DETERMINING THE VALIDITY OF THE
KAUFMAN ASSESSMENT BATTERY FOR CHILDREN (K-ABC)
WITH LEARNING DISABILITIES

DISSERTATION

Presented to the Graduate Council of the
North Texas State University in Partial
Fulfillment of the Requirements

For the Degree of

Doctor of Philosophy

By

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August, 1986

This study investigated the relation of the Kaufman Assessment Battery for Children (K-ABC) with the Wechsler Intelligence Scale for Children - Revised (WISC-R) for learning disabled (LD) children, the relation of K-ABC Achievement subtests with other achievement tests, and the relation of verbal and perceptual abilities assessment and the K-ABC. One hundred white, middle to above socio-economic status (SES), LD students 6 to 12 1/2 years old were administered the K-ABC in addition to the test battery used to identify them. Findings indicated significant differences (p<.01) between WISC-R Full Scale scores and K-ABC MPC scores, with MPC scores being 3.33 points lower. Significant correlations (p<.01) were found between the following: (a) WISC-R Performance scores and K-ABC Simultaneous scores, (b) K-ABC Sequential and Simultaneous scores, (c) WISC-R Performance and K-ABC Sequential scores, (d) K-ABC Arithmetic and WRAT Arithmetic, and (e) K-ABC Reading Understanding and the following: Woodcock Word Identification, Woodcock Passage Comprehension, WRAT Reading, and Durrell Silent Reading. The study found the MPC correlates higher with tests of perceptual ability than with tests of verbal ability. Results indicate the
following: (a) the WISC-R and K-ABC can substitute each other when measuring overall intelligence, (b) the WISC-R and K-ABC do not measure the same abilities, (c) the Sequential-Simultaneous score discrepancy is a poor diagnostic indicator of LD, (d) the discrepancy between the Achievement scale and the K-ABC intelligence scales is a poor diagnostic indicator of LD, (e) the K-ABC Arithmetic subtest is no better and no worse than the WRAT Arithmetic subtest, (f) WRAT Reading, Woodcock Word Identification and K-ABC Reading Recognition are not interchangeable measures of word calling skills, (g) the K-ABC Reading Understanding subtest is as adequate a measure of reading comprehension as other available tests, (h) the MPC is clearly more a measure of perceptual ability than of verbal ability, and (i) the K-ABC is no more fair a measure to use with LD children than are intelligence tests with a heavy language component.
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CHAPTER 1

DETERMINING THE VALIDITY OF THE KAUFMAN ASSESSMENT BATTERY FOR CHILDREN (K-ABC) WITH LEARNING DISABILITIES

The major purposes of psychoeducational evaluation as implemented in most schools are the identification of those pupils who are experiencing more than expected academic difficulty, and arriving at appropriate diagnoses according to standard special education categories. A secondary purpose of evaluation is to obtain information that can be used to plan individual programs for those children who are identified as handicapped (Meyers & Hammill, 1976). The identification process begins by locating the students who are experiencing difficulty and concludes with decisions being made relative to the type of handicap a child may have, and the setting in which the child can best be taught. Therefore, a comprehensive school appraisal system will account for referral, screening, in-depth assessment, placement, and review.

From the educational point of view, the most important reason for evaluating children is to collect information that can be used as the basis for planning instructional programs for children. Educational evaluation has been described as a structured testing and educational procedure designed to assess the child's functioning and level of
achievement in a variety of areas (Jedrysek, Klapper, Pope, & Wortis; 1972). When properly employed, assessment provides an opportunity to watch a child learn under standardized conditions, to explore capacity for mastering new learning, and to discover the potential obstacles to learning which may be present. The educational profile of the child forms the foundation for planning the educational program, one based on the systematic and detailed information received about the child.

The assessment process, which usually employs standardized instruments to collect information about the child, involves far more than the administration of tests. Often, however, plans have been based almost exclusively on the results of tests. This is unfortunate due to the shortcomings inherent in testing (Salvia & Ysseldyke, 1981). Emphasis has been given to a search for "the test," usable with all populations, able to answer all diagnostic questions, and to make educational recommendations. This "search" has produced many instruments which have low reliabilities, limited test content, and undemonstrated educational validity. Ysseldyke (1979) has suggested that educational personnel are and have been engaged in testing for no apparent purpose and with no reasonable impact on children, educational systems, or anything else. This argument supports the possibility that professionals give
tests for the sake of giving tests and that educational
decision making is a practice characterized by
ineffectiveness and inconsistencies (Ysseldyke & Algozzine,
1983). The goal of improved psychoeducational assessment
practices seems to be escaping. Vast numbers of students
are being subjected to the assessment process, while
questions of accuracy and effectiveness continue to prompt
concern.

The limitations of standardized tests seem to have
always plagued assessment personnel. Issues of test bias
and questions regarding validity and reliability have
frequently emerged, especially when new tests are
introduced. One relatively new instrument which is
generating an enormous amount of controversy is the Kaufman
Assessment Battery for Children (K-ABC) (Kaufman & Kaufman,
1983b).

The Kaufman Assessment Battery for Children (K-ABC)
The K-ABC was published in April of 1983. Since its
release it has received considerable attention from both the
popular (Starr, 1983; West, 1982) and professional (Kaufman,
1983) presses. A specialty newsletter devoted entirely to
this test has started publication (K-ABC Information/Edge,
published by Buttonwood Farms, Inc.). In the fall of 1984,
The Journal of Special Education published a special issue
devoted entirely to the K-ABC.
The K-ABC is a test which yields measures of both intelligence and academic achievement. The test's scales of intelligence are based upon current theory in neuropsychology and cognitive psychology, in which intelligence is defined as the ability to solve problems. The K-ABC approaches intellectual assessment in a manner consistent with the work of various investigators who have suggested that two types of mental problem solving functions, simultaneous and sequential, can be identified and may even reflect cerebral specialization (Gazzaniga, 1975; Bogen, 1975; Kinsbourne, 1978). This orientation draws heavily upon the work of Luria (1966a, 1966b, 1973), who conducted research on the identification and localization of specific brain-behavior relationships, and the work of Das, Kirby, and Jarman (1975, 1979), who expanded upon Luria's findings and strongly support the dual processing model of mental functioning.

The two intellectual processes measured by the Kaufman scales are designated as simultaneous and sequential. The simultaneous processing factor refers to stimuli integrated as total gestalts, very often spacial in context, so that problem solving is most successful when all elements are considered at one time. In contrast, the sequential processing factor demands that stimuli be processed in a specific temporal sequence for problem solving to be efficient. These two processes, simultaneous and
sequential, make up the Mental Processing Scales of the Kaufman battery, and together yield the Mental Processing Composite score (MPC), which may be considered a measure of intelligence.

In addition to the Mental Processing Scale (which forms the basis of the Kaufman test), an achievement scale is also presented. The Achievement Scale includes items more typically seen in measures such as the Verbal scale of the WISC-R (Wechsler, 1974) and purports to yield a reasonable estimate of "crystallized" intelligence rather than the "fluid" intelligence orientation of the Mental Processing scales. From the K-ABC's orientation, crystallized skills are thought of as achievement, reflecting the view that success on such tasks requires a certain development of academic skill, reading capacity, and information drawn from educational and cultural experiences. The Achievement Scale reflects the more traditional measures of intelligence. The K-ABC attempts to separate intelligence from achievement by minimizing the role of children's environmentally acquired knowledge in measuring intelligence.

