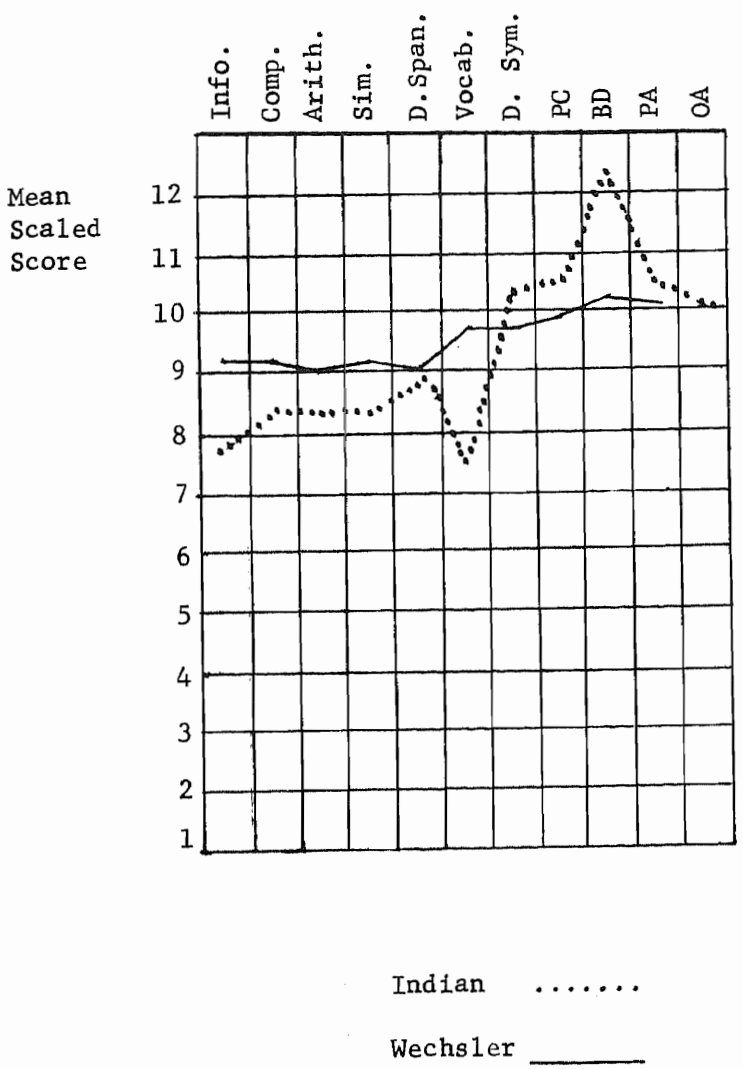


Figure 3 (continued)

