ASSESSING THE PERFORMANCE DIFFERENCES OF REFERRED NATIVE AMERICAN AND NON-NATIVE AMERICAN CHILDREN ON TWO INTELLIGENCE TESTS: K-ABC AND WISC-R

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

THE RESEARCH PROBLEM

Introduction

The original roots of testing are lost in antiquity, but to identify the major developments that shaped contemporary testing, it is necessary to look no further than the nineteenth century (Anastasi, 1976).

During the nineteenth century there was a growing concern for the humane treatment of the mentally retarded and the insane. Along with this was a growing need for some uniform criteria for the identification and classifications for these groups of individuals. Within this period, many people made contributions to the field of psychological testing, both directly and indirectly. As Anastasi (1976) reports, the ideas, concepts, vocabulary, tasks, and procedures developed by such people as Esquirol, Seguin, Galton, Cattell, and Kraepelin during the nineteenth century, are still being used today. It was with this backdrop that Theodore Simon and Alfred Binet developed the first practical test of intelligence known as the 1905 Scale (Wolf, 1973).

In the United States the L. M. Terman revision of the 1911 Binet-Simon Test became known as the Stanford-Binet

(1916), which came into widespread use. It was with this test that the intelligence quotient (IQ) was first used.

In 1917, Terman, with materials for a group intelligence test designed by Arthur Otis, put together the Army Alpha Examination for use in testing recruits. This group test did indeed locate men who made satisfactory officers, and Terman and others pressed for civilian testing. After the war, the group tests were incorporated quickly by school systems and colleges as a basis for pupil classification, guidance, and college admissions. Within 30 months, approximately four million children had been tested (Cronbach, 1975).

With child labor phasing out, and enrollment in schools increasing, superintendents were greatly concerned about coping with the range of abilities. The intelligence test promised to sort out pupils who would move fast, those who would move slow, those who should go to college, and those who should not. Virtually everyone favored testing in schools, and it seemed that testing offered a way to open doors for the talented poor in a system in which doors were most often opened by parental wealth and status (Cronbach, 1975).

It was not very many years before controversies over tests and testing practices began to appear. These controversies have continued to erupt over various issues to the present day (Cronbach, 1975). Most recently the issues of

bias in measurement and selection have come to the forefront. Minority groups and others have claimed that traditional intelligence tests are oriented toward white middle-class culture and may not reflect the true ability of minority children (Mercer, 1979; Williams, 1979). Professionals on the other side of this controversy suggest that the traditional intelligence tests are designed to discriminate between groups and individuals and thus, if minority groups differ from the majority population, this only reflects differences that exist (Jensen, 1980).

Traditionally, controversies concerning tests have primarily remained within the domain of selected professional circles; educators, statisticians, psychologists. However, in recent years, because of the growing awareness of intelligence measures by the general public, and the increased realization of their impact on the lives of individuals and groups, the controversy has slowly, but with increasing momentum, moved into the direct scrutiny of our legal system.

April, 1984, the American Psychological Association, in its monthly publication, Monitor, began its front page story as follows:

> A Federal appeals court has upheld a lower court ruling that California schools cannot use intelligence tests to place black children in classes for the educable mentally retarded. That moves Larry P. vs Riles a step closer to a U. S. Supreme Court review.
>
> The case pivots on the specific issue of the

> disproportionately high number of black students in such classes and the more general issue of whether intelligence tests are culturally biased . . . (Cordes, 1984, p. 1).

In that same article, Chief District Judge Robert Peckham's opinion in the Larry P. vs Riles case is quoted as follows:

> . . .on the average, blacks were known to score about 15 points lower than whites on standardized IQ tests but that neither the testing companies nor the state had investigated why this difference occurred. They assumed mental retardation was higher among blacks, . . . rather than trying to rid the exams of cultural bias. In criticizing that assumption, . . . noted that racial imbalance does not occur among students labeled severely mentally retarded . . . The use of intelligence tests to place black children in EMR classes in California, violated federal law and the California and United States Constitutions . . . (Cordes, 1984, p. 1).

Although it is not within the limits of this study to argue this issue, it is pertinent that professionals have been put on notice, everywhere, that they must be sensitive to cultural issues when testing minority children. It seems evident that professionals in the field must assume a role of leadership in amending discriminatory assessment practices and procedures, rather than to continue in the present position of defending assessment instruments and practices traditionally alleged by many to be inadequate (Mercer, 1979).

Considering contemporary social and legal issues related to the assessment of minority children, there is a general lack of specific information regarding the assessment of Native American children. To document this state-

ment it is only necessary to consult traditional reference books on psychological testing such as Anastasi (1976, 1982), and Sattler (1975, 1982), where sections dealing with findings on these children are very limited.

Research studies, which have been done, investigating the test performance of Native American children on individual intelligence tests, have shown consistent results; the overall intelligence scores are lower when compared to the standardization sample. However, when the individual subtest scores are separated into verbal and nonverbal areas of functioning, or tests are used which rely solely on nonverbal tasks, they score lower in verbal areas and comparable to the standardization sample in performance areas (Fitzgerald & Ludeman, 1926; Garth & Smith, 1937; Cundick, 1970; Pray, 1979; Hynd, Quackenbush, Kramer & Conner, 1980; Reschly & Jipson, 1981).

In 1980 this researcher completed a project, initiated by the Oklahoma State Department of Education. This project's goal was to develop additional identification assistance for the Native American population in Oklahoma. The results of this study, which compared performance of a Native American referral population with that of a non-Native American referral population on the Wechsler Intelligence Scale for Children-Revised (WISC-R), showed similar findings to those of other researchers.

Even though the research findings, for this minority

population, have been consistent and suggest strongly that the tests being used are inadequate, there have been no real alternatives.

However, in March of 1983, Alan and Nadeen Kaufman, co-authors of the Kaufman Assessment Battery for Children (K-ABC), made available to psychometrists and educators the first new intelligence test in many years. The K-ABC (Kaufman & Kaufman, 1983a, 1983b), published by the American Guidance Service, is reported to be a measure of the intelligence and achievement of 2-1/2 to 12-1/2 year old children. The Kaufman's state that they believe the K-ABC has certain advantages for minority children, especially where educational diagnosis and placement are involved (Kaufman & Kaufman, 1983b).

In addition, and of primary importance is the philosophy and consequent definition of intelligence which underlie this test. Intelligence is defined as the ability to process information effectively as a means of solving unfamiliar problems (Kaufman & Kaufman, 1983a, 1983b). The emphasis is on process rather than product. The Kaufman's divide their test into two kinds of processing. The first is <u>sequential processing</u> which is defined as a measure of a child's ability to solve problems by mentally manipulating the stimuli in serial or temporal order. The second kind of processing is that of <u>simultaneous processing</u>, which is defined as a problem solving skill whereby many stimuli have

to be organized and integrated in parallel or simultaneous fashion. This dichotomy is not viewed as hierarchical. Rather, each process is considered important to both problem solving and assessing intelligence.

With the Wechsler Intelligence Scale for Children-Revised (WISC-R), the emphasis is quite different. The importance in determining intellectual ability is placed on product. Intelligence, as measured by the WISC-R, is defined as an overall capacity of an individual to understand and cope with the world about him. The capacity can manifest itself in many forms, and intelligence is inferred from the way these abilities are manifested (Wechsler, 1973). Wechsler also organizes his test using a dichotomy. He states that his dichotomy is primarily a way of identifying two principal modes by which human abilities express themselves, verbal and performance. He views each of the items in the test to be weighted equally and based on the theory that intelligence measures are assortative, not hierarchical.

Statement of the Problem

To date, there have been no studies reported which investigate the test performance of Oklahoma Native American children using the Kaufman Assessment Battery for Children (K-ABC). There is only one study which has investigated the test performance of this specific minority population using

the WISC-R (Mitchell, 1980). Further investigation is needed to insure the most accurate intellectual assessment of Native American children that can currently be provided. If one of these tests can better measure intelligence in Native American as well as non-Native American children than the other, its selection must be supported by empirical data. That is the intention of this study.

Purpose of the Study

In Oklahoma, the primary intelligence measuring instruments used by agencies that evaluate children, and the tests of choice, are the Wechsler Scales: Wechsler Preschool and Primary Scale of Intelligence (WPPSI); Wechsler Intelligence Scale for Children-Revised (WISC-R); and Wechsler Adult Intelligence Scale-Revised (WAIS-R) (Oklahoma, 1983). If a child is having difficulty learning or progressing according to expectations for his age and grade placement, he is referred to one of the Regional Educational Service Centers (RESC) throughout the state. It is the task of the RESC's to administer a psychoeducational test battery and through this battery obtain pertinent and helpful information which is relayed back to the teachers and parents. This information is then used in a way that can best benefit the child. The purpose of this research is to compare results from the K-ABC and WISC-R to determine if one of those instruments shows significant group differences in reporting global IQ

scores for both Native American and non-Native American children in Oklahoma.

Significance of the Study

According to the population statistics for Oklahoma (1980 United States Census), there were an estimated 169,459 Native Americans living in Oklahoma in 1980. Of this number, 44,529 were enrolled in our public school system. Of those enrolled in school, 20,995 came from homes where a language other than English was spoken, and 10.7 percent of these children came from homes where no English was spoken. More directly related to the issue of assessment of minority populations are statistics which come from the Oklahoma State Department of Education. In their statistical report for 1979-1980, posted in the Regional Education Service Centers, the category of Identified Handicapped Indian Students showed a child count numbering 5,910, a little more than 12 percent of the Native American children enrolled in the state public school system.

These statistics show several important things. One, Oklahoma has a sizable proportion of people of Native American descent whose primary cultural training is different from the majority culture. Two, there is a large number of Native American children entering school who are bilingual. Three, the number of Native American children being identified and placed in special education programs is

disproportionately higher than non-Native American children. In Oklahoma the test of choice for placement in special education programs, the WISC-R, is an intelligence test which emphasizes knowledge valued by the majority culture. This test could put minority culture children at a disadvantage and may not reflect accurately their intellectual ability.

The present study attempts to determine if the K-ABC is a viable alternative to the WISC-R as an assessment instrument and Native American children in the State of Oklahoma. The K-ABC's emphasis on simultaneous and sequential processing may provide a more appropriate and accurate measurement of the global intelligence of this minority population.

Hypotheses

The following Hypothesis will be investigated in this study.

Null Hypothesis 1: There will be no significant difference between the mean performance of a referred population of non-Native American and Native American children on the K-ABC Sequential Processing scores, Simultaneous Processing scores, and the Mental Processing Composite scores.

Alternative Hypothesis 1: There will be a significant difference between the mean performance of a referred

population of non-Native American and Native American children on the K-ABC Sequential Processing scores, Simultaneous Processing scores, and the Mental Processing Composite scores.

Null Hypothesis 2: There will be no significant difference between the mean performance of a referred population of non-Native American and Native American children on the Verbal IQ, Performance IQ, and Full Scale IQ scores of the WISC-R.

Alternate Hypothesis 2: There will be a significant difference between the mean performance of a referred population of non-Native American and Native American children on the Verbal IQ, Performance IQ, and Full Scale IQ scores of the WISC-R.