Statement of the Problem

The K-ABC has been purported to be useful in identifying learning disabilities (LD), both in terms of categorizing children and evaluating the mental processing styles of the children identified. The search for "the
test" seems to have produced an instrument which appears to be extremely useful for a multitude of purposes. The innovative theoretical basis of the K-ABC indeed suggests the test may be useful in diagnosing learning disabilities, since the usual manner of diagnosing LD (significant differences between intelligence and achievement) would be readily observable. The question of LD diagnosis based on the K-ABC is exceedingly nebulous, however, and open to much needed research.

The problems of diagnosing learning disabilities with the K-ABC are inherent to the basic conceptualizations of the test, i.e., what is being compared to what. The authors state in the K-ABC Interpretive Manual (Kaufman & Kaufman, 1983b, p. 129) that "there is some evidence that learning disabled children perform relatively poor on those simultaneous processing tasks that have sequential components, and therefore demand integration of these two processes." Yet, Hooper and Hynd's (1982) study found that learning disabled children scored as poorly on some simultaneous processing subtests as they did on the sequential ones, a direct contradiction of the Kaufman position. Several samples of learning disabled children tested on the K-ABC have demonstrated approximately equal proportions of significant simultaneous greater than sequential and sequential greater than simultaneous discrepancies (Kaufman & Kaufman, 1983b). Thus, the
apparent difficulty that some learning disabled children have with integrated as well as sequential tasks appears to make a simple discrepancy between the simultaneous and sequential standard scores a poor potential diagnostic indicator of learning disabilities.

The problem of LD diagnosis with the K-ABC becomes even more complicated when one examines the tasks required in the Achievement Scale of the test. The Achievement Scale contains a combination of WISC-R (Wechsler, 1974) type subtests (Similarities, Information, Vocabulary, and Arithmetic), and subtests requiring word recognition and reading comprehension. Although all the subtests in the Achievement Scale require only limited verbal expressive ability, the combination of the two types of measures in the scale (cognitive developmental and school learning) appear to be inappropriate, raising the question of whether the Achievement Scale measures general cognitive development, school learning, or both. Further questions regarding just what is the relationship between the Simultaneous Scale, the Sequential Scale, the Mental Processing Composite, and the Achievement Scale for learning disabled populations have yet to be clarified.

**Need for the Study**

A number of questions can be raised regarding the validity of the K-ABC as it relates to LD populations. The
K-ABC Interpretive Manual (Kaufman & Kaufman, 1983b) reports limited data suggesting that many LD students have a strength in simultaneous processing and a weakness in both sequential processing and achievement. More research, however, is needed to confirm this hypothesis. "Additional research with homogeneous, clearly defined populations of learning disabled children is needed to verify the existing findings and to delimit the diagnostic potential of the K-ABC" (Kaufman & Kaufman, 1983b, p. 142). The purpose of this study is to examine the validity of the K-ABC, when used in diagnosis of learning disabled children.

Significance of the Study

The outcome of this study helps answer important questions not previously addressed in the literature, and attempts to validate the use of the K-ABC with learning disabled children. The study also expands upon the pre-publication validation studies cited in the test manual. The questions addressed in this study are the following: (a) To what extent does the Mental Processing Composite score of the K-ABC correlate with tests of perceptual and verbal ability? (b) To what extent does the K-ABC correlate with the WISC-R (Wechsler, 1974) for LD children? (c) Are there any significant differences in simultaneous and sequential processing in a given learning disabled population? (d) How do scores on the achievement subtests of
the K-ABC correlate with scores on other measures of achievement? It is on the answers to the above questions that this study bases its purpose and significance.

**Review of the Literature**

The stage for the development of the K-ABC was set in a Kaufman article published in *The Journal of Research and Development in Education* (1979). In this article, Kaufman maintained that individual intelligence testing has been resistant to change despite advances in the related fields of neurology and psychology, that substantive theoretical advances in intelligence research had been ignored in the conservative test publishing industry, and that the field of intelligence testing lacked any true innovations since the work of Binet around the turn of the century. Kaufman emphasized the need for theory-driven assessment, and interpretation of children’s intelligence from a strong theoretical base. The K-ABC's theoretical underpinnings is perhaps what distinguishes most this test from its predecessors.

**Research and Reviews of the K-ABC**

A considerable amount of interest and research on the K-ABC has developed since the instrument was first introduced in 1983. Research topics surrounding the K-ABC have been as varied as: (a) factor analysis of the K-ABC (Kaufman & Kamphaus, 1984) (b) age progressions of the K-ABC subtests (Reynolds, Wilson, & Chatman, 1983), (c)
correlations of the K-ABC with other tests (Bing & Bing, 1984; Harrison & Kamphaus, 1984; Kamphaus, 1983; McLoughlin & Ellison, 1984; Naglieri & Haddad, 1984; Snyder, Leark, Golden, Grove, & Allison, 1983; Zins & Barnett, in press), (d) profile interpretation of the K-ABC (Naglieri & Kamphaus, in press), and (e) the use of the K-ABC with Appalachian children (Clark, 1984), trainable mentally retarded children (Kaplan & Klanderman, 1984), learning disabled children (Klanderman, Perney, & Kroeschell, 1984), and gifted children (McCallum & Karnes, 1984). The K-ABC has also been reviewed for the Reading Teacher (Narrot, in press), the 9th Edition of the Mental Measurements Yearbook (Anastasi, 1983), and the Journal of Psychoeducational Assessment (Das, 1984a).

The fall 1984 special issue of the Journal of Special Education, totally devoted to the K-ABC, has to date furnished the most comprehensive set of reviews and critiques of the test. The last article in the issue, entitled "K-ABC and Controversy", is Kaufman's response and rebuttal to the K-ABC critics. Kaufman (1984) lists seven questions which he sees as the most frequently posed by critics of the K-ABC:

1. Is the K-ABC either invalid or less valid than existing intelligence tests?
2. Is the theory underlying the K-ABC defensible?
3. Is the role of a clinician understood by laboratory researchers?
4. Is the K-ABC's ability-achievement dichotomy defensible?
5. Are any proposed alternate interpretation models more defensible than the K-ABC's sequential-simultaneous model?
6. Can one use the sequential-simultaneous processing dichotomy as a basis for remediation?
7. How well do we understand the Black-White differences on the K-ABC? (p. 410)

The following review reflects the currently available literature on the K-ABC and addresses five of the above controversial issues regarding the K-ABC as identified by Alan Kaufman (1984). Since the present study does not address Black-White differences or the issue of clinical versus laboratory use, these topics have been purposely omitted. Issues regarding diagnostic interpretation, however, will be included.

**Validity of the K-ABC According to Current Theories of Intelligence**

The *K-ABC Interpretive Manual* (Kaufman & Kaufman, 1983b) furnishes voluminous information on the validation of the K-ABC. Numerous pre-publication studies are cited which serve as evidence of construct, predictive, and concurrent validity of the K-ABC. Ample disagreement exists, however,
regarding the validity of this test. Anastasi (1984), for example, approaches this issue from a technical adequacy and statistical point of view, while Sternberg (1984) approaches the questionable validity of the K-ABC from a theoretical, empirical point of view. The validity issue is also raised by Jensen (1984) who seriously questions what the K-ABC does and does not measure.