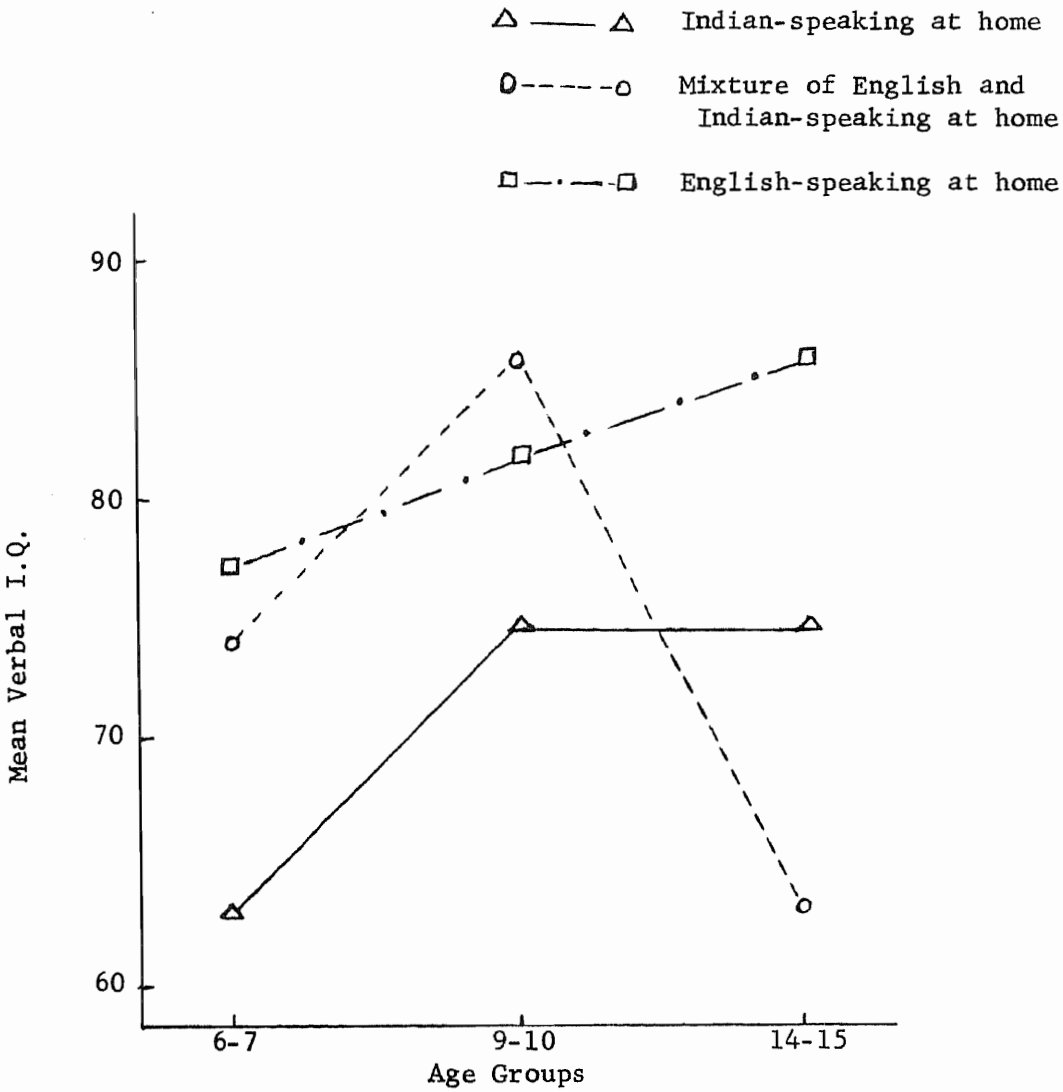


Figure 4. Relationship of Language, Age and Mean Verbal