Null Hypothesis 3: There will be no significant difference between the mean performance of a referred population of Cherokee and Kiowa children on the K-ABC Sequential Processing scores, Simultaneous Processing scores, and the Mental Processing Composite scores.

Alternate Hypothesis 3: There will be a significant difference between the mean performance of a referred population of Cherokee and Kiowa children on the K-ABC Sequential Processing scores, Simultaneous Processing scores and the Mental Processing Composite scores.

Null Hypothesis 4: There will be no significant difference between the mean performance of a referred

population of Cherokee and Kiowa children on the WISC-R Verbal IQ, Performance IQ, and the Full Scale IQ scores.

Alternate Hypothesis 4: There will be a significant difference between the mean performance of a referred population of Cherokee and Kiowa children on the WISC-R Verbal IQ, Performance IQ, and Full Scale IQ scores.

Null Hypothesis 5: There will be no significant difference between the mean performance of a referred population of non-Native American and Native American children on the eight subtests of the K-ABC.

Alternate Hypothesis 5: There will be a significant difference between the mean performance of a referred population of non-Native American and Native American children on the eight subtests of the K-ABC.

Null Hypothesis 6: There will be no significant difference between the mean performance of a referred population of non-American and Native American children on the ten subtest scores of the WISC-R.

Alternate Hypothesis 6: There will be a significant difference between the mean performance of a referred population of non-Native American and Native American children on the ten subtest scores of the WISC-R.

Null Hypothesis 7: There will be no significant difference between the mean performance of a referred population of Cherokee and Kiowa children on the eight subtests of the K-ABC.

Alternate Hypothesis 7: There will be a significant difference between the mean performance of a referred population of Cherokee and Kiowa children on the eight subtests of the K-ABC.

Null Hypothesis 8: There will be no significant difference between the mean performance of a referred population of Cherokee and Kiowa children on the ten subtests of the WISC-R.

Alternate Hypothesis 8: There will be a significant difference between the mean performance of a referred population of Cherokee and Kiowa children on the 10 subtests of the WISC-R.

Limitations

This study was limited to the investigation of two Native American tribes (Kiowa and Cherokee) located in rural regions of Oklahoma. The sample size was limited by the actual number of these specific populations referred to the RESC for psychoeducational assessment during the 1983-1984 school year.

CHAPTER II

INTELLIGENCE TESTS

Development

The ideas and concepts underlying the Wechsler tests, as they are presently known and used, grew originally from David Wechsler's work in assessing military recruits. It was then that he became increasingly convinced that intelligence defined solely in terms of intellectual ability needed modification. This view eventually found expression in his definition of intelligence (1939) as a global and not unique capacity and guided his search for subtests for the available standardized tests. His ideas would not be fully articulated until the publication of the Wechsler-Bellevue Scale and his book, The Measurement of Adult Intelligence, in 1939. With minor variations, this definition was continued in the 1941, 1944, 1958, and 1972 revisions of that book. Wechsler's definition is as follows:

> Intelligence, as a hypothetical construct, is the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment. It is an aggregate or global because it is composed of elements or abilities which, although not entirely independent, are qualitatively differentiable. By measurement of these abilities through scores from a test, we have available to us objective data which are invaluable in the evaluation of intelligence. (Matarazzo, 1972, p. 79).

The Wechsler-Bellevue Scale was the direct forerunner to the development of the Wechsler Preschool and Primary Scale of Intelligence (WPPSI), Wechsler Intelligence Scale for Children (WISC), Wechsler Adult Intelligence Scale (WAIS), Wechsler Intelligence Scale for Children-Revised (WISC-R), and the Wechsler Adult Intelligence Scale-Revised (WAIS-R) (Matarazzo, 1972; Sattler, 1974, 1982). Concurrent with Wechsler's emerging views on the role of nonintellectual factors in general intelligence (Wechsler, 1940) was his awareness of age and aging as a factor. Those ideas he translated into one of his most important contributions, the use of a deviation quotient (Wechsler, 1940, 1943, 1949; Matarazzo, 1972). This concept was first introduced in the WISC, in which IQ scores were obtained by comparing each subject's test performance exclusively with scores earned by individuals in a single age group (Wechsler, 1949; Matarazzo, 1972; Sattler, 1974; Anastasi, 1976).

Wechsler Intelligence Scale for Children

The Wechsler Intelligence Scale for Children (WISC) was first prepared as a downward extension of the original Wechsler-Bellevue. Most of the items were taken directly from the adult tests, with easier items of the same type added to each test. The WISC was applicable to children 5 years 1 month through 15 years 11 months of age. It was standardized on 2,200 white boys and girls predominantly

from middle and upper socioeconomic levels (Wechsler, 1949; Sattler, 1974).

Wechsler Intelligence Scale for Children-Revised

The revised edition of the Wechsler Intelligence Scale for Children (WISC-R), was published in 1974. The revision required a little over three years to complete. Although there were many changes, the scale as a whole remained structurally and contextually the same (Wechsler, 1974). The WISC-R consists of the same 12 tests that constituted the 1949 WISC. All 12 tests were administered to the entire standardization sample; only 10 of the WISC-R tests are considered mandatory. The WISC-R maintains the original subdivision of the scale into Verbal and Performance tests. This dichotomy is viewed as a way of identifying two principal modes by which human abilities express themselves (Wechsler, 1974). Factorial studies have confirmed the validity of this broad dichotomy (Kaufman, 1979b). Each item on the test is weighted equally, based on the theory that intelligence measures are regarded as assortative, not hierarchal (Wechsler, 1974).

One of the principal changes involves the age range of the battery which is now 6 years 0 months through 16 years 11 months of age. There were many changes in content, and attention was given to altering items which seemed

culturally weighted (Wechsler, 1974). The sequence in which the tests were administered was changed, with Verbal and Performance tests now given in alternating order. There was allowance on the WISC-R for giving the child the correct response on the first item to insure the understanding of the nature of each task.

Standardization

The standardization sample was broadened and included 2,200 subjects. There were 200 children (100 boys, 100 girls) in each of 11 age groups, ranging from 6-1/2 through 16-1/2 years of age. The stratification was done along selected variables in accordance with the 1970 United States census. The variables used were: age, sex, race, (non-white), geographic region, occupation of head of household, and urban-rural residence.

Concerning the variable of race, the proportion of whites and nonwhites correspond to the 1970 census. Of the 330 nonwhites in the total standardization sample, 305 (92.4%) were black, the remaining 25 nonwhite included American Indians, Orientals, Puerto Ricans, and Chicanos, which were categorized in accordance with visible physical characteristics (Wechsler, 1974).

Native American

Generally, the studies related to the intellectual assessment of Native Americans can be characterized as either correlative or factor analytic. Typically, these studies sought to relate one measure of ability to another, examining the differences between the resulting test scores and the standardization sample (Hynd & Garcia, 1979).

There is some evidence indicating Indian children tend to be more successful on the WISC Performance Scale than on the WISC Verbal Scale. Turner and Penfold (1952) reported that a sample of 42 North American Indian children from the Coradoc Reserve, between 7 and 14 years of age, obtained a Performance Scale IQ that was 11 points higher than their Verbal Scale IQ. Cundick (1970) studied the performance of the southwestern American Indian children from the Navajo and Ute tribes on four measures of intelligence. On the WPPSI and WISC, Verbal Scale IQ's were significantly lower than those for the normative groups in all grades tested. Performance scale IQ's were significantly lower than the normative groups only at the prekindergarten level. Cundick's study shows that American Indian children differ from test standardization groups differentially, according to the functions measured.

One of the early large scale attempts to examine Native American intellectual abilities was initiated in 1941. The

results of this project suggested Native Americans demonstrated normal levels of intelligence when performance types of indices were used. Havighurst (1958) concluded that other factors entered into their test performances which negatively affect the overall results.

Research conducted by Cundick (1970) came to the same conclusion as did more recent studies, using the WISC-R (Pray, 1979; Hynd, Quackenbush, Kramer, Conner & Weed, 1980; Mitchell, 1980). Native American children score below the standardization sample in tasks which emphasize verbal receptive/expressive skills. With tasks which emphasize visual-spatial skills, Native American children score comparable to the standardization sample. Snyder (1961) concluded that increased contact with the majority culture tends to decrease test performance differences.

In 1975 Kaufman did a factor analytic study using the WISC-R standardization sample. He identified three factors: verbal comprehensive, perceptual organization and freedom from distractability. Further investigations showed these three factors were the same for blacks (Kaufman, 1975). Cross validation with other normal population of Whites, Blacks, and Chicanos, produced the same factors (Reschly, 1978). The only variations noted by Reschly (1978) were Blacks and Native American children. The verbal and perceptual emerged as factors for all groups, but not the freedom from distractability factor. The explanation was

that this might be a nonintellectual factor.

Reschly and Sabers (1979) investigated the differential validity of the WISC-R with four groups, Anglos, Blacks, Chicanos, and Native American children. They used a sample of 910 children from the Tucson School District, with scores on both the Metropolitan Achievement Test (MAT) and the WISC-R. The results of this study suggest that the performance of minority groups, Blacks, Chicanos, and Native American children were over-predicted relative to an achievement measure, when a common regression equation was used. The Anglo group was under-predicted relative to achievement using the same regression equation. Although not discussed in terms of explanation, the Native American group had lower correlations and slopes, particularly at grades 3, 5, and 7, and for part of the analysis this group was deleted. They concluded that the WISC-R appears to be equally valid for different groups as a measure of academic aptitude and supported its continued use in decisions about exceptional children, in spite of their results.

Later investigations using the WISC-R found IQ factor scores to correlate significantly with the reading and mathematics portion of the Metropolitan Achievement Test and teacher ratings for Native American children. These results were interpreted as supporting the construct validity of the WISC-R for Native American children (Reschly & Sabers, 1979).

Controversy - Minority Group Testing

The criticisms of individually administered and group intelligence tests appear often in professional journals, popular magazines and local newspapers. It is thought by some that many of the negative comments are really more emotional than empirically defensible, when the focus is on issues of cultural fairness and test bias (Jensen, 1973, 1980).

Largely because of the educational consequences of the misuse of intelligence tests and the scores they yield, critics have demanded a moratorium on testing (Diana vs. California Board of Education, 1969; Larry P. vs. Riles, 1972; Williams, 1979) while others make logical arguments against such a ban (Cleary, Humphries, Kendrick & Wesman, 1975; Flaugher, 1978; Jensen, 1980). In commenting on this polarization of professionals, Kaufman (1979b) says:

> Unfortunately many staunch defenders of the faith are equally lacking in objectivity; they unquestioningly accept 'what intelligence tests measure' as an adequate definition of the construct of intelligence, pay homage to global IQ's, and perceive these IQ's to be immutable reflections of the magical g factor.
>
> The tests do have flaws, but their shortcomings are not debilitating...but need to be understood well by test users to facilitate both test interpretation and the selection of supplementary measures (p. 11).

In the midst of the heated debates, Kaufman (1979b) presented logical criticism of the current intelligence measures. He believes that a major limitation of

intelligence tests is their failure to grow conceptually and incorporate the advances in the areas of neuropsychology, cognitive development, and learning theory.