Sternberg (1984, p. 276) notes that the K-ABC "shows that it is possible to reduce [interindividual] differences if only one creates a test of sufficiently low validity." He adds that "the way to eliminate differences between groups entirely is to create an entirely invalid test, and the Kaufmans seem to have taken a step in this direction" (Sternberg, 1984, p. 276). The K-ABC "is based upon an inadequate conception of intelligence, and as a result, it is not a good measure of intelligence" (Sternberg, 1984, p. 277). Turning the tables, Sternberg suggests the data cited by the K-ABC authors to support the conception of the test do not actually support it at all. The external validations, if anything, counterindicate the validity of the theory, and the internal validations are inadequate (Sternberg, 1984). All of these issues will be discussed in latter sections of this chapter.

A different view of the K-ABC's validity is taken by Anastasi (1984), who points out that the development of the
K-ABC provides a good example of the multi-stage validation procedure, a technique that she strongly advocates. Although she says nothing about test content, Anastasi (1984) states that the K-ABC reveals sophisticated application of current test construction methodology. Like any psychological test designed for intensive individual assessment, it requires an examiner who is thoroughly knowledgeable about clinical assessment procedures and research findings in the psychology of individual differences. Some statements in the K-ABC manuals may, however, support common misconceptions about the nature of performance on intelligence tests. Specifically, Anastasi addresses statements about separating the assessment of acquired knowledge (achievement) from problem solving ability (mental processing). This masks the fact that information-processing skills are impacted by a child's background experiences. In a 1983 review, Anastasi stated that the K-ABC is an innovative cognitive assessment battery whose development meets high standards of technical quality. She warns, however, that the test should be presented to the testing community with suitable cautions against probable misuses.

According to Jensen (1984), researchers have various opinions about what the K-ABC actually measures and how it measures it. The K-ABC yields a more diluted, and less valid, measure of g than do the Stanford-Binet (Terman &
Merrill, 1972) and Wechsler (1974) scales. Jensen claims that the K-ABC factors of successive and simultaneous mental processing, independent of the g factor, constitute only a small fraction of the total variance in K-ABC scores, and that the predictive validity of small factors, per se, is probably nil (Jensen, 1984).

Another opinion of what the K-ABC measures, and how, is voiced by Sternberg (1984), who says that "it is astonishing to find that tests that measure little more than rote learning comprise one of the two scales that appear on the K-ABC" (Sternberg, 1984, p. 275). Sternberg challenges the validity of the entire K-ABC since the Simultaneous Processing Scale also has heavy memory demands. He states that the K-ABC "is grossly out of line with other existing [intelligence] tests in this respect. Most do not measure rote learning at all, and those that do, such as Wechsler, assign it little weight" (Sternberg, 1984, p. 275).

Admittedly, Kaufman (1984) concedes that the K-ABC includes many memory tasks, but he feels this fact alone does not, by itself, invalidate the battery.

Kaufman (1984) further defends the validity of his test by quoting Jensen's (1984) statement that the K-ABC "should be fundamentally ... close in nature to the old Simon-Binet test of 1905" (Jensen, 1984, p. 378). There seems to be a fallacy in Kaufman's defense, however. Kaufman cites
Jensen's own study of the K-ABC which found that $g$ loadings of the K-ABC subtests, when related to $g$ loadings of the WISC-R and Stanford-Binet, produce "correlations and congruence coefficients [that] are so high as to suggest that all three tests measure very much the same $g$" (Jensen, 1984, p. 387). This suggests that the K-ABC is not any more advanced or more sophisticated than older intelligence tests in terms of psychometric theory and technology.

In summary, the **K-ABC Interpretive Manual** (Kaufman & Kaufman, 1983b) reports substantial data on the validity of the MPC. Additional reviews of validity of the K-ABC were reported by Kaufman (1983). The test authors have indeed made impressive and extensive efforts to prove that the K-ABC is a highly valid instrument to assess intelligence and achievement in children. The validity of the K-ABC has been examined, however, from different vantage points by various experts, some of whom disagree over what and how the K-ABC actually measures what it measures. There are some who reject the test to such a degree as to totally invalidate it. Perhaps it would be appropriate to conclude this section with Anastasi's (1984) reminder that we still must await the gradual accumulation of empirical data regarding the "practical" effectiveness of the K-ABC to best evaluate the instrument's validity and the effectiveness of its theoretical orientation.
The Theory of Sequential Versus Simultaneous Processing

This section contains information regarding the theoretical orientation of the K-ABC as viewed by various theoreticians and researchers. The K-ABC's theoretical underpinnings are not universally accepted. Further, some of the individuals who gave rise to the simultaneous-successive mental processing theory are in disagreement with the Kaufman interpretation of the theory.

In the K-ABC, the factors which make up the mental processing scale, simultaneous and sequential, are taken from a model of information integration informally named by Kaufman and his collaborators as the Das-Luria model. Das (1984), however, feels that the K-ABC has initiated, but not completed, the job of constructing a process-based test of cognitive competence. The K-ABC would perhaps be described by as "the first attempt at constructing a standardized test in response to the contemporary notion of intelligence as information processing" (Das, 1984b, p. 236). The K-ABC does not measure sequential processes adequately, however, and its test items for simultaneous and sequential processes can also be characterized respectively as nonverbal and verbal (Das, 1984b p. 229).

Sternberg (1984) notes that the K-ABC Interpretive Manual (Kaufman & Kaufman, 1983b) tends to misrepresent and over-rate the support for the theory underlying the K-ABC (simultaneous-successive) in the cognitive-psychological
literature. Of the various investigators mentioned in the manual as having done work supporting the simultaneous-successive processing distinction, only Das, Kirby, and Jarman (1979) have completed research addressing this processing distinction. This work, however, was neither cognitive-experimental nor neuropsychological in character, but rather factor analytic. Sternberg (1984) claims that although other investigators studied various processing dichotomies -- sequential versus parallel or serial versus multiple (Neisser, 1967), analytic versus gestalt/holistic (Levy, 1972), time-ordered versus time-independent (Gordon & Bogen, 1974), controlled versus automatic (Schneider & Shiffrin, 1977), and verbal versus imagery or sequential versus synchronous (Paivio, 1975) -- they were not the successive versus simultaneous dichotomy proposed by Luria (1966b), which serves as the theoretical basis for the K-ABC. The K-ABC authors "thus seem to interpret support for any process dichotomy as support for their process dichotomy", and there is a lack "of any empirical support in the cognitive-experimental literature that should lead one to accept Luria's theory, either as a psychological theory or as a basis for an intelligence test (Sternberg, 1984, p. 271-272).

Simon and Newell (1971) have claimed that all human information processing is sequential. Anderson (1976)
argued that the simultaneous/sequential controversy is empirically unresolvable. Goetz and Hall (1984) contend that the K-ABC authors cite factor analytic support for their simultaneous and sequential constructs (e.g., Kaufman & Kamphaus, 1984), but factor analytic studies of K-ABC subtests do not sample a sufficiently broad range of tasks to promote the likelihood of identifying general factors.

