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# A CROSS-SECTIONAL STUDY OF INTELLIGENCE AND ACHIEVEMENT IN A SEMINOLE INDIAN RESERVATION SCHOOL[1]

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## SUMMARY

The entire population of Seminole Indian children at the Big Cypress Reservation school, deep in the Everglades, was administered the Wide Range Achievement Test, the Raven Standard Progressive Matricies, the Draw-a-Person Test, the Bender-Gestalt Test, and speech and hearing examinations. Median achievement in reading, spelling and arithmetic was found to be over one standard deviation below national norms. The older children showed a more serious deficit than the younger group when each group was compared with its respective age norms for reading and spelling, although raw scores on intelligence tests increased steadily with age but remained consistently below norm group medians. The verbal achievement deficit among the older children was attributed to educational and to cultural factors.

## INTRODUCTION

Although Seminole Indian children in Florida have attended federal and public schools for almost half a century, to date there are fewer than two hundred high school graduates, and only two Seminoles have graduated from college. Those who have completed their education often have experienced considerable difficulty in finding and retaining employment off the reservations, a fact which greatly reduces the incentive for Indian youths to remain in school. In 1969 the Bureau of Indian Affairs reported a 67% drop-out rate among Seminoles of school age (Kersey, 1969).

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To a great extent, this lack of educational attainment probably can be attributed to the geographic isolation and lack of acculturation of certain elements of the Seminole people. The one thousand members of the tribe live on three widely separated reservations in south Florida: the Big Cypress Reservation deep in the Everglades, the Brighton Reservation on the northwest shore of Lake Okeechobee, and the Hollywood Reservation in the Fort Lauderdale metropolitan area. Each of these sites presents a unique educational adaptation. The children from the Hollywood and Brighton reservations attend public schools in nearby communities; in general, a high percentage of these students do well in school and most remain to graduate. The Big Cypress Reservation is another story. Due to the inaccessibility of this reservation, the Bureau of Indian Affairs has operated a four-year elementary day school there since 1940. The children attending this school come from an environment which is severely deprived both economically and educationally. Many families still live in thatched-roof "chickees" or other submarginal housing where there is neither running water nor sanitary facilities. While a number of Indians work for the tribe or Bureau of Indian Affairs, most depend upon agricultural labor for their income (Kersey, 1969). Only a few earn adequate wages, and a number of families subsist on some form of welfare. Most of the Indian parents have had little or no education and offer only minimal support for the work of the school; moreover, the community has not taken an active role in running the school although there is provision for an elected school board. The school has been hampered by frequent teacher turnover, by lack of close supervision by the Bureau of Indian Affairs, and by a curriculum which is not always relevant to Seminole life.

In such a setting the school, with all its limitations, functions as the primary agency in preparing Seminole children for assimilation into the world beyond the reservation (Kersey, 1970). Most immediately, the children must be prepared to enter the public school where they are transferred in the fifth grade. The round trip bus ride from Big Cypress to Clewiston, the nearest city, covers ninety miles and takes almost three hours. This exhausting ride, coupled with poor preparation, primitive living conditions, and lack of parental support, has placed the Indian children at a tremendous disadvantage in the schools. They consistently score below their grade level on standardized tests and generally lag behind their peers in classroom achievement. They have few opportunities to participate in the social life of the school and usually keep to themselves. The result has been poor attendance, low grades, a general apathy toward schooling, and a high dropout rate.

The Bureau of Indian Affairs has recently committed itself to an intensive program of remedial and compensatory education for the Big Cypress children in hopes of reversing this situation. However, before effective planning could be undertaken, it seemed wise to compile basic data on the children. There had never been a formal testing program at the day school, so no information on the learning abilities or achievement levels of the children was available.

## METHOD

In the spring of 1969 a contract was awarded to Florida Atlantic University to devise and to conduct a testing program. Since the sum of money allocated to the testing precluded a comprehensive program, the primary consideration became one of selecting a few instruments which would yield maximally useful data on the Indian children.