Although the stimulus materials of intelligence tests (WISC-R and Binet) have been improved and modernized, the item content, structure, and conceptualization of most intelligence tests have remained basically unchanged (Matarazzo, 1972; Sattler, 1974; Anastasi, 1976).

Theoretical Considerations

The theoretical base of a global concept of intelligence upon which Wechsler's tests are based (Matarazzo, 1972; Wechsler, 1974) are viewed differently when the findings in neuropsychology, cognitive development, and learning theory are taken into consideration.

Cerebral Specialization

There is increasing evidence regarding the specialization of functions of the cerebral hemispheres.

The studies of "split-brain" patients by Roger Sperry (1968) and his associates, led to what they interpreted as the lateralization of cerebral functions. They suggested the key differences between the hemispheres was the content handled most efficiently by each half of the brain. Verbal skills were associated with the left hemisphere and visual-spatial abilities with the right hemisphere (Sperry, 1968).

As more studies were completed, beginning with Bogen (1969) and including Levey and Trevathen (1976) and Ornstein (1972, 1977, 1978), there was a shift in focus. These researchers suggested the key differences between the hemispheres was the mode of processing the stimuli rather than the specific nature of the stimuli (verbal versus nonverbal). Their studies pointed to the left hemisphere as processing information in an analytic and sequential manner, and the right hemisphere as processing information in a global, holistic manner (Kaufman, 1979a; Kaufman & Kaufman, 1983).

Through the many research studies involving split-brain and unilaterally brain damaged individuals, the evidence accumulated suggests that the analysis of hemispheric differences in terms of verbal and nonverbal stimuli may be inadequate. It appeared more valuable to examine what an individual did with the stimulus presented (Springer & Deutsh, 1981).

Although the evidence lends support for hemispheric related processing styles (analytic versus holistic) the proven relationship is not yet established.

Luria's Model

The direct roots of this model lie in Luria's observation that the cortex is engaged in two types of integrative activity; successive and simultaneous. His

observations were based on the clinical examination of persons with lesions in the left hemisphere of the cortex (Luria, 1966). In his studies he found that lesions in the frontal-temporal areas disturb successive processing, whereas lesions in the occipital-parietal areas lead to disturbances in the simultaneous organization of stimuli.

Luria proposes that the processing of cognitive content by the brain is accomplished through the use of a series of analyzers. In humans, the analyzers are identified in terms of cortical localization and work in conjunction with one another by way of overlapping zones; this synthesis can be of two parts, successive and simultaneous.

Successive information processing refers to processing of information in serial order. There is a system of cues which consecutively activate the components. There are three varieties of this type of processing; perceptual, mnemonic, and complex intellectual. Luria suggests that human speech is an example of the last variety.

Simultaneous information processing refers to the synthesis of separate elements into groups, these groups often taking on spatial overtones. This type of processing suggests that any portion of the result is at once surveyable without dependence upon its position in the whole. Luria suggests there are three varieties of this type of processing also: direct perception, mnemonic processes, and complex intellectual.

Das (1973) and Das, Kirby and Jarman (1975, 1979) summarize the numerous investigations of a test battery assembled by them to measure successive and simultaneous processing as defined by Luria (1966). The empirical technique of factor analysis was used by Das and his co-workers to investigate this processing model. Through their studies, they identified two factors (successive and simultaneous) for groups differing in age, socioeconomic status, intellectual level and cultural background. These two factors consistently emerged and thus offer support to a successive-simultaneous dichotomy.

Cognitive Psychology

Bellers' studies (1970) are representative of the many research efforts in cognitive psychology. These studies have been in a variety of areas directly related to learning: visual search, attention, inception, detection, and memory. These investigations have both directly and indirectly given empirical support for the possibility of a sequential-simultaneous processing dichotomy.

In terms of cognitive development, Piaget's theory of development of intelligence seems pertinent and should be considered for incorporation into intelligence measures. His experiments and observations indicate that children at different stages of development differ in the quality of their mental organization, rather than in the quantity of

their responses (Piaget, 1950; Phillips, 1981). Piaget asserts that to assess a child's intelligence, the specific tasks must vary in content and process according to the cognitive stage of the child (Piaget, 1950). This implies that different tests will be needed to measure intelligence across a broad age range.

In terms of learning theories, there is a question concerning the nature and breadth of the content of intelligence tests (Kaufman, 1979a). There are numerous theories concerning learning (Guilford, 1967; Gagne, 1977) and yet there has not, historically, been any attempt to incorporate these theories into intelligence tests (WISC-R). This seems significant, inasmuch as intelligence quotients are used to predict ability to learn in school and that there is no disagreement about the close theoretical relationship between intelligence and learning ability. The WISC-R contains one item which could be considered a learning task (Coding) but does not require high-level mental processing.

Native American

In terms of Native American children, which are the focus of this research, there was one research project utilizing a neuropsychological evaluation model to investigate the performance of this minority population. This study, done by Golden, Raraback and Pray (1977), used the

Halstead-Reitan battery. They examined the performance of Native American adolescents ages 15 through 18 compared to a matched sample of Caucasian adolescents. The results showed the performance of both groups to be essentially equivalent. The authors believed that it was clearly demonstrated that neuropsychological tests are not influenced by cultural demands within an American Indian population. It was also concluded that this type of testing gave diagnostic information useful to educators in developing appropriate education plans for children.

Kaufman Assessment Battery For Children

As a result of Alan and Nadeen Kaufman's vast experience with testing, they were offered an opportunity by the American Guidance Service to develop a new intelligence measure. This opportunity coincided with their own separate decision to try to bridge the gap between psychological research and intellectual assessment. In 1978 the development of the Kaufman Assessment Battery for Children (K-ABC) began, which culminated in the publication of the test in 1983 (Kaufman & Kaufman, 1983).

> At all times the essence of test development was to blend the new with the known, to combine innovation with adaptations of tasks with proven clinical, neuropsychological, and empirical validity (Kaufman & Kaufman, 1983, p. 5)

Their goals for the K-ABC were as follows:

1. To measure intelligence from a strong theoretical and research basis.

2. To separate acquired factual knowledge from the ability to solve unfamiliar problems.

3. To yield scores that translate to educational intervention.

4. To include novel tasks.

5. To be easy to administer and objective to score.

6. To be sensitive to the diverse needs of preschool, minority group, and exceptional children. (Kaufman & Kaufman, 1983, p. 6)

In addressing the issues concerning minority children, they report making great effort to be sensitive to these groups in the choice of materials, item format and the selection of children for the standardization. The test includes "teaching" items for all problem solving tasks to reduce the potential of culturally disadvantaged children not comprehending the nature of the task. A foreign language can be used to teach the tasks for bilingual children and there is a scoring rule which accepts correct answers given in subcultural slang or a foreign language.

In selecting items and tasks which would be fair cross-culturally they used the empirical results of item bias statistics; used minority consultants to review the items and tasks; and they relied on research which had repeatedly shown the selected items to be fair culturally (Kaufman & Kaufman, 1983).

The role of language ability in the Mental Processing Scales was minimized to prevent contamination of problem-solving ability with level of language development or fluency in verbal expression. Most of the K-ABC processing subtests employ nonverbal concrete stimuli, and only three subtests require vocalization for the responses. There was another effort made to ensure a more equitable minority group assessment, which was the testing of additional black children above the proportional number of blacks needed for the national norming. This data was combined with the standardization data to produce supplementary norms by race and socioeconomic status for whites and blacks.

Standardization

The National Standardization Samples for the K-ABC consisted of more than 2,000 children (1,000 girls, 1,000 boys) listed at 34 sites in 24 states. The sample stratified within each age group by sex, geographic region, socioeconomic status, race or ethnic group, community size, and educational placement of the child (normal or special classes).

The standardization sample was randomly selected by computer from a large pool of parental permission forms. "Cells" were created based on United States Census figures for each stratification variable and random selection in each Cell.

Later, an additional 496 black children and 119 white children were tested for the socioeconomic norming program. The final socioeconomic norm sample included a total of 807 black and 1,569 white children, reflecting a broad geographical representation.

The "other" category included Native Americans, Asians, Alaskan Natives, and Pacific Inlanders, a total of 82 children representing 4.1 percent of the sample.

Native American Children

Kaufman reports two validation studies using Native American children. One study was done using a group of 40 children from the Sioux Tribe, who attended regular public schools and spoke English well. The other study was done using a group of 33 children from the Navajo Tribe. This group of children lived on a reservation in an isolated community of 1,700 where the majority of the population spoke primarily Navajo, and less than half lived in dwellings that had running water and electricity; all were tested by a Navajo examiner (Naglieri & Kamphaus, 1983).

Both Sioux and Navajo children earned very similar mean standard scores on the Simultaneous Processing Scales of the K-ABC, both scoring at about the normative mean of 100. The Sioux children displayed no discrepancy in their styles of processing information, but the Navajo children scored a noticeable 12 points higher on Simultaneous than on

Sequential Processing. Both groups earned higher Mental Processing scores than Achievement standard scores.

The subtest profiles for these two tribes on the K-ABC scales were very much alike. Both groups scored above 10 on Gestalt Closure, Triangles, and Spatial Memory, and below 10 on Matrix Analogies, Photo Series, and Hand Movements. Examination of the subtest profile for the Navajo children reveal very depressed scores on two subtests: Number recall, and Word Order. Both of these involve auditory stimuli and demand good verbal comprehension skills. The low scores may well reflect their limited proficiency in English (Naglieri & Kamphaus, 1983).

Both groups of Native Americans showed their strength was in visual-spatial abilities; they showed less well developed skill in integration of Sequential and Simultaneous processes and reasoning (Kaufman & Kaufman, 1983). The visual-spatial strengths of Native Americans have been documented often with many tests other than the K-ABC (Sattler, 1974, 1982).

Culture

The following is presented to bring into focus some significant cultural aspects which often effect the evaluation of Native American children.

There are generalized statements which are not to be

viewed as true for all Native American tribes, but are presented in an effort for those unfamiliar with the Native American culture to gain some insight into the important differences between cultures. This, it is hoped, will give an appreciation for the difficulty many Native American children experience in public schools and the difficulty psychometrists and educators have in attempting to be of service to them.

Attitudes

All to often Native American people view the public school system as a white man's institution, to which they must send their children, but over which they have little or no control (Morton, 1964). The combination of this general attitude and frequent language barriers cause many Native American children in rural Oklahoma, as well as other parts of the country, to drop out of school as soon as possible (Wahrhaftig, 1965).

However, demographic information (United States Census, 1960, 1980) and sociological studies (Wahrhaftig, 1965) tell us that Native American children are staying in school longer than in the past. Although the increases do not appear to be related to what goes on inside the school, but rather a result of other types of factors such as better transportation, more enforcement of truancy regulations, welfare payments contingent on school attendance, and less

employment for youth (Wahrhaftig, 1965).

As a further complication, parents are aware that educated children tend to leave the community, either geographically or socially. For these parents, school threatens the breakup of the family and a division of the community (Morton, 1964). In addition, Native Americans and white alike equate competence in school with assimilation into the majority culture. Thus, to encourage literacy they must be convinced this is no threat to their society, that education and educational testing are not clever devices to wean children away from the tribe and their heritage (Morton, 1965; Wahrhaftig, 1965).