According to Goetz and Hall (1984), Luria's (1966b, 1973) use of the terms "simultaneous" and "successive" differs markedly from that of the K-ABC. In Luria's model, information is said to be represented simultaneously in the third functional unit of the brain, but only after extensive processing of successive inputs in the first two units. The notion that individuals have preferred modes of processing is not a theme directly addressed in Luria's theory of how the brain works (Goetz & Hall, 1984). Goetz & Hall agree with Sternberg (1984) that after analysis of the information processing literature, there is nothing which reveals support for the simultaneous/sequential processing dichotomy on which the K-ABC is based. This may not necessarily negate the possibility that individuals might have processing preferences that could be characterized as sequential or simultaneous. From the information processing perspective, however, "there is at present no theoretical basis for the simultaneous/sequential analysis of intellectual or academic ability" (Goetz & Hall, 1984, p. 285).
Dean's (1984) view of the theoretical basis of the K-ABC is somewhat more favorable. He suggests that the K-ABC attempts to quantify bimodal, hemispheric brain functioning, and that portrayed as differences in cognitive processing, the successive-simultaneous scales of the K-ABC would seem to relate quite closely to the coexisting modes of thought attributed to left and right hemispheric differences. Though Dean acknowledges the similarity between the lateralized brain functions and subtests for each mental processing scale of the K-ABC and notes that this has the backing of factor analytic studies within the battery (see Kaufman & Kaufman, 1983b), the direct neurological implications of performance on the mental processing scales remain to be investigated. However, "the K-ABC represents a theoretically consistent battery of tests that offers insights into children's cognitive processing beyond presently available measures of intelligence" (Dean, 1984, p. 251). Kaufman (1984) claims to have presented evidence which attests to the convergence among theories and makes it defensible to consider support for each theory as empirical support, on some level, for the K-ABC dichotomy. Kaufman cites Kamphaus and Reynolds (1984) and Majovski (1984) who "see quite clearly the convergence among theorists, and recognize our right to interpret these theories as a solid basis for an intelligence test" (Kaufman, 1984, p. 417).
Thus, the theory on which the K-ABC is based is shrouded with controversy. Mental processing may be measurable but it may also not be synonymous with intelligence. Some feel that the K-ABC does not measure certain processes adequately, and that even if it did, there is lack of support for the simultaneous-successive psychological theory as a basis for an intelligence test. The dichotomous mental processing theory of the K-ABC is not without its followers; however, there is still a considerable lack of empirical support for the use of this theory as a basis for measuring either intelligence or academic ability.

**Ability Versus Achievement**

The mental-processing versus achievement dichotomy of the K-ABC is intended to separate acquired factual knowledge from the ability to solve unfamiliar problems (Kaufman & Kaufman, 1983b). According to the Kaufmans, the distinction between mental processing and achievement corresponds to the distinction between fluid and crystallized intelligence or between "a child's current level of intellectual functioning" (Kaufman & Kaufman, 1983b, p. 25) and "factual knowledge and skills acquired in a school setting or through alertness to the environment" (Kaufman & Kaufman, 1983b, p. 33). From an information-processing perspective, it appears that the mental processing subtests are intended to tap cognitive processes and strategies and the achievement
subtests intended to tap children's knowledge structures. Goetz and Hall (1984), however, note that performance on the processing tasks is dependent upon prior learning and the availability of appropriate knowledge structures. Similarly, a correct response to an achievement item inevitably requires processing of information presented in the item (Goetz & Hall, 1984).

The prevalent concept of learning disabilities (and the elusive task of diagnosing the disorder) requires an aptitude-achievement discrepancy. In contrast to the theoretical base of the K-ABC mental processing dichotomy, the test's intelligence-achievement distinction is primarily a practical one, intended for use in clinical applications for diagnostic purposes. Controversy exists, however, over the K-ABC's conception of what aptitude and achievement are and their relationship to each other. According to Kaufman (1984) the K-ABC's aptitude-achievement distinction is generally related to the Cattell-Horn (1966) notion of fluid and crystallized thinking. He sees the similarity as an outgrowth of the rational and logical influences that went into determining what tests might legitimately constitute a fairer measure (than existing IQ tests) of children's intelligence, and what tests are best thought of as "applied intelligence" (i.e., achievement). The words rational and logical seem to stand out in Kaufman's statement.
Anastasi (1984) considers the use of the term "achievement tests" to be an unfortunate choice for the authors of the K-ABC, and she questions why the Kaufmans didn't just include in the measure of intelligence the Achievement Scale, which seems to fit the concept just as well. Anastasi adds that "the so called Achievement Scale was designed 'not' to measure knowledge of facts, and that the Kaufmans had made special efforts ... to dissociate the achievement tests from specific information acquired in the classroom" (Anastasi, 1984, p. 364). This comment appears to be a reinterpretation by Anastasi since the K-ABC Interpretive Manual (Kaufman & Kaufman, 1983b) states that "regardless of more traditional approaches to the definition and measurement of intelligence, the K-ABC is predicated on the distinction between problem solving and knowledge of facts. The former set of skills is interpreted as intelligence; the latter is defined as achievement" (p. 2).

Kaufman (1984) concedes that perhaps "achievement" is an unfortunate choice, and maybe, as Jensen (1984) implies, it would have been better to disavow the K-ABC's claim to measure intelligence. The practicalities of educational evaluation, however, require children to be assessed on measures of intelligence and achievement. Kaufman states that using the term "mental processing" instead of "intelligence" coupled with a euphemism for achievement would not only limit the K-ABC's use, but would prohibit it
from use for educational diagnosis or school placement in many states. Although the term "IQ" was rejected, "we could not cripple the chances of the K-ABC becoming a legitimate assessment alternative because of a semantic distinction -- especially when we truly believe that we are measuring both intelligence and achievement in the K-ABC" (Kaufman, 1984 p. 428).

Anastasi's (1984) question of why not combine Mental Processing and Achievement scores to assess overall intelligence is answered by Kaufman (1984): The combination does occur, but it occurs after obtaining the separate standard scores. Kaufman maintains that global scores are not combined into an even more global aggregate because such a union would penalize those very children who were to be protected by the separation -- culturally disadvantaged, subculturally different, learning disabled, and mentally retarded. Skill separation in the K-ABC is questioned, however. Goetz and Hall (1984) discuss that children differ in their exposure to factors which would alter scores on mental processing (i.e., exposure to geometric forms such as those in the Matrix Analogies and Triangles subtests). Sternberg (1984, p. 273) also points out that "problem solving, even of the most abstract kind, does not take place in a vacuum of knowledge." Another point made by Goetz and Hall (1984) is that knowledge structures (i.e., the products
of achievement) are inextricably interwoven with mental processing in any cognitive task. They claim that the separation of processing and achievement measures is suspect from an information processing perspective. This statement has implications regarding the appropriateness of separating the two abilities from the K-ABC point of view, and raises even more questions about what this test actually measures.

One aspect of the aptitude-achievement distinction that Kaufman (1984) admits was not handled well or interpreted appropriately in the K-ABC concerns the degree to which the two variables would correlate with each other. Both Jensen (1984) and Mehrens (1984) point out that the Kaufmans interpret the findings that WISC-R and Binet IQ's correlate more highly with the Achievement Scale than MPC as evidence that conventional IQ's are largely measures of school related accomplishments. Kaufman (1984) replies: "We neglect to point out that our own MPC correlated .74 with the Achievement scale as a whole for school age children, about the same magnitude as the coefficients for WISC-R and Binet. In addition, we interpret the relatively high correlation between MPC and Achievement in a favorable light, pointing out that school achievement is the ultimate criterion for an intelligence test" (Kaufman, 1984, p. 430). This last statement seems to raise some questions, however. Should scores on Mental Processing be used to predict
academic achievement? Or should Achievement scores be examined to predict academic achievement?