Scale I.Q. Scores

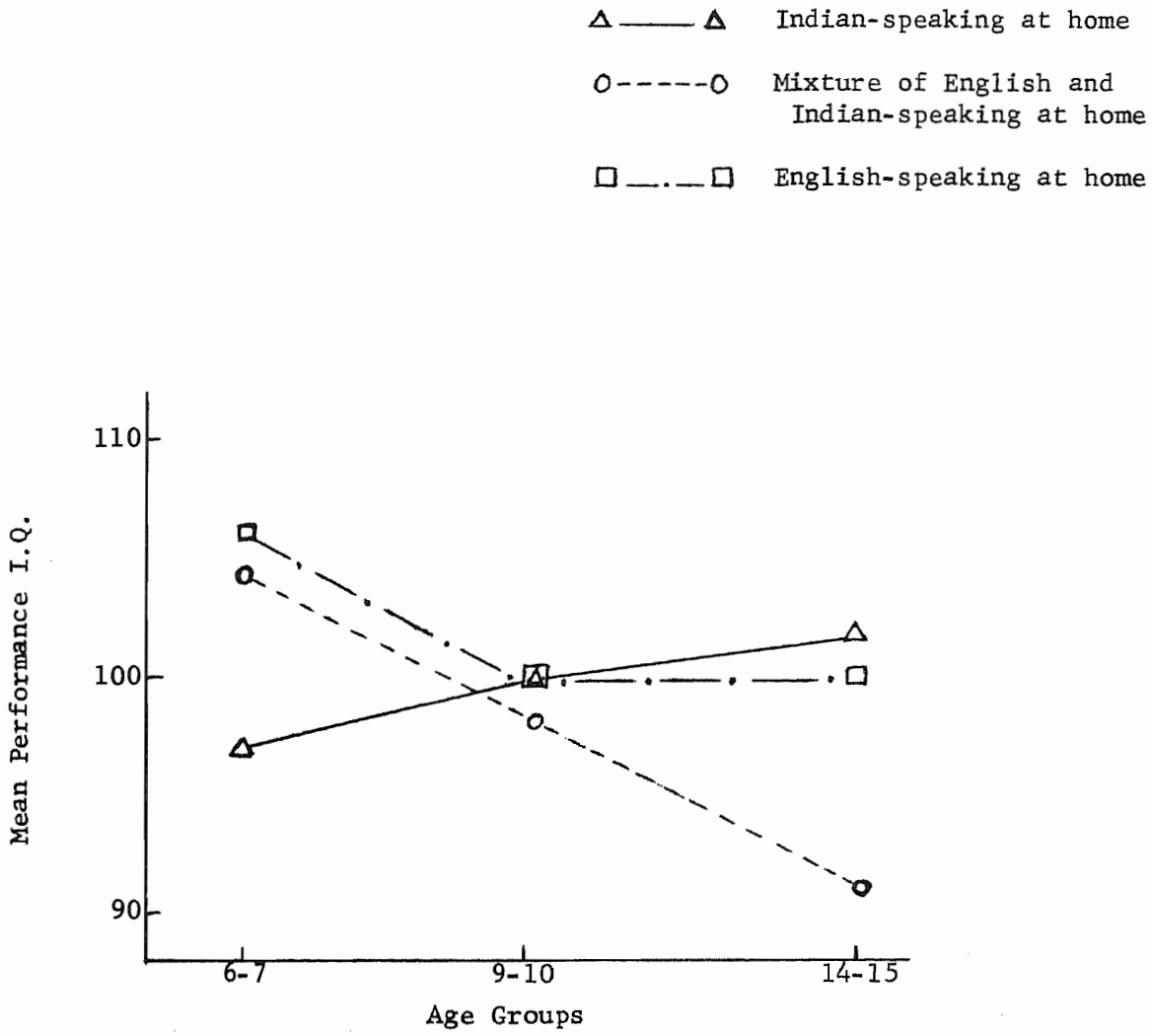
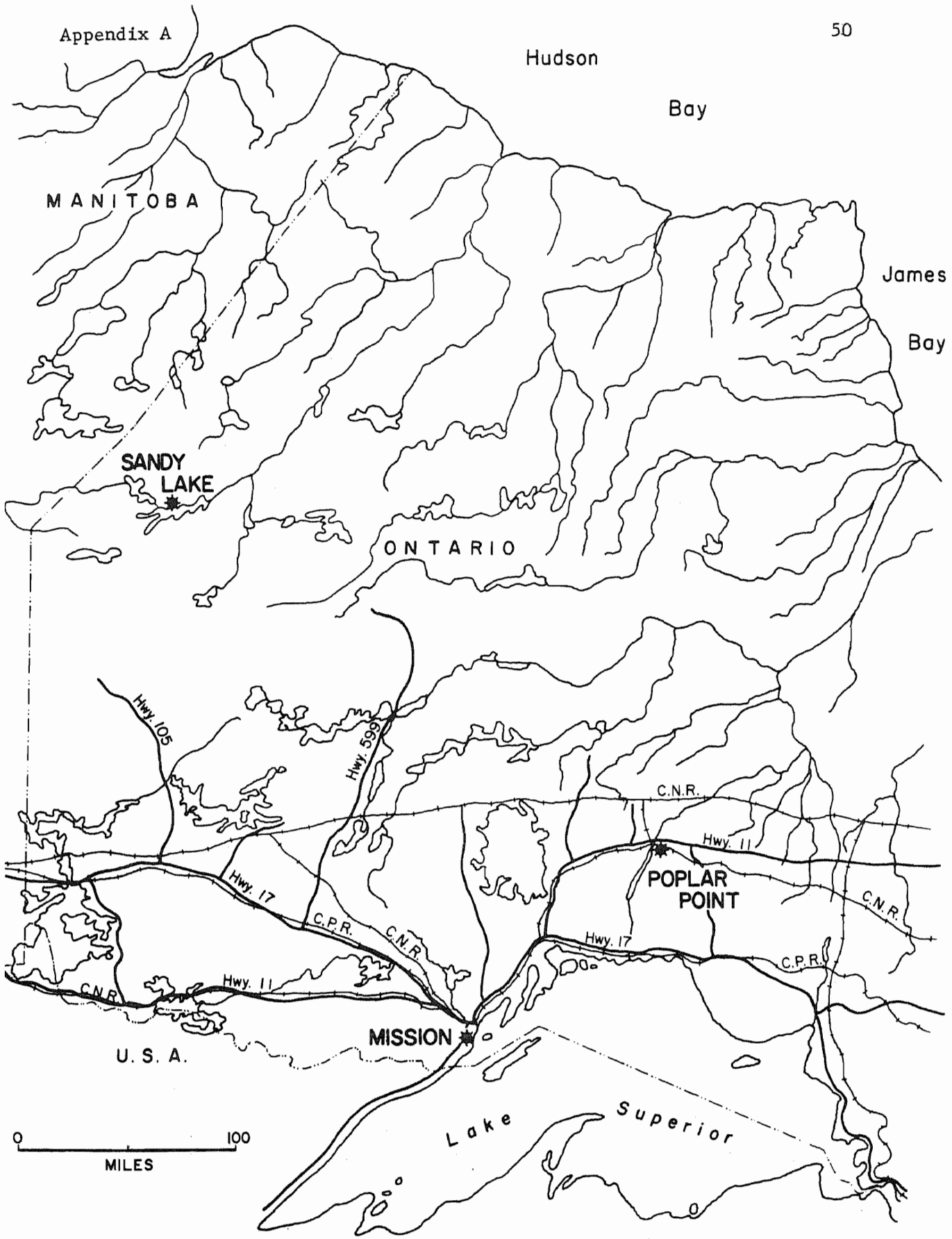