Learning Patterns

In the rural settings of Oklahoma, members of the Native American communities do most of their learning in the home, In the home of neighboring kinsman, or in the church. A skill is most often learned by watching others practice it for some time before trying it themselves. There is a long period of what Morton (1965) calls "pre-learning" which is done in the natural routine context of their daily life.

The children are brought up in close association with persons both younger and older than themselves. By watching and listening to older persons, the children gradually learn skills and proper conduct, but this is not taught formally or in isolation from adults. As the children mature they

are quickly given responsibility for important tasks, such as the care of younger children, as few responsibilities for child rearing are assumed by the parent (Wahrhaftig, 1965). Learning within the culture is typically nonfragmented and nonsequential. Achievement of a skill is not seen as a result of effort expended, it is viewed with more magical overtones.

There is an assumption by the majority culture that a child will be motivated to learn fragments of skills in a fixed sequence, through concentrated effort, and be sustained by the faith that the utility of those skills will be ultimately known and valuable. This is not true for this culture.

To complicate this further, the majority culture often equates these pre-learning and nonfragmentary, nonsequential learning skills on the part of the Native American with failure to learn.

Family

In most of the tribal societies in Oklahoma there are few authoritarian figures and very little coercion. Each person, child or adult, is afforded equal respect. The nuclear family is very loosely defined and incorporated changes in persons living within a given household easily. For instance, there is not such a thing as an illegitimate child. A child born out of marriage is just another member

of the family.

There is generally a male head of a family who has some authority within the individual household. The extended family, within the community, provides many refuges for the person who feels coerced. It is such that undue pressures on an individual or group are almost certain to result in the individual withdrawing in one form or another.

Language

Tribal languages are used at community gatherings, virtually all formal discourses, informal conversations in the home, and with religious settings and ceremonies. The extent of its use varies between tribes, but for Cherokees it is of special importance. It becomes apparent in a review of literature that tribal language is spoken not only because the speakers exist, but also because using the language defines the event as distinct. Thus, it is viewed by experts (Morton, 1964; Wahrhaftig, 1965; Hynd & Garcia, 1979), as a practice which is likely to continue, and we will continue to see bilingual and non-English speaking children entering school and being referred for testing.

For the Native American child, learning to speak English does not occur unless they interact or play with English speaking children. Language is not learned apart from personal interaction, it is viewed only as an integral part of interaction with a particular other.

English fluency is important to school success, but also it is important in test taking, considering our traditional test instruments. It is often difficult for psychometrists to determine whether the halting use of English results from inability to speak fluently, not liking to converse in English, or merely from shyness or feeling ill-at-ease.

Other Tribes

Several investigators (Havighurst, 1944; Zintz, 1962; Hynd & Garcia, 1979; Naglieri and Kamphaus, 1983) have suggested that there are a number of core values which unite most Native American people, and often effect their performance on standardized tests. They are as follows:

1. Children are accorded the same degree of respect as an adult.

2. There is an importance placed on the values of cooperation and harmony with the environment.

3. An individual is judged by his relative contribution to the group, not by his individual achievement.

4. Competition is encouraged, but in an intra-individual sense.

5. There is a desire to live a relatively unhurried and present-time oriented life style.

6. Children are not generally accustomed to structure imposed on them by adults.

7. There is a tendency to explain natural phenomenon by mythology and sorcery rather than by science, together with fear of the supernatural.

8. There is value placed on the traditional life styles with a concomitant desire to remain anonymous and submissive.

9. There is a desire to satisfy present needs and to share, rather than working to get ahead and saving for the future.

10. There is a preference for living in rural, tribal communities, with a vast majority living below socioeconomic standards.

In conclusion, there are included the following statements which were compiled as a result of a Bureau of Indian Affairs Research Conference held in Chicago in 1963 (Morton). These statements were made and jointly approved by Native American leaders from across the United States and Canada. The conference was held to address directly the problems and solutions of their people.

1. The Native American population is not only increasing, but it appears it will increase as a definable population group.

2. Indians themselves appear to resist assimilation because they "prize" their identity.

3. Their identifiability as a population group has not been the result of exclusion from the dominant society

as is frequently the case with other minority groups of distinctive physical appearance.

4. The dominant society has tried to encourage assimilation of Indians, in terms of government policies and public opinion.

5. Programs designed to help Indians must respect, and take into account, the importance of Indian identity in order to be successful in serving the needs of Indians. Three hundred years have proven the futility of trying to abolish Indian identity or ignoring its strength and persistence.

6. Indians have accepted innumerable items from the culture of the dominant society, particularly technical skills and material objects. This has been misinterpreted as evidence of inevitable and willing assimilation.

It is clear that in their statements they identify themselves as Indians, above and beyond their particular tribal affiliation, and that this identity is of enormous importance. True to Native American tradition, the goal is for the group and for others' respect, not money or material things. Their solidarity is impressive and manifests itself in many ways, ways which are significantly different from the majority cultures and its values.

Summary

In summary, this chapter has attempted to review literature in a wide variety of areas, all of which impact on the particular research study being done. The review is not seen as exhaustive in any one of the areas, nor complete in terms of all the issues raised within a topic focusing on the assessment of intelligence. However, it is hoped that it is complete enough to give the reader and others interested in the assessment of intelligence, a good background, historical perspective, knowledge of the test instruments, their construction and philosophic consideration, and an awareness of cultural aspects which can affect the results of intelligence testing.

CHAPTER III

METHODS

Introduction

Statement of the Problem

As was stated in the review of the literature, studies relating to the assessment of Native American children are limited. Those that have been done suggest inconsistencies in obtaining valid global intelligence measures when compared to the standardization samples. When global scores are separated into verbal and nonverbal areas of functioning, as the Wechsler tests do, scores of the Native American population of children do not differ significantly from the standardization samples in nonverbal areas. However, with verbal areas scores of the Native American children were significantly lower than the standardization samples (Hynd, Fitzgerald & Ludeman, 1926; Garth & Smith, 1937; Reschly & Jipson, 1976; Cundick, 1979; Pray, 1979).

This study is designed to determine if a relatively new test, the K-ABC, with its emphasis on sequential and simultaneous processing, can be used as a measure of global intelligence for both Native American and non-Native American populations of children--a measure in which the two populations will not score significantly different from each

other.

The investigation of this problem is complicated by two considerations: (1) some investigators (Hynd & Garcia, 1979; Naglieri & Kamphaus, 1983) suggest there are tribal differences within the Native American population, and (2) a referral population is a special group within the general population.

It is hypothesized that the results of this study will show no significant differences between the mean performance of the two Native American tribes (Cherokee and Kiowa) and/or between the mean performance of the referred Native American and non-Native American research population on the K-ABC global or subtest scores, but that significant differences will occur between the referred Native American and non-Native American populations on the WISC-R global or subtest scores.

If the results show the populations perform significantly different on either one or both instruments (K-ABC and WISC-R), this study will attempt to explain the difference through the examination of subtest score performance.

Research Questions

To test this hypothesis the following research questions were asked:

1. Will the referred population of Native American

children score significantly lower (at the .05 level of significance) than the referred population of non-Native American children on the K-ABC Sequential Processing scores, Simultaneous Processing scores and the Mental Processing Composite score?

2. Will the referred population of Native American children score significantly lower (at the .05 level of significance) than the referred population of non-Native American Children on the Verbal IQ score, the Performance IQ score and the Full Scale IQ score of the WISC-R?

3. Will the referred population of Kiowa children care significantly lower (at the .05 level of significance) than the referred population of Cherokee children on the Sequential Processing score, the Simultaneous Processing score and the Mental Processing Composite score of the K-ABC?

4. Will the referred population of Kiowa children score significantly lower (at the .05 level of significance) than the referred population of Cherokee children on the Verbal IQ score, the Performance IQ score, and the Full Scale IQ score of the WISC-R?

Additionally, to determine if there are any significant differences in subtest performance on these two instruments, four research questions are asked.

5. Will the referred population of Native American children score significantly lower (at the .05 level of

significance) than the referred population of non-Native American children on the eight subtests of the K-ABC?

6. Will the referred population of Native American children score significantly lower (at the .05 level of significance) than the referred population of non-Native American children on the ten subtests of the WISC-R?

7. Will the referred population of Cherokee children score significantly lower (at the .05 level of significance) than the referred population of Kiowa children on the eight subtests of the K-ABC?

8. Will the referred population of Cherokee children score significantly lower (at the .05 level of significance) than the referred population of Kiowa children on the ten subtests of the WISC-R?

Research Subjects

All of the 86 subjects were randomly selected from children referred to the Regional Education Service Centers (RESC) in two rural regions of Oklahoma: (1) 59 children from eastern Oklahoma had been referred to the Muskogee RESC, which serves Wagner, Muskogee, and Cherokee counties; (2) 27 children from southwestern Oklahoma had been referred to the Anadarko RESC, which serves Caddo and Grady counties. According to the United States Census (1980) report, the population in these two regions of Oklahoma are culturally and demographically similar.

The Native American population samples used in this study correspond to the areas served by their respective Regional Educational Service Centers, as did the non-Native American subjects. The population subjects were distributed as follows: 29 Cherokee children and 30 non-Native American children from the eastern region; and 15 Kiowa children and 12 non-Native American children from the southwestern region.

These specific tribes were chosen to represent not only major tribes found in Oklahoma, but also tribes which were separated geographically. The eastern region of Oklahoma was chosen as it is predominantly populated by Native Americans classified as members of one of the Five Civilized Tribes, with the Cherokee tribe being well represented. The other region chosen, the southwestern regions of Oklahoma, is predominantly populated by tribes classified as Plains Indians, and the Kiowa is the largest single tribe represented in that area. The tribe selection was important due to the problems of obtaining an adequate sample of referred children within the time limits of the study.

Instrumentation

The Kaufman Assessment Battery for Children (1983) (K-ABC) and the Wechsler Intelligence Scale for Children-Revised (WISC-R) are the two intelligence measures used in this study.

Kaufman Assessment Battery for Children

The Kaufman Assessment Battery for Children (K-ABC), developed by Nadeen and Alan Kaufman, was published in 1983 as an effort to provide a new intelligence measure. In constructing the test, the authors showed great sensitivity toward issues relating to minority populations such as: choice of materials, format, and the selection of subjects for standardization. The test provides teaching items for all problem solving tasks, can be administered in foreign languages, and accepts answers in subcultural slang or foreign languages. Most of the K-ABC processing subtests employ concrete stimuli. Only three subtests require verbal responses.

The K-ABC gives eight mental processing subtest scores, which yield a standard score with a mean set at ten, and a standard deviation set at three, for each age level. These are the same parameters used by Wechsler (1974) for his subtests. The K-ABC yields standard scores with a mean set at 100 and standard deviation of 15 in three global areas of functioning: Sequential Processing, Simultaneous Processing, and Mental Processing Composite. These are the same parameters Wechsler used for his tests with the three global areas of functioning: Verbal IQ, Performance IQ, and Full Scale IQ.

Reliability

A variation of the split-half reliability procedure was used, a procedure which utilized properties of the Rasch-Wright model. The K-ABC showed internal consistency, across the full age range. There was a mean value of .80 and above for 12 of 16 subtests. No coefficients for any age went below .70.