In summary, the usual manner of diagnosing learning disabilities in children is to examine discrepancies between their intelligence (aptitude) and academic achievement. Since the K-ABC measures both, it would appear to be a valuable diagnostic tool. Controversy exists, however, over what abilities are being measured by which scale in the K-ABC. From the test's theoretical perspective, the separation of mental processing from achievement appears difficult. The question of whether mental processing equals intelligence is also raised. Furthermore, the appropriateness of attempting to separate aptitude and achievement (as measured by the K-ABC) has been questioned. Alternate Interpretations of the K-ABC Scales

A recommendation made in Chapter 6 of the K-ABC Interpretive Manual (Kaufman & Kaufman, 1983b, p. 204) addresses the experienced clinician to explore alternative theoretical models in grouping subtests for interpretive purposes. Several investigators have already taken steps in that direction and have proposed alternate models for explaining what the K-ABC measures. Keith and Dunbar (1984) have confirmed through factor analysis alternative groupings of K-ABC subtests, and provide novel interpretations of what these clusters measure. Although factor analyses of the K-ABC standardization data generally offer support for the
validity of the two mental processing scales, analyses including the achievement tests have been considerably less supportive. Results of Keith and Dunbar's (1984) study using all subtests suggest that the K-ABC has an alternative structure which measures (a) verbal memory skills, (b) verbal reasoning, and (c) nonverbal reasoning. They advise users to exercise caution when interpreting K-ABC scores, especially scores on the Achievement Scale. Das (1984b) considers the K-ABC mental processing dichotomy to be no more than a verbal-nonverbal distinction for ages 10 and above. Kaufman and Kamphaus (1984) present data, however, which is contrary to this claim, and which they maintain invalidates support for interpreting sequential processing as verbal ability for older children.

Jensen (1984, p. 382) supports the contention that the K-ABC is primarily a measure of g because it is "undoubtedly measuring g more than anything else." He states that the achievement tests measure the same g factors as the mental processing subtests, but the achievement subtests do it better. Jensen (1984, p. 384) concludes that the sequential and simultaneous processing tests measure g more than they measure mental processing, and he holds that "the sequential and simultaneous processing tests do not provide very clear measures of these two supposedly distinct measures of cognitive ability." Keith and Dunbar (1984) also concluded
that the three verbal reasoning subtests (combined with two reading subtests and labeled Achievement in the test itself) provide strong measures of \( g \) rather than achievement when analyzed without the reading tests. Kaufman (1984) answers such claims regarding \( g \) in the K-ABC: "Isn't it just possible that \( g \) is a measure of general achievement or of some amalgam of general intelligence and achievement? ... I don't dispute the importance of \( g \) as a psychological construct; but if clear-cut achievement tests load highest on it, then how effective is it as a criterion for evaluating an intelligence test's quality, or for selecting tasks for inclusion in an intelligence test? I think it is time for us to start reevaluating some of our old knee-jerk responses to the meaning of \( g \" (Kaufman, 1984, p. 432).

Goetz and Hall (1984) state that factor analytic studies of K-ABC subtests do not sample a sufficiently broad range of tasks to promote the likelihood of identifying general factors. Further, the pattern of correlations observed can be explained more simply in terms of task demands than central processing, since all of the serial subtests and none of the simultaneous subtests require that response be output in a given order. Goetz and Hall (1984) concluded after an information-processing analysis of the tasks that even nominally simultaneous tasks have important sequential components. Sternberg (1984) asks why one would wish to obtain and then use the two subscale scores as
though they were pure measures of each construct, when in reality they are not. Kaufman (1984) maintains, however, that a K-ABC goal was to have sequential components in the simultaneous tasks and vice versa (because) "intelligence is complex, and probably the most intelligent behavior results from an integration of sequential and simultaneous processing" (Kaufman & Kaufman, 1983b, p. 31). The Kaufmans' position is well taken; however, it does not seem to address the question posed by Sternberg.

In conclusion, the K-ABC authors encourage clinicians using this test to explore alternative theoretical models in grouping subtests for interpretive purposes. Several investigators have so explored the K-ABC, and alternative models are already emerging. One model suggests that the test measures (a) verbal memory skills, (b) verbal reasoning, and (c) nonverbal reasoning. Another model suggests that the K-ABC's processing dichotomy reduces to little more than a verbal-nonverbal dichotomy at some ages. Yet another model suggests that the K-ABC is primarily a measure of g. Some researchers criticize the K-ABC for having tasks which demand integration of both sequential and simultaneous processes. This seems to negate the dichotomy on which the test is based.
The K-ABC as a Diagnostic Tool

Currently there are several issues regarding the usefulness of the K-ABC for making diagnostic inferences based on test profiles. From Das' (1984b) point of view, the tester's purpose is not to find out whether children can solve the problem, but how they approach the problem. Kaufman (1984) asserts that this is not true since both goals are equally important. Das further criticizes the K-ABC for not providing a procedure for scoring the performance on a task in conjunction with the strategies used by the child. The tasks are scored as defined, a priori, by their placement in one of the two coding categories. Sternberg (1984b, p. 272) agrees: "Rather than taking a given task and assessing whether it is solved by a given individual via a simultaneous or successive style, styles of information processing are equated with tasks [a priori]."

Kaufman & Kaufman (1983b) discuss a systematic method of generating hypotheses from K-ABC profiles which Mehrens (1984) sees as valuable provided the users seriously study it and have the necessary theoretical background. Anastasi (1984) states that the procedure provides an excellent illustration of the cycle of hypothesis generation and hypothesis testing that is the essence of the clinical approach to diagnosis. Majovski (1984) feels that the K-ABC can represent the best of traditions regarding qualitative observation, plus well standardized and well defined
reliability and validity for making generalizations in the assessment process. On the other hand, Goetz and Hall (1984) feel that most usable interpretive information is based on correct response data only and that performance comparisons are difficult to conduct.

Das (1984b) questions whether the K-ABC is an adequate tool for testing children's cognitive processing, particularly because of the lack of flexibility in scoring the performance of children in terms of how they approach the tasks. A priori placement of a measure in a particular scale does not mean that the subject will process the information in that manner. It also appears to make it difficult when comparing discrepancies between scores to arrive at accurate conclusions regarding a child's processing approach, which may vary from that suggested by the test. Salvia and Hritcko (1984) comment that Kaufman and Kaufman do not require a significant discrepancy to be observed (between the simultaneous, sequential, or achievement scales) before recommending a particular remedial program. It is clear that controversy exists regarding the usefulness of the K-ABC as a diagnostic instrument.

Remediation with the K-ABC

An entire chapter of the K-ABC Interpretive Manual (Kaufman & Kaufman, 1983b) is devoted to educational
implications based on the K-ABC, and includes specific remediation procedures to use which address specific processing styles. Considerable controversy exists, however, over what these remediation procedures are and how effective or appropriate they may be.