Figure 5. Relationship of Language, Age and Mean Performance Scale I.Q. Scores


Hudson
Bay
MANITOBA
James
Bay
SANDY
LAKE
ONTARIO
Hwy. 105
Hwy. 599
C.N.R.
Hwy. 11
POPLAR
POINT
Hwy. 17
C.P.R.
C.N.R.
C.N.R.
Hwy. 17
C.P.R.
Hwy. 11
C.N.R.
MISSION
U. S. A.
Lake
Superior
0
100
MILES

Appendix B

NAME: _____

AGE: _____ BIRTHDATE: _____

SCHOOL: _____ GRADE: _____

NUMBER OF YEARS IN SCHOOL: _____

Where are you living now: _____

If not at home, how long have you been away: _____

Do you like the home where you are now: _____

Why: _____

Why not: _____

How many are in the home: _____

How many share the same bedroom with you: _____

Do you have chores: _____

What are they: _____

Do you have a place to study: _____

Do you study at home: _____

What is your favourite subject at school: _____

What languages are spoken at home: _____

What work does your father do: _____

What work does your mother do: _____

How many brothers and sisters have you: _____

How many older than you: _____

How many younger than you: _____

What is your favourite activity during spare time: _____

What would you like to be when you grow up: _____

What do you think you will be when you grow up: _____

BIBLIOGRAPHY

Adler, Manfred. Reported incidences of giftedness among ethnic groups. Exceptional Children, 1967, 34, 101-105.

Bloom, B. L. Ecological factors in intelligence test performance. Social Processes, 1961-62, 25, 67-90.

Bloom, B. L. Ecological factors in the WAIS picture completion test. Journal of Consulting Psychology, 1959, 23, 375.