Internal reliability for the Global scales had a mean coefficient range from .86 (simultaneous) to .93 (achievement) for preschool children, and from .89 (sequential) to .97 (achievement) for school age children. The mean values for mental processing components and achievement exceed .90 at both preschool and school age levels.

The test-retest, stability-coefficients were .77 to .95 for preschool children, and .82 to .95 for 5 to 8 year olds, and for 9 to 12-1/2 year olds, .87 to .97.

Intercorrelations

The sequential and simultaneous processing are only moderately related to each other: .41 for preschool and .50 for school age. The mental processing composite correlates with achievement: .70 to .79. The very young children, at 2-1/2 years old had a low correlation related to the limited definition of the processing construct on the K-ABC for this age (Kaufman & Kaufman, 1983).

It is suggested by the authors that the low correlation between Sequential and Simultaneous Processing Scales meet the theoretical construct upon which the K-ABC is based, as the two modes of processing are distinct but related enough to be combined into a global measure. The higher inter-correlations with the processing scales and the achievement scale, suggest they are meaningfully related.

Validity

Kaufman and his researchers made efforts to offer evidence of the construct, predictive, and concurrent validity of the K-ABC. The construct validity was considered of great importance and they utilized Anastasi's (1982) description of the five main areas which contribute to a test's construct validation: developmental changes, internal consistency, factor analysis, convergent and discriminant validation, and correlations with other tests (Kaufman & Kaufman, 1983).

Developmental Changes

Showing the existence of progressive increases in test scores with advancing age, age differentiation is one criteria for intelligence test validation. Reynolds, Chatman, and Willson (1983) evaluated the statistical significance of the age progressions by correlating raw scores on the K-ABC subtests to chronological age. Using

data from the standardization sample, and the supplementary sociocultural norms group, they found significant correlations with age for each K-ABC subtest. They further found no significant differences in the correlations obtained for children from different races or ethnic groups. They concluded that their analysis supports the construct validity of the K-ABC as a developmental measure of intelligence for white boys and girls, as well as those of different ethnic backgrounds.

Internal Consistency

To determine internal consistency of a multiscore test battery it was necessary to correlate the subtest scores with the total test scores. A statistical analysis, using the standardization sample, was done (Kaufman & Kaufman, 1983). The research results show internal consistency coefficients for Mental Processing Composite with school age children varied from .40 to .76. The best measures of total processing were the subtests Photo Series, Triangles, and Matrix Analogies.

Factor Analysis

The definition of intelligence for the K-ABC relies on the distrinction between two types of mental processing. It was therefore of extreme importance to show that there were exactly two factors underlying the test.

Confirmatory factor analysis, principal factor analysis, and principal components analysis were used to factor analyze the K-ABC. All of the analyses were conducted using data from the 2,000 standardization sample cases (Kaufman & Kaufman, 1983).

The results of the principal component analysis and principal factor analysis show a clear-cut empirical support for the existence of two factors for each age level (Kamphaus, Kaufman & Kaufman, 1982). Factor scores on the Sequential Processing and Simultaneous Processing Factors were correlated with standard scores obtained on the K-ABC scales of the same name to verify that the separate scales correspond to the theoretical constructs.

Correlation coefficients were computed for each age group. The Sequential Processing standard score correlated .84 to .96. The Simultaneous Processing standard score correlated .78 to .95. Coefficients with factor scores of the opposite name correlated much lower, with the values ranging from .25 to .46 (Kamphaus, Kaufman & Kaufman, 1982).

Chi-square was computed for each analysis to determine whether the proposed factor structure would be confirmed. The results showed large, highly significant values of Chi-square for all analyses, and substantial factor loadings for the subtest on each factor. The sequential-simultaneous dichotomy was confirmed for all age groups, and the Sequential-Simultaneous-Achievement organization of the sub-

tests was also confirmed (Willson, Reynolds, Chatman & Kaufman, 1983).

Convergent and Discriminant Validation

This type of validity was explored for the K-ABC Mental Processing Scales by correlating the Sequential and Simultaneous Processing variables with Das, Kirby, & Jarman (1975, 1979), Successive-Simultaneous battery. This battery was selected as a criterion because of its foundation in Luria's theory (1966) and the factor analytic support for the mental processing dichotomy that underlies this battery (Das, Kirby, & Jarman, 1975, 1979).

There were two validity studies conducted correlating the two test batteries. For both studies, the K-ABC's Sequential Processing subtest consistently correlated more highly with the Das-Kirby-Jarman Successive factor than with their Simultaneous factor, whereas the reverse was true for the K-ABC Simultaneous Processing subtests. The K-ABC correlated more highly with the Simultaneous factor on the Das-Kirby-Jarman test than with their Successive factor. The results of these research investigations conformed to the predictions and thus lent support to the construct validity of the K-ABC (Kaufman & Kaufman, 1983).

Correlations With Other Tests

Because the Wechsler scales for children (Revised) and the Stanford-Binet Intelligence Scale are so widely accepted as criteria of intelligence (Sattler, 1974, 1982; Anastasi, 1976, 1982), coefficients obtained by correlating these instruments with the K-ABC were used as evidence of construct validity (Kaufman & Kaufman, 1983). There were 16 separate studies, a total of 613 children, who were administered both the WISC-R and K-ABC. The correlation varied with the highest occurring between the Simultaneous Processing and the WISC-R Full Scale IQ. Overall, the results supported the construct validity of all K-ABC subtests (Kaufman & Kaufman, 1983).

There were three validation studies completed using normal school age children (121 total). They compared their performance on both the Stanford-Binet and K-ABC. A correlation of .61 between the two tests was reported as typical (Kaufman & Kaufman, 1983; Zins and Barnett, 1983a; Zins and Barnett, 1983b). In addition, the variability in Mental Processing Composite that was not accounted for by the Stanford-Binet IQ suggests that the K-ABC measure of intelligence taps unique aspects of mental functioning (Kaufman & Kaufman, 1983).

Predictive Validity

In the K-ABC, present level of performance on the Achievement Scale is intended as the best and most meaningful predictor of a child's future academic accomplishments. However, the Mental Processing Composite should be able to significantly predict school achievement as well.

Kaufman reports that there were six predictive validity studies that used K-ABC scales as predictors and various standardized individual or group achievement test performances as criteria. The intervals between the administration of predictor and criterion tests ranged from six months to one year.

Three of those studies used the Peabody Individual Achievement Test (PIAT). The Mental Processing Composite correlated in the 50's with PIAT total for the sample of normal school age children, and for the sample of culturally different Navajo children (Kaufman & Kaufman, 1983). The Educable Mentally Retarded (EMR) sample had a correlation of only .29 (Kaufman & Kaufman, 1983).

One of the studies used a preschool sample, not applicable to this study, and the two remaining studies reported by Kaufman and Kaufman used group administered achievement batteries. The results of those two studies showed a .58 correlation with the Iowa Tests of Basic Skills composite score and a .65 correlation with the California

Achievement Test total score with the K-ABC Mental Processing Composite.

Concurrent Validity

Kaufman reports in his manual that tests of school achievement were the best criteria of concurrent validity for all K-ABC scales. He supports this statement by references to several studies using individually administered achievement tests, as well as group-administered tests. The largest studies were done by Kamphaus (1983). During the K-ABC standardization most children, ages 6 through 12-1/2, were tested on either the Passage Comprehension subtest of the Woodcock Reading Mastery Tests or on the 40 Written computation items in the Key Math Diagnostic Arithmetic Test. Kamphaus (1983) analyzed this data for the total sample and separately for whites, blacks, and Hispanics. Twenty-six of the children in the sample were Native American. The concurrent validity coefficients for the Mental Processing Composite and the Passage Comprehension was .65 and for the Key Math was .50.

The Wide Range Achievement Tests (WRAT) were used as a concurrent validity criterion by several investigators. The results of those studies showed Mental Processing Composite correlations to range between .39 to .64 with WRAT reading, arithmetic, and spelling. The WRAT was also administered to most of the learning-disabled samples as part of the

diagnostic process. The data was not reported because coefficients between measures of intelligence and achievement were spuriously low for the learning-disabled children who had been preselected as having significant discrepancies between these variables (Kaufman & Kaufman, 1983).

Since the K-ABC Mental Processing Scales are based on a dichotomy that is rooted in cognitive and neuropsychological theories, including Luria's (1966), Golden's (1981) adaptation of the Luria-Nebraska Neuropsychological Battery was chosen as a suitable criterion for evaluating the K-ABC. Two studies investigated the concurrent validity of the K-ABC with this battery. Both studies used learning-disabled children (Kaufman & Kaufman, 1983). As this battery does not provide a composite score, multiple regression analysis was applied to examine the relationships between the batteries. The 11 Luria-Nebraska subtests were used as predictors, with the K-ABC scales serving as criteria. The multiple correlations in both studies obtained .70 for the Sequential and Simultaneous Processing and .73 for the Mental Processing Composite. In the Naglieri and Kamphaus (1983) study, multiple correlations for the scales were .86 (Mental Processing Composite), .81 (Sequential) and .40 (Simultaneous) (Kaufman & Kaufman, 1983).

Wechsler Intelligence Scale For Children-Revised

In 1974 a revised edition of the WISC was published; the Wechsler Intelligence Scale for Children-Revised (WISC-R). There were many changes, but the scale as a whole remained structurally and contextually the same (Wechsler, 1974). The WISC-R consists of the same 12 tests that constituted the 1949 WISC. All 12 tests were administered to the entire standardization sample although only 10 of the WISC-R tests are considered mandatory. The WISC-R retains the subdivision of the scale into Verbal and Performance tests as presented in the original WISC. Wechsler (1974) views this dichotomy as a way of identifying two principal modes by which human abilities express themselves, and factorial studies have confirmed the validity of this broad dichotomy (Kaufman, 1979b). Each item on the test is weighted equally, based on the theory that intelligence measures are assortative rather than hierarchal (Wechsler, 1974).

For each of the 12 tests in the battery, the distribution of raw scores at each age level was converted to scale scores having a mean of 10 and a standard deviation of three. This was accomplished by preparing a cumulative frequency distribution of raw scores for each age group, normalizing the distributions, and computing the appropriate

scaled score for each raw score. Minor irregularities were found and were eliminated by smoothing (Wechsler, 1974).

In keeping with Wechsler's theory of measurement, which stressed the comparison of a child with his chronological age peers, the WISC-R IQ scores are based on scale scores derived separately for each age group. The three sums of scale scores (Verbal, Performance, Full Scale) were obtained for each child in the standardization sample, and the mean and standard deviation of the corresponding sum of scaled scores were set equal to 100 and 15, respectively, and the appropriate IQ was assigned.

Reliability

Reliability coefficients were obtained by the split-half technique (usually odd versus even items) with appropriate corrections for the full length of the test by the Spearman-Brown formula. This formula was used also as a measure of internal consistency on all of the subtests except Digit Span and Coding. On these two tests, a test-retest or a stability coefficient was used.