Some investigators have concluded that "an inadequate data base exists to match instruction to K-ABC abilities, to link instruction to the remediation of deficient abilities, or to link remediation of deficient abilities to increased performance on transfer tasks" (Salvia & Hritcko, 1984, p. 345). There seems to be an absence of empirical validation to support linking K-ABC scores to altered teaching methods. Kaufman (1984) complains that Salvia and Hritcko (1984) have "lumped" the K-ABC's remedial approach to ability training programs such as Delacato's (1966), Frostig's (1967), and Kirk and Kirk's (1971), which they conclude "simply have had no value." Kaufman (1984) insists that the K-ABC approach is, however, the opposite of an ability training model. He stresses that remediation based on the K-ABC follows an aptitude-treatment interaction (ATI) approach, which refers to the direct teaching of academic areas by methods that are geared to the child's most efficient mode of processing information. Kamphaus and Reynolds (1984) agree, and state that the K-ABC approach to remediation is not an ability training model at all and it does not attempt to train or remediate any underlying
cognitive deficits. A comprehensive inservice program for
coloring structured workshops for teachers on the
interpretation and application of the simultaneous-
sequential processing dichotomy has been developed and is
known as the Kaufman - Sequential or Simultaneous (K-SOS;

A limited number of studies on intervention based on
the mental processing model have been conducted (Gunnison,
Kaufman & Kaufman, 1982; Gunnison & Kaufman, 1982).
Although Kaufman (1984) finds the results of these studies
encouraging, he labels them inconclusive and little more
than pilot investigations. Mehrens (1984), however, claims
the Kaufmans offer insufficient cautions about drawing
inferences regarding the educational implications of the
sequential-simultaneous processing dichotomy based on these
studies. Salvia and Hritcko (1984) take the approach that
there should be empirical validation before ability training
is introduced in the schools. "In the absence of such
empirical validation, the educational uses that the Kaufmans
advocate for the K-ABC are currently unacceptable" (Salvia &

Remediation based on the K-ABC is a controversial issue
partly because some see it in the same light as ability
training programs which have proven ineffective in the past.
Kaufman maintains that K-ABC remediation techniques are
aimed at exploiting the child's strengths, not ameliorating weaknesses. Nevertheless, empirical validation to support the techniques advocated in the test manual is still lacking and the methods advocated are either rejected by some authors or accepted with much caution by others.

Review of the Literature: Summary

The preceding has been a review of the literature regarding the Kaufman Assessment Battery for Children (K-ABC). The review was organized around five issues Kaufman (1984) identified as the most controversial surrounding the K-ABC. The first of these controversial issues was validity.

The Kaufmans report substantial data to support the validity of their test in the K-ABC Interpretive Manual (Kaufman & Kaufman, 1983b); however, much disagreement exists over the validity of the test. Validity in the K-ABC has been examined from a theoretical orientation and from a standards of test adequacy point of view. Factor analytic studies have also been conducted but these have been accompanied by their own controversy. The validity of the K-ABC will continue to be a subject of controversy until empirical data is collected by researchers over a period of time.

The theoretical basis of the K-ABC is a second issue surrounded by controversy. The argument involves whether mental processing may be thought of as synonymous with
intelligence, also whether this simultaneous-successive theory may legitimately serve as a basis for an intelligence test. Questions have arisen regarding the Kaufmans' interpretation of the theory as used in the K-ABC. The K-ABC is the first attempt at measuring intelligence using the simultaneous-successive processing dichotomy. Much empirical evidence is still needed, however, before this theory becomes more widely accepted as a viable and valid way of measuring intelligence or academic ability.

An additional point of controversy of the K-ABC revolves around the issue of ability versus achievement. This issue is especially important when using the K-ABC in the diagnosis of learning disabilities. Taken at face value, it would appear that the K-ABC is a valuable tool for this type of diagnosis since the usual manner of making LD diagnoses is the observable discrepancy between aptitude and achievement, and the K-ABC purportedly measures both. However, there are serious questions regarding the separation of mental processing from achievement. The K-ABC seems to equate mental processing with intelligence. This is, again, questionable. There is confusion regarding the fact that some mental processing subtests are subject to prior learning, and that all the achievement subtests require mental processing. It has been argued that perhaps
it was inappropriate to try to have a separate scale to measure achievement.

The issue of alternate models of what the K-ABC actually measures is yet another topic which has been discussed in the recent K-ABC literature. One model suggests the test yields measures of (a) verbal memory, (b) verbal reasoning, and (c) nonverbal reasoning. Another suggests the K-ABC employs a verbal-nonverbal dichotomy. Still another model suggests that the K-ABC is primarily measuring g. As with the dichotomous sequential-simultaneous model the K-ABC itself offers, further empirical research will be needed to validate or invalidate these assertions.

An additional issue of disagreement regards the usefulness of the K-ABC as a diagnostic tool. The K-ABC has been criticized for not providing a procedure for scoring the performance on a task in conjunction with the strategies used by the child. Although a systematic method of generating hypotheses from K-ABC profiles is discussed in the K-ABC Interpretive Manual (Kaufman & Kaufman, 1983b), some researchers feel that most usable interpretive information is based on correct response data only, making performance comparisons difficult. Additionally, the question of significant discrepancies between scales on the K-ABC is not adequately addressed by the test authors.
Controversy engulfs the K-ABC's remediation approach based on test profiles. This was another popular issue in the recent K-ABC literature. The test manual devotes a large section to techniques aimed at remediation based on the manner in which children process information. The procedure has been criticized because it lacks empirical validation; however, much of the criticism reflects a rejection of ability training programs of the past which were found to be ineffective. Kaufman insists that remediation with the K-ABC is not ability training at all, but a way to teach the child by using that child's strengths, not by ameliorating weaknesses. It is clear that regarding all the issues mentioned, additional research on the K-ABC is necessary.

Hypotheses
This study will encompass the following hypotheses:

1. There will be no significant differences between the K-ABC MPC and WISC-R Full Scale scores.

2. There will be no significant correlation between the scores on the Verbal and Performance Scales of the WISC-R and scores on the Simultaneous and Sequential Scales of the K-ABC.

3. There will be no significant differences in simultaneous and sequential processing scores.
4. There will be no significant differences between the K-ABC Achievement subtests scores of Reading Recognition, Reading Comprehension, and Arithmetic, and subtest scores of the following achievement measures: (a) Woodcock Reading Mastery Test (Woodcock, 1973); (b) the Wide Range Achievement Test (WRAT) (Jastak & Jastak, 1978); (c) Gilmore Oral Reading Test (Gilmore & Gilmore, 1968); (d) the Durrell Analysis of Reading Difficulty (Durrell & Catterson, 1980); and (e) the Peabody Picture Vocabulary Test-Revised (Dunne & Dunne, 1981)).

5. There will be no significant correlation between the MPC score of the K-ABC and tests designated as measuring perceptual abilities: (a) Bender Visual Motor Gestalt Test (Bender, 1946); (b) Developmental Test of Visual Motor Integration (Beery, 1982); (c) Test of Auditory Discrimination (Goldman, Fristoe, & Woodcock, 1970); (d) Auditory Closure subtests of the ITPA (Kirk, McCarthy, & Kirk, 1968); and (e) Performance Scale subtests from the Wechsler Intelligence Scale for Children (WISC-R) (Wechsler, 1974). There also will be no significant differences between the MPC and tests designated as measuring verbal abilities (Information, Similarities, Vocabulary, Arithmetic, and Comprehension subtests from the WISC-R).
CHAPTER II

METHOD

This chapter describes the sequence, materials, and procedures employed in this study. Included are the topics of (a) sample selection, (b) materials and equipment, (c) training of examiner, (d) collection of data, (e) preparation for data analysis, (f) procedures for analysis, and (g) treatment of the data.