Bruininks, Robert H. Teaching word recognition to disadvantaged boys. Journal of Learning Disabilities, 1970, 3, 28-37.

Carney, R. E. & Trowbridge, M. Intelligence test performance of Indian children as a function of the type of test and age. Perceptual and Motor Skills, 1962, 14, 511-514.

Davis, Allison. Social Class Influence Upon Learning, New Haven, Connecticut: Harvard University Press, 1948.

Eells, Kenneth; Davis, Allison; Havighurst, Robert J.; Herrick, Virgil; & Tyler, Ralph W. Intelligence and Cultural Differences - A Study of Cultural Learning and Problem Solving. Chicago, Illinois: University of Chicago Press, 1951.

Evans, LaVon. A comparison of test scores for the 16-17 year age group of Navaho Indians with standardized norms for the Wechsler Adult Intelligence Scale. Unpublished Masters Thesis: Provost, Utah: Brigham Young University, 1957.

Ferron, Oscar. The test performance of "colored" children. Educational Research, 1965, 8, 42-57.

Gaddes, W. H.; MacKenzie, A. & Barnsley, Roger. Psychometric intelligence and spatial imagery in two northwest Indian and two white groups of children. Journal of Social Psychology, 1968, 75, 35-42.

Galvan, Robert B. Bilingualism as it relates to intelligence test scores and school achievement among culturally deprived Spanish-American children. Unpublished Ph.D. Thesis: Commerce, Texas: East Texas State University, 1967.

Gold, Dolores. Psychological changes associated with acculturation of Saskatchewan Indians. Journal of Social Psychology, 1967, 71, 177-184.

Hanna, Gerald S.; House, Betty, & Salisbury, Lee H. WAIS performance of Alaskan native university freshmen. Journal of Genetic Psychology, 1968, 112, 57-61.

Havighurst, Robert J.; Gunther, Muina K. &Pratt, Inez E. Environment and the Draw-A-Man test; The performance of Indian children. Journal of Abnormal and Social Psychology, 1946, 41, 50-63.

Havighurst, Robert J. & Hilkevitch, R. R. The intelligence of Indian children as measured by a performance test. Journal of Abnormal and Social Psychology, 1944, 39, 419-433.

Hendry, Charles H. Beyond Traplines. Toronto, Ontario: The Ryerson Press, 1969.

Hewitt, Patricia & Massey, James O. Clinical Clues from the Wechsler Intelligence Scale for Children. Palo Alto, California: Consulting Psychologists Press, 1969.

Hicks, Robert A. & Pellegrini, Robert J. The meaningfulness of Negro-White differences in intelligence test performances. Psychological Record, 1966, 9, 43-46.

Hopkins, K. D. & Michael, W. B. The diagnostic use of WISC subtest patterns. California Journal of Educational Research, 1961, 12, 116-117, 130.

Howell, R. J.; Evans, L. & Downing, L. N. A comparison of test scores for the 16-17 year age group of Navajo Indians with standardized norms for the Wechsler Adult Intelligence Scale, (Arizona and New Mexico). Journal of Social Psychology, 1958, 47, 355-359.

Knowles, Donald W. & Boersma, Frederick J. Optional shift performance of culturally different children to concrete and abstract stimuli. Alberta Journal of Educational Research, 1968, 14, 165-177.

Levinson, B. M. Traditional Jewish cultural values and performance on the Wechsler tests. Journal of Educational Psychology, 1959, 50, 177-181.

Levinson, B. M. A comparison of the performance of bilingual and monolingual native-born Jewish pre-school children of traditional parentage on four intelligence tests. Journal of Clinical Psychology, 1959, 15, 74-76.

Levinson, B. M. Cultural pressure and WAIS scatter in a traditional Jewish setting. Journal of Genetic Psychology, 1958, 93, 277-286.

Littell, W.M. The Wechsler Intelligence Scale for Children, a review of a decade. Psychological Bulletin, 1960, 57, 132-156.