The reliability coefficients for the Verbal, Performance, and Full Scale IQ scores were obtained from a formula for computing the reliability of a composite group of tests (Guilford, 1954). Wechsler reports that the Verbal, Performance, and Full Scale IQ scores have high reliabilities across the entire age range, the average coefficients being

.94, .90, and .96, respectively. The reliability of the individual tests have average coefficients ranging from .77 to .86 for the Verbal tests, and from .70 to .85 for the Performance tests. There are six coefficients that fall below .65 (Wechsler, 1974; Anastasi, 1976).

Validity

There is no discussion of validity included in the WISC-R manual. It does report higher correlations with the 1972 Stanford-Binet IQ scores, than the WISC. The mean correlation with the WISC-R Full Scale IQ is .73, Verbal Scale .71, Performance Scale .60. However, since its inception in 1974, the WISC-R has been subject to a variety of research investigations which literally number in the thousands.

Procedures

To select subjects for participation in this research, the first criterion was that they were currently attending a public elementary school in one of the two respective geographical regions. The next criterion was that each of the children had been referred by their individual classroom teacher to the local Regional Education Service Center (RESC) for a psychoeducational test battery during the 1983-1984 school year. Another criterion was that they had been administered a standard test battery which included a

WISC-R, through the normal RESC procedures and processes.

To obtain the sample of Cherokee and Kiowa children, the first step was to locate schools within the targeted counties, known by the respective RESC Administrators and Psychometrist to be densely populated with children from these two tribes. The lists of referred children from those schools were screened for children who reported themselves to be of Native American descent, whose names were of Cherokee or Kiowa origin, or who were known by the local psychometrist to be Native American. These names were then verified through the Johnson O'Malley lists or through the regional Bureau of Indian Affairs headquarters (Anadarko and Tahlequah) as being listed on the respective tribal roles. The standard for inclusion in the sample was one-quarter or greater of Native American descent (Cherokee or Kiowa).

The corresponding non-Native American samples were from the same schools or a school in close geographical proximity.

After the general guidelines were met and a pool of potential subjects was available, subject selection was made based on age criterion. The children selected had to be between the ages of 6 years 0 months and 11 years 11 months, which roughly corresponds to first through fifth grades. The final criterion was that of primary referral concern. The children selected had been referred because of a general low academic achievement, or a specific delay in reading.

Those children whose primary referral concern related to mental retardation, emotional/behavioral maladjustment, or who had a physical disability which would preclude administration of the K-ABC, were excluded from the samples.

After the population samples were obtained according to the criteria outlined, each of the children was then individually given the K-ABC in a private room at his or her local school. Administration time was approximately 45-50 minutes for each child. The K-ABC was given by either one of the staff psychometrists with the respective RESC, or one of four volunteer certified psychometrists. Subjects names were drawn and assigned to psychometrists for testing. Psychometrists may or may not have known the subjects they tested. No effort was made to match subjects with psychometrists.

The K-ABC was scored by the psychometrists and double checked for accuracy by the researcher.

Once the K-ABC had been administered and scored, a copy of the child's WISC-R scores were obtained. The two test scores were grouped, sample subjects were numbered and identified by tribal affiliation or non-tribal affiliation, and the names destroyed to insure individual privacy.

Summary

The ability of an assessment instrument to discriminate differences between individuals as well as groups based on

the strength and nature of process as well as performance, regardless of cultural variabls, is of critical concern to professionals. The results of this study could provide needed information to further research into improving assessment techniques with culturally different populations as well as providing a base from which to develop more effective intervention plans for Native American children.

CHAPTER IV

RESULTS

Data Analysis

Various statistics were considered to study the results of assessing performance differences of referred Native American and non-Native American children on two intelligence tests, the Kaufman Assessment Battery for Children (K-ABC) and the Wechsler Intelligence Scale for Children-Revised. Means and standard deviations were computed to describe central tendencies and variabilities between the Native American, non-Native American, Kiowa and Cherokee children and to test significance of departures of their actual differences from hypothesized null change in the populations from which the study samples were drawn.

A series of single-factor multivariate analysis of variance were used to examine the mean differences in performance between racially different groups with group membership (i.e., non-Native American, Native American and Cherokee, Kiowa) serving as the independent variable. Upon examination of the within cell error correlation in each analysis, the value level of .30 was taken as the level of choice to indicate whether a multivariate or univariate approach to analysis was needed. The Wilk's Lambda

procedure was used to test the multivariate null hypothesis and the Roy-Bargman Stepdown F tests were used with analysis of each hypothesis. The hierarchy of entry was selected by the researcher.

Hypotheses

Null Hypothesis 1: There will be no significant difference between the mean performance of a referred population of non-Native American and Native American children on the K-ABC Sequential Processing scores, Simultaneous Processing scores, and the Mental Processing Composite scores.

Alternate Hypothesis 1: There will be a significant difference between the mean performance of a referred population of non-Native American and Native American children on the K-ABC Sequential Processing scores, Simultaneous Processing scores, and the Mental Processing Composite scores.

Tables I and II present the results of analysis of the dependent variables K-ABC Sequential Processing, Simultaneous Processing and Mental Processing Composite global scores. The within cell error correlation was greater than .30 suggesting the use of a multivariate approach to analysis. The Wilk's Lambda statistic was then calculated at .98673. This is equivalent to a F ratio of .373 with 3 and 81 degrees of freedom. The probability of obtaining an

F (.733) this large by chance is greater than the required .05 level of significance. Therefore Null Hypothesis 1 was accepted for no significant difference was found between the mean performance of a referred population of non-Native American and Native American children on the K-ABC Sequential Processing scores, Simultaneous Processing scores, and the Mental Processing Composite scores. There was no evidence to support the Alternate Hypothesis 1 that a significant difference would be found in this dependent variable, and it has been rejected.

TABLE I

MULTIVARIATE ANALYSIS OF VARIANCE
K-ABC's GLOBAL SCORES, BY RACE.

Multivariable Analysis of Variance

Source	Multivariable F (3,82 df)	Univariate F (1,84 df)	Stepdown F (df)
Race	.584 (ns)		
Sequential Processing		.732	.309 (1,81)
Simultaneous Processing		.792	.923 (1,82)
Mental Processing Composite		.805	.805 (1,83)

TABLE II

MEANS AND STANDARD DEVIATIONS BY RACE, OF K-ABC GLOBAL SCORES.

	Native American		Non-Native American		Total Sample	
	X	S.D.	X	S.D.	X	S.D.
Mental Processing Composite	92.07	11.36	91.37	14.68	91.73	12.99
Simultaneous Processing	93.50	10.97	92.76	14.74	93.14	12.85
Sequential Processing	92.77	13.50	91.71	15.11	92.26	14.22

Null Hypothesis 2: There will be no significant difference between the mean performance of a referred population of non-Native American and Native American children on the Verbal IQ, Performance IQ, and Full Scale IQ scores of the WISC-R.

Alternate Hypothesis 2: There will be a significant difference between the mean performance of a referred population of non-Native American and Native American children on the Verbal IQ, Performance IQ, and Full Scale IQ scores of the WISC-R.

In Tables III and IV the results of analysis of the Verbal IQ, Performance IQ, and Full Scale IQ scores of the WISC-R are presented. With these dependent variables the

within cell error correlation was also greater than .30 suggesting a multivariate approach to analysis. The Wilk's Lambda statistic was calculated to be .97672. This is equivalent to an F ratio of .651 with 3 and 82 degrees of freedom. The probability of obtaining an F (.584) of this value by chance is greater than the required, .05 level of significance and the Null Hypothesis 2 which stated that there would be no significant difference between the mean performance of non-Native American and Native American children on the Verbal IQ, Performance IQ, and Full Scale IQ scores of the WISC-R has been accepted. No evidence presented indicated a significant difference did occur and the Alternate Hypothesis 2 is rejected.

TABLE III

MULTIVARIATE ANALYSIS OF VARIANCE
WISC-R GLOBAL SCORES, BY RACE.

MANOVA

Source	Multivariable F (3,82 df)	Univariate F (1,84 df)	Stepdown F (df)
Race	.584 (ns)		
Full Scale		.210	.210 (1,84)
Performance Scale		.432	.615 (1,83)
Verbal Scale		.166	.711 (1,82)

TABLE IV

MEANS AND STANDARD DEVIATIONS BY RACE,
OF WISC-R GLOBAL SCORES.

	Native American		Non-Native American		Total Sample	
	X	S.D.	X	S.D.	X	S.D.
Full Scale	86.32	13.89	89.90	12.37	88.07	13.22
Performance	92.25	14.87	97.71	14.05	93.45	14.44
Verbal	82.86	15.34	87.19	13.22	84.98	14.42

Null Hypothesis 3: There will be no significant difference between the mean performance of a referred population of Cherokee and Kiowa children on the K-ABC Sequential Processing scores, Simultaneous Processing scores, and the Mental Processing Composite scores.

Alternate Hypothesis 3: There will be a significant difference between the mean performance of a referred population of Cherokee and Kiowa children on the K-ABC Sequential Processing scores, Simultaneous Processing scores and the Mental Processing Composite scores.

When Global scores of the dependent variables Sequential Processing, Simultaneous Processing, and Mental Processing Composite on the K-ABC were analyzed (Tables V and VI) the within cell error correlation once again was greater than .30 suggesting the use of multivariate analysis. The Wilk's Lambda was calculated to be .92363 which is equivalent to a F ratio of 1.102 with 3 and 40 degrees of freedom. The probability of obtaining a F (.359) of this size by chance is greater than the .05 level of significance. Therefore, Null Hypothesis 3, which stated that there would be no significant difference between the means of these scores, was not rejected. Conversely, there was no evidence to support the Alternate Hypothesis and it was not accepted.

TABLE V

MULTIVARIATE ANALYSIS OF VARIANCE
K-ABC 3 GLOBAL SCORES, BY TRIBES.

MANOVA

Source	Multivariable F (3,40 df)	Univariate F (1,42 df)	Stepdown F (df)
Tribe	.359 (ns)		
Mental Processing Composite		.007	.077 (1,42)
Simultaneous Processing		.180	.723 (1,41)
Sequential Processing		.097	.833 (1,40)

TABLE VI

MEANS AND STANDARD DEVIATIONS BY TRIBE,
OF K-ABC GLOBAL SCORES.

	Cherokee		Kiowa		Total	
	X	S.D.	X	S.D.	X	S.D.
Mental Processing Composite	94.24	12.65	87.87	6.87	92.07	11.36
Simultaneous Processing	95.10	12.38	90.40	6.87	93.50	10.97
Sequential Processing	95.21	14.67	88.07	9.66	92.77	13.50

Null Hypothesis 4: There will be no significant difference between the mean performance of a referred population of Cherokee and Kiowa children on the WISC-R Verbal IQ, Performance IQ, and the Full Scale IQ scores.

Alternate Hypothesis 4: There will be a significant difference between the mean performance of a referred population of Cherokee and Kiowa children on the WISC-R Verbal IQ, Performance IQ, and Full Scale IQ scores.

Tables VII and VIII present the results of analysis of dependent variables Verbal IQ, Performance IQ, and Full Scale IQ scores on the WISC-R. Here too the within cell error correlation was greater than .30 suggesting the multivariate approach to analysis. The Wilk's Lambda was calculated to be .86629 which is equivalent to a F ratio of 2.06 with 3 and 40 degrees of freedom. The probability of obtaining a F (.121) this large by chance is greater than the .05 level of significance which supports Null Hypothesis 4 which states that there will be no significant difference between the means of the WISC-R global IQ scores. In this instance it can be seen that the Alternate Hypothesis 4 which states there will be a significant difference must be rejected.