Sample Selection

Permission was obtained from the Shelton Evaluation Center, Dallas, Texas to conduct research. The sample for the study was composed of 100 children referred to the Center for psychoeducational assessment and who were subsequently diagnosed as LD based on significant discrepancies (as per Texas Education Agency guidelines) between intelligence (in this case as measured by the WISC-R), and achievement as measured by various standardized achievement tests which will be described later. The diagnosis of LD was made by the director of the Center, a highly respected PhD, licensed speech and language pathologist with over 25 years of experience in the field of LD assessment. Only children between the ages of 6 years, 0 months and 12 years, 6 months participated. All children in the sample were white, of average to above average
intelligence (as measured by the WISC-R), from middle to above socioeconomic status (SES) as measured by the Two Factor Index of Social Position (Hollingshead, 1957), and all diagnosed as being learning disabled according to Texas State Board of Education guidelines, with problems in at least one academic area.

Parental consent forms were obtained from parents of children considered for the study. These children were administered the test battery described in the next section and a diagnosis of LD was formulated based upon the test results. A sample of 100 children so diagnosed was selected for the purposes of the study.

Rationale for Test Selection

There is no one universally accepted standard test battery for the assessment of learning disabilities. Sattler (1982) advocates that evaluating processing skills in addition to intelligence and achievement skills, may often be important. It was using this rationale that tests were selected for the battery used in this study.

The Wechsler Intelligence Scale for Children - Revised (WISC-R) (Wechsler, 1974) is an extensively researched and valid intelligence test which yields a profile quite useful in LD diagnosis. It was included in the battery for this reason.
According to Vellutino et al. (1977), the assessment of reading disorders in children should focus on the child's skills in reading - such as repertoire of words identified on sight; knowledge of speech sounds; comprehension skills; silent, and oral reading skills. The reading tests used in this study were intended to assess all such skills.

Sattler (1982) describes the **Woodcock Reading Mastery Tests** (Woodcock, 1973) as having excellent standardization and satisfactory reliability, with apparent usefulness in the evaluation of children's reading skills. The skills assessed by this test include word calling ability, knowledge of phonics, and reading comprehension. In order to obtain the most complete picture of the reading ability of the children in this study, the Woodcock was supplemented by an additional measure of word calling ability (The WRAT Reading subtest), and measures of oral and silent reading ability. These were the **Gilmore Oral Reading Test** (Gilmore & Gilmore, 1968) and the Silent Reading subtest of the **Durrell Analysis of Reading Difficulty** (Durrell & Catterson, 1980).

Mathematics and spelling skills were assessed with subtests of the **Wide Range Achievement Test** (WRAT) (Jastack & Jastack, 1978) because of the usefulness of the standard scores yielded by this test. Receptive vocabulary was assessed with the **Peabody Picture Vocabulary Test - Revised** (PPVT-R) (Dunn & Dunn, 1981) because of the appropriateness
of this test for use with a sample of all white children, and its usefulness in screening children with limited expressive vocabulary.

Because many learning disabled children have deficits in auditory skills, several tests which measure such abilities were included in the battery. The Test of Auditory Discrimination (Goldman, Fristoe, & Woodcock, 1970) can be very useful not only in assessment of the ability to discern between similarly sounding words, but also in screening children who are distractible by noise. In addition, the Auditory Closure subtest of the Illinois Test of Psycholinguistic Abilities (ITPA) (Kirk, McCarthy, & Kirk, 1968) was employed to screen children who have deficits in the ability to derive meaning when hearing incomplete or somewhat distorted messages. The Listening Comprehension subtest of the Durrell Analysis of Reading Difficulties (Dunne & Dunne, 1980) was also employed to determine the children's ability to understand and retain story type material.

Two additional tests were chosen for inclusion in the battery for the assessment of visual-motor and perceptual-motor abilities. These were the Bender Visual Motor Gestalt Test (Bender, 1946) and the Developmental Test of Visual Motor Integration (Beery, 1982). The Bender test is probably the most popular of the visual-motor tests. The
Beery test yields standard scores and percentiles which are very useful, and it can be used in conjunction with the Bender test to differentiate children who do better in structured rather than unstructured situations. In addition, this test can be used diagnostically to assess children's organizational and planning strategies. The battery in this study thus assessed children's skills in the following four areas: (a) intellectual, (b) auditory/language, (c) perceptual motor, and (d) academic achievement.

**Instrumentation**

Scores on the following standardized instruments were used in testing the hypotheses:

1. **Wechsler Intelligence Scale for Children - Revised** (WISC-R) (Wechsler, 1974).
   - Verbal Subtests: Information, Similarities, Arithmetic, Vocabulary, Comprehension, Digit Span.
   - Performance Subtests: Picture Completion, Picture Arrangement, Block Design, Object Assembly, Coding.

2. **Bender Visual Motor Gestalt Test** (Bender, 1946; Koppitz, 1963).

3. **Developmental Test of Visual-Motor Integration** (Beery, 1982).

   - Subtests: Quiet, Noise
5. **Illinois Test of Psycholinguistic Abilities** *(ITPA)* (Kirk, McCarthy, & Kirk, 1968)
   Subtest: Auditory Closure


7. **Durrell Analysis of Reading Difficulty** (Durrell & Catterson, 1980).
   Subtests: Silent Reading, Listening Comprehension


   Subtests: Reading, Spelling, Arithmetic


    Mental Processing Scales and Achievement Scale

**Training of Examiner**

Only one examiner (the author) collected all the data. The examiner is a certified Educational Diagnostician in the state of Texas with 13 years of special education experience in teaching and assessment. Although the examiner never received any specialized training exclusively on the K-ABC (such as a workshop sponsored by the publishers) the
examiner has, however, attended seminars on non-biased assessment where the K-ABC was presented, demonstrated and taught. In addition, the examiner has worked closely with, and been supervised by, individuals with extensive experience in the field of assessment, test administration, and test construction. The examiner received additional training on the use of the K-ABC from these individuals.

Control of Examiner Bias

Because it is doubtful whether any observations conducted by human beings are entirely free of bias, and because the same examiner collected all data in this study, steps were taken during the planning and course of the study to minimize instances of observer bias. All tests used in this study were objective, standardized measures which were scored strictly under the standardization procedures delineated in the respective test manuals. All LD diagnoses were made based on the same Texas Education Agency guidelines and by a person other than the examiner. In every instance, the conditions for test administration remained constant and the sample was very homogeneous, thereby reducing further the possibility of observed bias. In addition, the observations being recorded were of specific behaviors, not abstract qualities. One further step taken to reduce the instance of bias was to wait until all the data was collected before beginning data analysis. This
worked to reduce the examiner's knowledge of trends in scores obtained and reduce bias created by the expectation of these trends prior to the completion of data collection.

Collection of Data

Children between the ages of 6 years, 0 months and 12 years, 6 months were administered all the tests listed in the section on instrumentation, in a counter balanced order. A different child was tested every day (five days a week) and only one child a day was tested. Data collection continued until a sample of 100 children diagnosed as LD was reached. Diagnoses were based on performance on all tests administered except the K-ABC, which was not currently being used at the Center from which the sample population was drawn. All collected data were coded on computer sheets for analysis.

Preparation for Data Analysis

Instruments were scored according to directions in the various test manuals. Whenever possible, standard scores were employed when making statistical comparisons. Grade scores, age scores, or percentile scores were used when necessary.