Lombardi, Thomas P. The psycholinguistic abilities of Papago Indian school children. Exceptional Children, 1970, 36, 485-495.

Lowrey, Laura M. Differences in visual perception and auditory discrimination between American Indian and white kindergarten children. Journal of Learning Disabilities, 1970, 3, 359-363.

MacArthur, R. S. Assessing the Intellectual Ability of Indian and Metis Pupils at Fort Simpson, North West Territories, Ottawa, Ontario: Department of Northern Affairs and National Resources, 1962.

MacArthur, R. S. Longitudinal Prediction of School Achievement for Metis and Eskimo Pupils. Paper presented to the C.C.R.E. Conference on Educational Research, Winnipeg, Manitoba: 1967.

MacArthur, R. S. Differential Abilities of Eskimo Youth in Relation to those of their White Classmates. Paper presented to the annual meeting of the Canadian Psychological Association. Ottawa, Ontario: 1967.

MacArthur, R. S. Some cognitive abilities of Eskimo, White and Indian-Metis, age 9-12 years, Canadian Journal of Behavioral Sciences, 1969.

MacArthur, R. S. Some differential abilities of northern Canadian native youth. International Journal of Psychology, 1968, 3, 43-51.

MacArthur, R. S. Assessing intellectual potential of native Canadian pupils: a summary, Alberta Journal of Educational Research, 1968, 14, 115-122.

MacArthur, R. S. Educational Potential of Northern Canadian Native Pupils. Paper presented at the 19th Alaskan Science Conference, American Association for the Advancement of Science. Whitehorse, Yukon Territory: 1968.

MacLaish, Kenneth. Help for the Philippine tribes in trouble, National Geographic, 1971, 140, 220-255.

Moore, Andrew A. A summary of education in the MacKenzie district. Canadian Journal of Economics and Political Sciences, 1945, 11, 61-82.

Mowat, Farley. The Siberians. Toronto, Ontario: Atlantic Monthly Press, Little-Brown and Company, 1970.

O'Bryan, K. G.; MacArthur, R. S. Reversibility, Intelligence and Creativity in Nine-Year Old Boys. Paper presented at the 29th annual meeting of the Canadian Psychological Association, Calgary, Alberta: June 5, 1968.

Osborne, R. T.; Mille, Frank. Racial differences in environmental influences on numerical ability as determined by heritability estimates. Perceptual and Motor Skills, 1969, 28, 535-538.

Provins, K. A.; Bell, C. R.; Biershenval, S.; Adiseskiak, W. The cross-cultural measurement of perceptual and motor skills in relation to human adaptation. Human Biology, an International Record of Research, 1968, 40, 484-493.

Purdy, Joseph D. Associative learning rates of 2nd, 4th and 6th grade Indian and white children using a paired-associates learning task, Psychological Abstracts, 43, 1025.

Quereski, M. Y. The internal consistency of WISC scores for ages 5-16. Journal of Clinical Psychology, 1968, 24, 192-195.

Quereski, M. Y. Practise effects on the WISC subtest scores and I.Q. estimates. Journal of Clinical Psychology, 1968, 24, 79-85.

Renaud, Andre, O.M.I. Indian education today, Anthropologica, 1958, 6, 1-49.

Small, G. W. The usefulness of Canadian Army selection tests in a culturally restricted population, Canadian Psychologist, 1969, 10, 9-19.

Semler, Ira; Iscoe, Ira. Structure of intelligence in Negro and White children. Journal of Educational Psychology, 1966, 57, 326-336.

Sydiaha, D.; Remple, J. Motivational and attitudinal characteristics of Indian school children as measured by the Thematic Apperception Test. Canadian Psychologist, 1964, 5, 139-148.

Telford, C. W. Test performances of full and mixed-blood North Dakota Indians. Journal of Comparative Psychology, 1932, 14, 123-145.

Torrence, E. P. Testing the educational and psychological development of students from other cultures and subcultures. Review of Educational Research, 1968, 38, 71-76.

Vernon, P. E. Ability factors and environmental factors. American Psychologist, 1965, 20, 723-733.