TABLE VII

MULTIVARIATE ANALYSIS OF VARIANCE
WISC-R 3 GLOBAL SCORES, BY TRIBE.

MANOVA

Source	Multivariable F (3,40 df)	Univariate F (1,42 df)	Stepdown F (df)
Tribe	.121 (ns)		
Full Scale		.732	.309 (1,81)
Performance		.792	.923 (1,82)
Verbal		.805	.805 (1,83)

TABLE VIII

MEANS AND STANDARD DEVIATIONS BY TRIBE,
OF WISC-R GLOBAL SCORES.

	Cherokee		Kiowa		Total	
	X	S.D.	X	S.D.	X	S.D.
Full Scale	88.52	15.61	82.07	8.68	86.32	13.89
Performance	92.76	16.19	91.27	12.37	92.25	14.87
Verbal	86.45	17.29	75.93	6.86	82.86	15.34

Four additional hypotheses were tested to determine if there was a significant difference between the racially different (non-Native American, Native American and Cherokee, Kiowa) groups of children in their performance on the individual subtests which combine to give the global scores of the K-ABC and WISC-R intelligence tests.

Null Hypothesis 5: There will be no significant difference between the mean performance of a referred population of non-Native American and Native American children on the eight subtests of the K-ABC.

Alternate Hypothesis 5: There will be a significant difference between the mean performance of a referred population of non-Native American and Native American children on the eight subtests of the K-ABC.

The analysis of the eight subtest scores of the K-ABC which served as one group of dependent variables is presented in Tables IX and X. The within cell error correlation was greater than .30 suggesting a multivariate approach to analysis. The Wilk's Lambda was calculated to be .92361 which is equivalent to a F ratio of .786 with 8 and 76 degrees of freedom. The probability of obtaining a F (.617) of this size by chance is greater than .05 indicating that the differences between the means was not significant which supports Null Hypothesis 5. In this case the Null Hypothesis is accepted and the Alternate Hypothesis is rejected.

TABLE IX

MULTIVARIATE ANALYSIS OF VARIANCE
K-ABC 8 SUBTESTS, BY RACE.

MANOVA

Source	Multivariable F (8,76 df)	Univariate F (1,83 df)	Stepdown F	df
Race	.617 (ns)			
(4) Gestalt C.		.469	.469	1,83
(6) Triangles		.294	.408	1,82
(8) Matrix		.297	.133	1,81
(9) Spatial Memory		.346	.494	1,80
(10) Photo Series		.499	.254	1,79
(3) Hand Movement		.474	.313	1,78
(5) Number Recall		.804	.987	1,77
(7) Word Order		.984	.764	1,76

TABLE X

MEANS AND STANDARD DEVIATIONS BY RACE, OF K-ABC 8 SUBTESTS.

		Native American		Non-Native American		Total Sample	
		X	S.D.	X	S.D.	X	S.D.
(4)	Gestalt	9.97	2.84	9.51	3.05	9.75	2.94
(6)	Triangle	9.11	2.87	8.37	3.63	8.75	3.26
(8)	Matrix	8.71	2.32	9.27	2.64	8.98	2.48
(9)	Spatial	9.11	2.41	8.59	2.72	8.86	2.56
(10)	Photo Series	8.59	2.14	8.98	3.04	8.78	2.60
(3)	Hand Movement	8.59	3.15	8.15	2.49	8.38	2.84
(5)	Number Recall	9.05	3.04	8.88	3.16	8.96	3.08
(7)	Word Order	8.84	2.75	8.85	3.09	8.85	2.90

Null Hypothesis 6: There will be no significant difference between the mean performance of a referred population of non-Native American and Native American children on the 10 subtest scores of the WISC-R.

Alternate Hypothesis 6: There will be a significant difference between the mean performance of referred populations of non-Native American and Native American children on the 10 subtest scores of the WISC-R.

To test these hypotheses the 10 subtest scores of the

WISC-R were taken as dependent variables. The analysis of these scores appears in Tables XI and XII. Since the within cell error correlation was less than .30 in this case, a univariate approach to analysis was indicated. The Wilk's Lambda was calculated to be .74368 which is equivalent to a F ratio of 2.59 with 10 and 75 degrees of freedom. The probability of obtaining a F this large by chance is .01 indicating that there is a significant difference between the means of performance on the 10 subtests of the WISC-R.

Examination of the univariate F tests with 1 and 84 degrees of freedom shows WISC-R subtest 4 (Vocabulary) with a F equal to 6.25 and subtest 5 (Comprehension) with a F equal to 6.41. The probability of obtaining F scores of this size is less than .05 and is significant at the .01 level. In this case Null Hypothesis is rejected in favor of the Alternate Hypothesis which states that there would be a significant difference between the mean performance of referred non-Native American and Native American children on the 10 subtests of the WISC-R.

TABLE XI

MULTIVARIATE ANALYSIS OF VARIANCE
WISC-R 10 SUBTESTS, BY RACE.

MANOVA

Source	Multivariable F (10,75 df)	Univariate F (1,84 df)	Stepdown F	df
Race	.010 **			
(7) P.C.		.166	.166	1,84
(8) P.A.		.985	.423	1,83
(9) B.D.		.272	.106	1,82
(10) D.A.		.102	.016*	1,81
(11) Coding		.943	.971	1,80
(1) Information		.397	.135	1,79
(2) Similarities		.892	.634	1,78
(3) Arithmetic		.768	.280	1,77
(4) Vocabulary		.014**	.016*	1,76
(5) Comprehension		.013**	.089	1,75

P<.05* P<.01**

TABLE XII

MEANS AND STANDARD DEVIATIONS BY RACE, OF WISC-R 10 SUBTESTS.

		Native American		Non-Native American		Total Sample	
		X	S.D.	X	S.D.	X	S.D.
(7)	P.C.	9.11	2.51	9.90	2.7	9.50	2.64
(8)	P.A.	9.30	3.82	9.31	3.20	9.30	3.51
(9)	B.D.	9.09	2.88	8.38	3.08	8.74	2.98
(10)	D.A.	8.68	3.48	9.81	2.80	9.23	3.19
(11)	Coding	8.59	2.99	8.64	3.66	8.62	3.32
(1)	Information	6.49	2.57	7.00	3.12	6.73	2.84
(2)	Similarities	7.41	3.22	7.50	2.97	7.45	3.08
(3)	Arithmetic	7.39	2.82	7.21	2.56	7.30	2.68
(4)	Vocabulary	7.41	3.20	9.00	2.66	8.19	3.04
(5)	Comprehension	7.80	2.93	9.33	2.69	8.55	2.91

Null Hypothesis 7: There will be no significant difference between the mean performance of a referred population of Cherokee and Kiowa children on the eight subtests of the K-ABC.

Alternate Hypothesis 7: There will be a significant difference between the mean performance of a referred population of Cherokee and Kiowa children on the eight subtests of the K-ABC.

The next dependent variables to be analyzed were the eight subtests of the K-ABC used as a means of comparing the Native American Cherokee and Kiowa children (Tables XIII and XIV). The within cell error of correlation was greater than .30 suggesting the use of multivariate analysis. The Wilk's Lambda statistic was calculated to be .6850 which is equivalent to a F ratio of 2.01 with 8 and 35 degrees of freedom which falls at the .07 level of significance. Since the probability of obtaining a F of this size is greater than the required .05 level of significance, Null Hypothesis 7, which states there will be no significant difference in these dependent variables, was accepted and the Alternate Hypothesis was rejected.

TABLE XIII

MULTIVARIATE ANALYSIS OF VARIANCE
K-ABC 8 SUBTESTS, BY TRIBE.

MANOVA

Source	Multivariable F (8,35 df)	Univariate F (1,42 df)	Stepdown F	df
Race	.074 (n.s.)			
(4) Gestalt C.		.608	.608	1,42
(6) Triangles		.853	.946	1,41
(8) Matrix		.004	.004	1,40
(9) Spatial Memory		.459	.517	1,39
(10) Photo Series		.785	.158	1,38
(3) Hand Movement		.776	.817	1,37
(5) Number Recall		.126	.156	1,36
(7) Word Order		.054	.272	1,35

TABLE XIV

MEANS AND STANDARD DEVIATIONS BY TRIBE, OF K-ABC 8 SUBTESTS.

		Cherokee		Kiowa		Total	
		X	S.D.	X	S.D.	X	S.D.
(4)	Gestalt	10.14	3.03	9.67	2.50	9.98	2.84
(6)	Triangle	9.17	3.09	9.00	2.48	9.11	2.87
(8)	Matrix	9.41	2.45	7.53	1.18	8.71	2.32
(9)	Spatial	9.31	2.33	8.73	2.60	9.11	2.41
(10)	Photo Series	8.66	2.47	8.47	1.36	8.59	2.14
(3)	Hand Movement	8.69	3.57	8.40	2.23	8.59	3.15
(5)	Number Recall	9.55	3.37	8.07	2.05	9.05	3.04
(7)	Word Order	9.41	2.83	7.73	2.28	8.84	2.75

Null Hypothesis 8: There will be no significant difference between the mean performance of a referred population of Cherokee and Kiowa children on the 10 subtests of the WISC-R.

Alternate Hypothesis 8: There will be a significant difference between the mean performance of a referred population of Cherokee and Kiowa children on the 10 subtests of the WISC-R.

The last dependent variables to be submitted to analysis were the 10 subtest scores of the WISC-R in comparison of the mean performances of Native American Cherokee and Kiowa children (Tables XV and XVI). The within cell error correlation was greater than .30 suggesting once again a multivariate analysis. The Wilk's Lambda was calculated to be .76096 which is to a F ratio of 1.04 with 10 and 33 degrees of freedom. The probability of obtaining a F of .44 by chance is greater than the .05 level indicating no significant difference in these scores. Therefore, Null Hypothesis 8 is confirmed and the Alternate Hypothesis is rejected.

TABLE XV

MULTIVARIATE ANALYSIS OF VARIANCE
WISC-R 10 SUBTESTS, BY TRIBE.

MANOVA

Source	Multivariable F (10,33 df)	Univariate F (1,42 df)	Stepdown F	df
Race	.436 (n.s.)			
(7) P.C.		.645	.645	1,42
(8) P.A.		.898	.699	1,41
(9) B.D.		.715	.740	1,40
(10) D.A.		.230	.180	1,39
(11) Coding		.743	.654	1,38
(1) Information		.032	.017	1,37
(2) Similarities		.090	.465	1,36
(3) Arithmetic		.057	.723	1,35
(4) Vocabulary		.056	.810	1,34
(5) Comprehension		.038	.309	1,33

TABLE XVI

MEANS AND STANDARD DEVIATIONS
BY TRIBE, WISC-R 10 SUBTESTS.