The choice of testing instruments was directed primarily by two factors: the possibility of language differences and other cultural factors invalidating the use of most standardized tests of intelligence and achievement, and the cost per child tested. The Raven Standard Progressive Matrices, 1958 revision, was chosen on the basis of its validity and reliability in measuring the general concepts of intelligence (Prutsman, Barlow, and Shelta, 1969). In addition, it is nonverbal and relatively free of cultural factors. On the other hand, it taps only a limited amount of intellectual behavior. Further, it does not lend itself to interpretation as to specific areas of intelligence as do many other tests. Raven (1952) provides wide band percentile norms, a provision which suggests that conservative interpretation be made of the results, although more discriminative percentile norms are probably justified for intragroup ranking purposes as long as the test is administered individually or to very small groups (Prutsman et al, 1969).

The Wide Range Achievement Test (WRAT) was included in the testing battery as an individually administered, although admittedly limited estimate of academic achievement level. It gives grade level norms and standard scores in spelling, reading, and arithmetic. The standard scores may be interpreted as roughly equivalent to achievement performance scores in the three subject areas. Since the WRAT was administered individually and interpreted in the light of other test data (Raven, Bender-Gestalt, and Draw-a-Person) by a qualified examiner, it was believed to give a reasonably valid and reliable estimate of academic achievement.

The Draw-a-Person Test was included as a measure of acculturation as well as a secondary check on the intellectual level of the subject as ascertained from the Raven and WRAT. It was assumed that dress, posture, ethnic features, and activities portrayed in the subject's drawing would indicate the degree of identification with traditional Seminole culture.

The Bender Visual Motor-Gestalt Test was administered as a screening device to detect gross abnormalities in visual perception and hand-eye motor coordination. It was also expected that, like the Draw-a-Person Test, the results would provide a secondary check on the intellectual level of the subject. In addition, a speech and hearing screening program was conducted with the school-age children on the reservation.

The testing program was conducted during a three-week period in March of 1969. Thirty-five of the 38 Seminole children enrolled at the Big Cypress day school were tested. One child was adjudged to be nontestable because of severe mental retardation, and the other two were chronic absentees who attended school less than half the time. Tests were administered to groups of eight or fewer children by a psychometrist with long experience in testing young children. All testing was conducted in a classroom at the school which was air conditioned, well lighted, and generally isolated from other activities. The speech and hearing screening was conducted on a complementary schedule which did not conflict with the testing.

## RESULTS

In order to evaluate the educational level of the children, each subject's raw scores on the WRAT were converted into standard scores to show how he compared with students of his age in the national norm group. For each of the subtests of reading, spelling, and arithmetic, the mean of the standard scores was set at 100, and the standard deviation at 15.

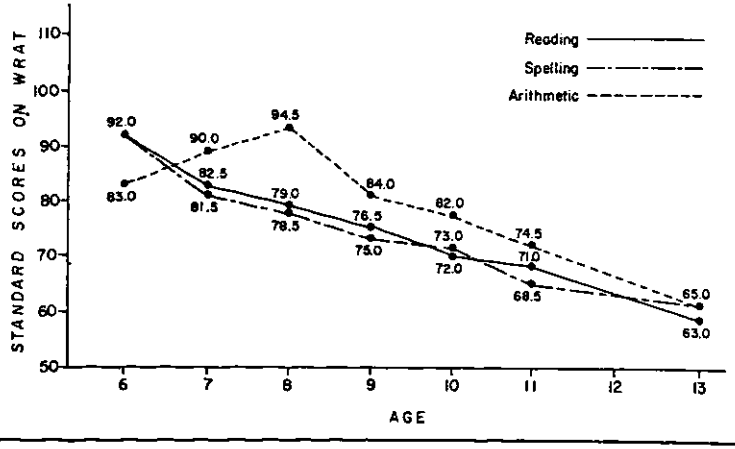
Since the investigators were particularly interested in the effects of educational opportunities and intellectual ability on academic development, the subjects were grouped according to age into seven categories from six to 13 (there were no 12-year olds on the reservation). For each age group, the median standard score was calculated for each of the three subtests. These data are presented in Figure 1. Performance on the reading and spelling tests was poorer among the older youths than the younger ones when each was compared with its own age norms. However, even the six-year-olds were found to score one-half standard deviation below the mean of the national norms. This gap widened to more than one full standard deviation for the seven-year-old children.