Vernon, P. E. Environmental handicaps and intellectual development. British Journal of Educational Psychology, 1965, 35, 9-20.

Wechsler, David, Wechsler Intelligence Scale for Children. New York: The Psychological Corporation, 1961.

Wechsler, David. Wechsler Adult Intelligence Scale. New York: The Psychological Corporation, 1955.

Wesman, Alexander. Intelligent testing. American Psychologist. 1968, 23, 267-274.

MacArthur, R. S. Assessing intellectual potential of native Canadian pupils: a summary, Alberta Journal of Educational Research, 1968, 14, 115-122

MacArthur, R. S. Educational Potential of Northern Canadian Native Pupils. Paper presented at the 19th Alaskan Science Conference, American Association for the Advancement of Science. Whitehorse, Yukon Territory: 1968.

MacLeish, Kenneth. Help for the Philippine tribes in trouble, National Geographic, 1971, 140, 220-255.

Moore, Andrew A. A summary of education in the MacKenzie district. Canadian Journal of Economics and Political Sciences, 1945, 11, 61-82.

Mowat, Farley. The Siberians. Toronto, Ontario: Atlantic Monthly Press, Little-Brown and Company, 1970.

O'Bryan, K. G.; MacArthur, R. S. Reversibility, Intelligence and Creativity in Nine-Year Old Boys. Paper presented at the 29th annual meeting of the Canadian Psychological Association, Calgary, Alberta: June 5, 1968.

Osborne, R. T.; Mille, Frank. Racial differences in environmental influences on numerical ability as determined by heritability estimates. Perceptual and Motor Skills, 1969, 28, 535-538.

Provins, K.A.; Bell, C. R.; Biershenval, S.; Adiseskiak, W. The cross-cultural measurement of perceptual and motor skills in relation to human adaptation. Human Biology, an International Record of Research, 1968, 40, 484-493.

Purdy, Joseph D. Associative learning rates of 2nd, 4th and 6th grade Indian and white children using a paired-associates learning task, Psychological Abstracts, 43, 1025.

Quereski, M. Y. The internal consistency of WISC scores for ages 5-16. Journal of Clinical Psychology, 1968, 24, 192-195.

Quereski, M. Y. Practise effects on the WISC subtest scores and I.Q. estimates. Journal of Clinical Psychology, 1968, 24, 79-85.

Reboussin, Roland; Goldstein, Joel W. Achievement orientation in Navajo and white students. American Anthropologist, 1966, 68, 740-745.

Renaud, Andre, O.M.I. Indian education today, Anthropoligica, 1958, 6, 1-49.

Small, G. W. The usefulness of Canadian Army selection tests in a culturally restricted population, Canadian Psychologist, 1969, 10, 9-19.

Semler, Ira; Isco, Ira. Structure of intelligence in Negro and White children. Journal of Educational Psychology, 1966, 57, 326-336.

Sydiaha, D.; Rempel, J. Motivational and attitudinal characteristics of Indian school children as measured by the Thematic Apperception Test. Canadian Psychologist, 1964, 5, 139-148.

Telford, C. W. Test performances of full and mixed-blood North Dakota Indians. Journal of Comparative Psychology, 1932, 14, 123-145.

Torrence, E. P. Testing the educational and psychological development of students from other cultures and subcultures. Review of Educational Research, 1968, 38, 71-76.

Vernon, P. E. Ability factors and environmental factors. American Psychologist, 1965, 20, 723-733.

Vernon, P. E. Environmental handicaps and intellectual development. British Journal of Educational Psychology, 1965, 35, 9-20.

Wechsler, David. Wechsler Intelligence Scale for Children. New York: The Psychological Corporation, 1961.

Wechsler, David. Wechsler Adult Intelligence Scale. New York: The Psychological Corporation, 1955.

Wesman, Alexander. Intelligent Testing. American Psychologist. 1968, 23, 267-274.

Winer, B. J. Statistical Principles in Experimental Design. New York: McGraw-Hill, 1971.