		Cherokee		Kiowa		Total	
		X	S.D.	X	S.D.	X	S.D.
(4)	P.C.	9.24	2.56	8.87	2.50	9.11	2.51
(8)	P.A.	9.24	4.24	9.40	2.97	9.30	3.82
(9)	B.D.	9.21	3.10	8.87	2.47	9.09	2.88
(10)	D.A.	9.14	3.76	7.80	2.76	8.68	3.48
(11)	Coding	8.48	3.05	8.80	2.96	8.59	2.99
(1)	Information	7.07	2.63	5.33	2.06	6.48	2.57
(2)	Similarities	8.00	3.56	6.27	2.09	7.41	3.22
(3)	Arithmetic	7.97	3.17	6.27	1.53	7.39	2.82
(4)	Vocabulary	8.07	3.44	6.13	2.26	7.41	3.20
(5)	Comprehension	8.45	3.30	6.53	1.40	7.80	2.93

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

This chapter presents a summary of the present investigation, discussion, and conclusions about the findings and recommendations for future research. Limitations of this research are also discussed.

The search of the literature for this study revealed that there had been limited research examining the performance of Native American children on intelligence tests and only one study of this nature using Native American children in Oklahoma (Mitchell, 1980).

Comparative studies examining the performance of Native American children on existing intelligence measures have reported consistent results. These studies show Native American children perform below average on verbal types of tests and test items, but average or above on performance oriented tests or test items (Pray, 1979; Hynd, Quackenbush, Kramer & Conner, 1980; Reschly & Jipson, 1981). However, when these lower overall test performance scores were used as predictors of later school performance they were found to be relatively accurate predictors of academic achievement levels (Reschly & Sabers, 1979). Although Native American

children, as a group, consistently varied, in the same way with lowered verbal test scores, which resulted in lowered overall IQ scores, these were considered as an accurate intellectual assessment because the tests could be validated as good predictors of later performance. Inasmuch as the philosophical base for our intelligence tests emphasized product, the justification of the continued use of these instruments seemed acceptable and difficult to dispute. The position of many professionals (Mercer, 1979; Williams, 1979), and more recently the courts (Larry P. vs. Riles, 1972), was that these lowered intelligence estimates, as well as school achievement levels, were due to the influence of cultural values and experimental opportunities. This position that values and experimental opportunities varied in significant ways and did indeed effect intelligence scores lead to the close examination of existing intelligence tests, but there were no real alternatives in terms of different ideas about what intelligence is and how it might be assessed more accurately without being negatively influenced by cultural differences.

The present study was undertaken to compare the performance of referred Native American children and non-Native American children on two intelligence tests. The WISC-R with its emphasis on product (Wechsler, 1974), and a new intelligence test, the K-ABC, with an emphasis on process, a different philosophic basis for assessing

intelligence (Kaufman, 1983). Variables were controlled so as to assess performance differences that might only have been the result of cultural or tribal membership and to determine if either of these tests showed significant group mean differences on this basis.

In Oklahoma we have a large population of Native American children who are attending public schools and who are referred for a psychoeducational evaluation, including an intelligence test; thus, this topic of investigation was a pertinent topic for our state. Inasmuch as most of the intelligence testing is done through our Regional Educational Service Centers and it is this population which is most effected by intelligence test results, they were chosen as the target population.

Eighty-six children participated in this research. All of the children had been referred to their respective RESC for a psychoeducational assessment. The referral concern for all of the children was low academic achievement in reading only or across all academic areas. The children ranged in age from 6 years to 11 years 11 months and were attending public school. The children lived in rural areas of Oklahoma: 29 Cherokee and 30 non-Native American children from Eastern Oklahoma, 15 Kiowa and 12 non-Native American children from Southwestern Oklahoma. Each child had been administered the WISC-R as part of the standard RESC evaluation and were later administered the K-ABC. The

results from these two tests were examined for performance differences between the culturally different groups as well as the tribally different groups.

Summary

The analysis of the data resulted in the following findings:

1. There was not a statistically significant difference between the performance of Native American and non-Native American children on the three global scores of the K-ABC.

2. There was not a statistically significant difference between the performance of Native American and non-Native American children on the three global scores of the WISC-R.

3. There was not a statistically significant difference between the mean performance of Cherokee and Kiowa children on the three global scores of the K-ABC.

4. There was not a statistically significant difference between the mean performance of Cherokee and Kiowa children on the three global scores of the WISC-R.

5. There was not a statistically significant difference between the mean performance of Native American and non-Native American children on the eight subtest scores of the K-ABC.

6. There was a statistically significant difference

at the .01 level of significance between the mean performance of Native American and non-Native American children on two of the 10 subtests of the WISC-R, the Vocabulary, and the Comprehension subtests.

7. There was not a statistically significant difference between the mean performance of Cherokee and Kiowa children on the eight subtest scores of the K-ABC.

8. There was not a statistically significant difference between the mean performance of Cherokee and Kiowa children on the 10 subtest scores of the WISC-R.

Conclusions

The following conclusions were made as a result of the analysis of the data obtained in this study.

The first four hypotheses tested attended directly to the global IQ scores. The results showed that the scores of the Native American children were not significantly different than the scores of the non-Native American children on either the K-ABC or the WISC-R. The results also showed that there was not a significant difference in the way Cherokee and Kiowa children performed on these two intelligence tests. It would appear that the difference in these two intelligence tests, in terms of their philosophic approach to the assessment of intelligence, makes no significant difference in test performance for culturally different groups. These results suggests that either test

instrument could be used to assess the intelligence of Native American children.

The last four hypotheses attended to the subtest scores which combine to form the global scores on the WISC-R and K-ABC. Upon examination of the analysis done with the subtest scores on these two instruments, there was a significant difference between the performance of Native American and that of the non-Native American children on the WISC-R. The univariate analysis was examined to determine more specifically what was accounting for these performance differences. It was found that the differences occurred on two subtests of the WISC-R Verbal Scale, the Vocabulary subtest, and the Comprehension subtest. On both these subtests the Native American children scored significantly lower than the non-Native American children. These two subtests are thought to be tied to experiential opportunities a minority child might have with the majority culture. These results support the contention of many professionals (Flaugher, 1978; Mercer, 1979; Williams, 1979) that Native American children are at a disadvantage in those areas which are emphasized by the majority culture but are not promoted by their own culture (Morton, 1965; Wahrhaftig, 1965). The areas related to language may often be effected by the fact that many of these children in Oklahoma come from homes which are bilingual (U. S. Census, 1980). Inasmuch as the WISC-R bases its assessment of intelligence on product, it

seems important to look closely at these results so that a child's intellectual capacity is not judged by measuring a skill or knowledge base they may have had limited experience with, as compared to the majority culture children, or that may be in direct opposition to their own cultural values. Since these children are in public schools, the WISC-R subtests (Vocabulary and Comprehension) may give us information about their readiness or preparedness for that specific setting, but we must be cautious in labeling them as limited or deficient intellectually.

The analysis of the subtests of the K-ABC showed that referred Native American and non-Native American children did not perform significantly differently on any of the K-ABC subtests. Considering the different philosophical base for the K-ABC, with its emphasis on process, rather than product, as a means of assessing intelligence, these results support the idea that the K-ABC may be a preferred instrument to use when cultural factors may subtly influence the test results for this group of minority children.

When the results of the analysis are viewed in terms of the values promoted by the Native American culture in general, it can be seen that these values correspond more closely to an emphasis on process, and problem solving rather than product. Core values such as the importance placed on the individual's contribution to the group rather than their individual achievement, competition is not

encouraged, a desire to live in an unhurried and present-time oriented manner, a pragmatic and unstructured learning environment encouraged by parents and the implication that success within the majority culture equates to a loss of Native American identity (Havighurst, 1944; Zintz, 1962; Morton, 1965; Hynd & Garcia, 1979; Naglieri and Kamphaus, 1983), suggest some ideas about why these children show intelligence subtest scores which were significantly different from the non-Native American sample.

The analysis of performance on the subtests of the K-ABC for the two tribally different groups of Native American children, Cherokee and Kiowa, showed that they did not perform significantly differently. The analysis of their subtest performance on the WISC-R did not show any significant differences between these tribally different groups.

The results of this investigation are considered meaningful to school personnel, psychometrists, and psychologists who deal with culturally different children, particularly the Native American child. The results suggest that there are differences between these children and that professionals need to be sensitive to these differences if they are to be helpful to children who are having difficulties within the public school system.

In conclusion, the emergence of no statistically significant difference in the global scores analyzed in this

study suggests that none exists. But we know that with small sample size the variability within the group, as compared to the variability between groups, can effect the results of a study. Because there were significant differences evident on individual subtest performance, but not evident on global score performance, it is the opinion of this researcher that sample size limited the sensitivity of the statistical procedure used and restricted the strength of any definite conclusion concerning the use of either the K-ABC or WISC-R with this population of children.

Recommendations

The following recommendations are offered on the basis of this study:

It seems clear to this researcher that there are many more studies needed before we can feel confident of the results of intelligence tests used to assess the ability of culturally different children. Intelligence testing, as a science is in process, but not complete. The K-ABC appears to be a step in the right direction. Its emphasis on assessing intellectual ability in terms of process rather than product, looking at ways children approach a task, not just the end product, seems to hold promise of being a more accurate assessment of Native American children. It appears that the K-ABC may be less likely to label children who are culturally different as having less ability. However, the

WISC-R appears to give professionals indications that this group of children are less prepared for successful performance within the public school system.

1. To confirm the conclusions of this study suggesting there are cultural differences affecting the performance of this referred population of Native American children on the WISC-R, larger samples of both Native American and non-Native American children are needed. It is recommended that further research be done with larger samples of Native American minority groups and other non-minority groups of children.

2. Inasmuch as the sample populations used were a special group within both populations (referred children) it is recommended that there be further investigation of the effects of cultural differences on intelligence test performance, utilizing a sample of Native American children who have not been referred for any academic difficulty. The sample should be comprised of Native American children who are functioning adequately within the academic demands of the public school. As a result of the sample used in this investigation the results cannot be generalized to all Native American children, or even all Cherokee or Kiowa children, but only to those who have been referred for psychoeducational testing.

3. The close examination of mean performance between tribally different groups of children suggest that this

should be investigated further. It is recommended that each tribe, Cherokee and Kiowa, be examined separately and compared to a non-Native American sample of children using both these intelligence instruments, the WISC-R and the K-ABC. This study, as designed, did not address the unique individual tribal differences adequately, thus leaving unanswered questions concerning the test performances of these two tribes.

4. There are a large number of different tribes of Native American children in Oklahoma. The results of this study suggest that each tribe needs to be investigated separately. In so doing, we may come to know if there are subtle cultural differences among all the tribes that affect the performance outcome of intelligence tests or whether those differences are only applicable to certain tribes and not others.

5. The samples of children, both Native American and non-Native American, were drawn from rural areas of Oklahoma. It is not known from this investigation whether there are significant differences in test performances, based on cultural factors, of a sample of children drawn from an urban area. If living in urban areas where tribes are not as likely to be mutually exclusive within tribal parameters or within racial parameters would be an important factor in terms of its effect on test performances.

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VITA

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Doctor of Philosophy

Thesis: ASSESSING THE PERFORMANCE DIFFERENCES OF REFERRED NATIVE AMERICAN AND NON-NATIVE AMERICAN CHILDREN ON TWO INTELLIGENCE TESTS: K-ABC AND WISC-R

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