The arithmetic subtest did not reveal a steady decline in relative achievement with increasing age. Since there were only three Seminole children aged 11 to 13, considerable caution must be employed in drawing inferences about median performance in this age bracket.

Since it was possible to test the entire school population of Seminole children ages six to 13 on the Big Cypress Reservation, the differences shown in Figure 1 are not estimated from samples but are the obtained differences for a population, even though the number of children is small. However, in another sense, these children are a sample of the population of children who go through the school over time. That is, they represent a population at a particular period in time, but they are a sample when different periods in time are considered. Hence, to determine whether it would be possible to obtain results such as these by chance, a chi square test of independence was employed. By collapsing the data presented in Figure 1 into three 2 x 2 contingency tables (one for each subject area), cell frequencies were sufficiently increased to permit an analysis of the association between age and academic achievement. The age factor was divided into eight and younger and nine and older. For the verbal subtests, the standard scores were dichotomized into zero to 79 and 80 to the highest score; the generally higher arithmetic standard scores necessitated a dichotomy of zero to 82 and 83 to the highest score in order to maintain two groups of approximately the same size.

*Figure 1.*

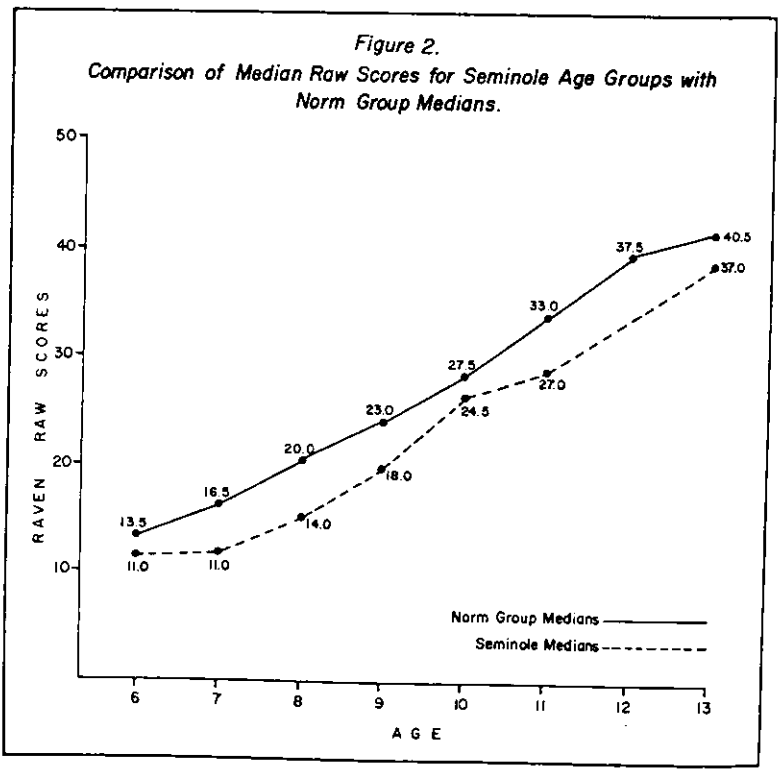
*Relative achievement of the Seminole youths on the Big Cypress Reservation.*



The analysis of age and reading skill produced a significant chi square of 10.2, df = 1, p = .01, indicating an association between age and reading ability for this group of Seminole Indian children. The reading level of the older children was considerably further below the norms for their age groups than the reading level of the younger children was below their norms.

The analysis of the dependency of spelling skill on age was also significant (chi square = 4.8, df = 1, p = .05). Hence, the older children tended to perform more poorly in spelling than the younger subjects when each was compared within its own age group.

*Figure 2.*
*Comparison of Median Raw Scores for Seminole Age Groups with Norm Group Medians.*



The chi square test between arithmetic skills and age was not statistically significant (chi square = 3.5, df = 1, $p > .05$). Therefore, performance on arithmetic was not found by this particular analysis to be dependent upon age, a somewhat interesting finding in view of the two previous significant associations of standard scores and age.

As shown in Figure 2, the intelligence of Seminole children, as measured by the Raven Standard Progressive Matrices, did not decline with increasing age. It was also apparent from the same figure that at each age the median raw score on the Raven fell below the median of the normative raw scores for that age (Raven, 1952). Therefore, the decline in verbal skills indicated in Figure 1 cannot be attributed to a decline in general intellectual ability among the Indian children.

Analysis of the Draw-a-Person and Bender-Gestalt Tests revealed some evidence of disabilities in the perceptual-motor area that may be ameliorated through a perceptual development program. The speech and hearing screening yielded very few cases that were referred for further study and treatment.

## CONCLUSIONS

From the results of this testing program a number of generalizations regarding the educational status of Seminole children at Big Cypress can be made. The Seminole children evidenced a progressive achievement decrement in language art skills as measured by the WRAT. This lack of verbal achievement can partially be explained in cultural terms. The Indian people of Big Cypress speak the Mikasuki language, which has very few structural similarities to English. They apparently find English difficult to learn; many of the older Indians spoke no English, and a number of young adults speak only broken English. Also, in everyday discourse on the reservation only minimal English is spoken; as a result, there is little reinforcement in the home or community for what the children learn at the day school. Although the children spoke English in the classroom, it was basically ungrammatical and restricted in vocabulary. Moreover, they generally reverted to the native tongue when playing at recess or conversing with one another in small groups in the classroom. Abstract English language concepts had little relationship to their daily lives outside the school so there was little incentive for most to learn.

The arithmetic skills of the Seminole children, on the other hand, showed no significant loss among the older children. In part, this is probably due to the relatively low scores of the six-year olds. However, these skills are constantly being reinforced in their culture in a way that English is not. Number concepts are present in their native tongue and are roughly the same as our system of numeration; so, numbers are easier for the Indian child to learn. Furthermore, the ability to manipulate numbers has been crucial in an economy where piece work and day labor are prevalent. Even though many Indian adults have a limited command of English, most have been quite capable of conducting business transactions. Thus, both cultures have been constantly reinforcing this particular skill. From a psychological viewpoint, it is interesting to note that the children performed well on the Raven Test and the arithmetic portion of the WRAT, while they performed poorly on the verbal skills. These results suggested confirmation of Piaget's thesis that progress in logical thinking is in no obvious way linked with progress in linguistic ability (Piaget, 1963). Most Seminole children observed, regardless of their English fluency, were capable of performing the concrete operations described by Piaget (counting, classifying, determining relationships, etc.) as being formed prior to language. Recent research has found that other American Indian children display mastery of the Piagetian conservation principles (Voyat, 1970) and concluded that they were probably transcultural.

Since the Raven Test and other measures indicated that the intellectual abilities of Seminole children held up well with increasing age, it appears likely that much of the low verbal achievement of the older children was due to cultural and educational factors rather than any inherent lack of ability. It was concluded that they could benefit from a program of remedial and compensatory education designed to capitalize on their resources. This need was particularly apparent among the older children who were rapidly approaching the day when they must transfer to the public schools and who showed the most serious achievement deficit.

As a result of this investigation the Bureau of Indian Affairs awarded a contract to Florida Atlantic University to plan and to conduct a special tutorial program for Seminole children at Big Cypress during the 1969-1970 school year.

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