In determining the appropriateness of age groups, all tests yielding standard scores were checked for similarities among means, standard deviations, and ranges to note any systematic differences.
Procedures for Analysis

For each hypothesis the data were analyzed in the following manner:

Hypothesis 1. A t test of significance was conducted.
Hypotheses 2. A canonical correlation was conducted to determine the relationship between the Verbal and Performance scales of the WISC-R and the Simultaneous and Sequential Scales of the K-ABC.
Hypothesis 3. A one-way analysis of variance was utilized.
Hypothesis 4. A correlation matrix was constructed from the results of the K-ABC achievement subtests and the other achievement tests. These Pearson product moment correlation coefficients then underwent a t test for significance.
Hypothesis 5. Two multiple correlations (Nunnally, 1978) one for perceptual measures and one for verbal measures were generated. A t test was used to determine if there were significant differences between the multiple correlations.
CHAPTER III
RESULTS

After determining the absence of bias in the sample population and the appropriateness of age groups included in the sample, the data were analyzed to reject or retain each of the five research hypotheses. The following section contains the procedures used to determine the representativeness of the sample, as well as procedures used in testing each hypothesis. Findings are delineated and data results tables are included.

Comparison of Sample and Control Group SES

To determine the representativeness of the population sample, permission was obtained from the Dean Diagnostic Center (Dallas) to collect data regarding the population which it serves. Twenty-five cases of children ages 6 to 12 years 6 months who had been diagnosed as LD under similar state guidelines were randomly pulled from the files. The Two Factor Index of Social Position (Hollingshead, 1957) was used to categorize the SES of these 25 children, as had been previously done for the 100 children in this study's sample. The procedure indicated the Dean Center group had very similar SES characteristics as the sample group. Percentiles of each SES classification for the control group and sample are presented in Table 1.
Table 1

Comparison of Sample and Control Group SES

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<th>SES Class</th>
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<tr>
<td>Percentile</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>Percentile</td>
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<td>36</td>
</tr>
</tbody>
</table>

Age Comparisons of the Sample

The 100 children in this study were categorized into seven age groups ranging from 6 to 12 years. Each test yielding standard scores was analyzed with regard to means, standard deviations and ranges across age groups. No systematic score fluctuations were noted as depicted by data in Tables C1 through C11 in Appendix C. All age groups were combined for analyses of the hypotheses with a total N of 100.

Hypothesis #1

The first research hypothesis assumed there would be no significant differences between the K-ABC MPC and the WISC-R Full Scale scores. In testing for significant differences between these two sets of scores a one way analysis of variance was conducted. Significant differences between the
variables were found, $F (1, 98) = 25.52, p < .01$. The mean MPC score for the sample was 101.93 while the mean Full Scale IQ was 105.26, making the MPC an average of 3.33 points lower than the Full Scale IQ. A Pearson Product Moment Correlation Coefficient ($r = .45$) was derived which indicates a moderate correlation between the Full Scale IQ and MPC. The results in this case reject the hypothesis as stated. The significance of the findings will be covered in the Discussion section.

Hypothesis #2

The second research hypothesis assumed a nonsignificant correlation between scores on the Verbal and Performance Scales of the WISC-R and scores on the Simultaneous and Sequential Scales of the K-ABC. This hypothesis was rejected. In examining the relation between the sets of scores, a canonical correlation analysis indicated a significant correlation among score means, $F (4, 192) = 9.74, p < .01$. Pearson Correlation coefficients indicated the highest correlation was between the WISC-R Performance Scale scores and the K-ABC Simultaneous Scale scores. The second highest correlation was found between the K-ABC Sequential and K-ABC Simultaneous scores. A significant correlation was found between WISC-R Performance scores and K-ABC Sequential scores. The lowest correlation was found between WISC-R Verbal and WISC-R Performance scores. Means,
standard deviations and ranges of scores obtained on the WISC-R and K-ABC are presented in Table 2. The correlation matrix derived from the score means is presented in Table 3.

Table 2
Score Means, SD's and Ranges for WISC-R and K-ABC

N=100

<table>
<thead>
<tr>
<th>Scores</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>WISC-R Full Scale IQ</td>
<td>105.26</td>
<td>10.97</td>
<td>82.0 - 132.0</td>
</tr>
<tr>
<td>Verbal</td>
<td>105.57</td>
<td>12.53</td>
<td>77.0 - 136.0</td>
</tr>
<tr>
<td>Performance</td>
<td>104.51</td>
<td>11.52</td>
<td>75.0 - 133.0</td>
</tr>
<tr>
<td>K-ABC Sequential</td>
<td>97.08</td>
<td>11.29</td>
<td>72.0 - 126.0</td>
</tr>
<tr>
<td>Simultaneous</td>
<td>105.12</td>
<td>10.29</td>
<td>76.0 - 128.0</td>
</tr>
<tr>
<td>Achievement</td>
<td>100.08</td>
<td>9.21</td>
<td>85.0 - 124.0</td>
</tr>
<tr>
<td>MPC</td>
<td>101.93</td>
<td>10.29</td>
<td>81.0 - 131.0</td>
</tr>
</tbody>
</table>
Table 3
Pearson r's among Score Means of WISC-R and K-ABC

<table>
<thead>
<tr>
<th></th>
<th>WISC-R</th>
<th></th>
<th>K-ABC</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Verbal Performance Full Scale</td>
<td>Seq.</td>
<td>Simul.</td>
<td>MPC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WISC-R Verbal</td>
<td>--</td>
<td>.28722</td>
<td>--</td>
<td>.31219</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>.33132</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Full Scale</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>K-ABC Sequential</td>
<td>.31958</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>.78453</td>
<td></td>
</tr>
<tr>
<td>Simultaneous</td>
<td>--</td>
<td>.47011</td>
<td>.39136</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>MPC</td>
<td>--</td>
<td>--</td>
<td>.45455</td>
<td>--</td>
<td>.88218</td>
<td>--</td>
</tr>
</tbody>
</table>

Hypothesis #3

The third research hypothesis assumed there would be no significant differences in Simultaneous and Sequential Processing scores. The findings rejected this hypothesis. In testing the hypothesis a one way analysis of variance was conducted. This procedure found significant differences between the two sets of scores, $F(1, 98) = 17.73, p < .01$. An examination of data in Table 2 shows an 8 point difference, with Sequential scores being lower than Simultaneous. A Pearson Product Moment Correlation Coefficient of .40 was derived from the score means, which indicated a moderate correlation between Simultaneous and Sequential Processing scores. The findings will be expanded upon in the Discussion section.
Hypothesis #4

The fourth hypothesis assumed there would be no significant correlations between selected K-ABC Achievement subtests and other tests of achievement which tap related skills. In testing this hypothesis, a Pearson Product Moment Correlation Coefficient was derived to determine the relation between three K-ABC Achievement subtests and the other achievement tests. A t test for the significance of the derived correlation coefficients was then conducted. Significant correlations are indicated in Table 4 along with the variance of K-ABC subtest scores accounted for in the comparisons. Although some r's may be statistically significant, the variance accounted for is not high enough to be educationally relevant. Caution should be exercised in making interpretations based upon the variance. This hypothesis was partially retained and partially rejected since significant as well as nonsignificant correlations were found.
Table 4
Relation between K-ABC and Other Achievement Tests

<table>
<thead>
<tr>
<th>K-ABC</th>
<th>Arithmetic</th>
<th>Reading Rec.</th>
<th>Reading Und.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRAT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>.38 (.14)</td>
<td>-</td>
<td>.73 (.53)</td>
</tr>
<tr>
<td>Spelling</td>
<td>.42 (.18)</td>
<td>-</td>
<td>.65 (.42)</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>.51 (.26)</td>
<td>-</td>
<td>.28 (.08)</td>
</tr>
<tr>
<td>Durrell</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silent Reading</td>
<td>-</td>
<td>-</td>
<td>.31 (.10)</td>
</tr>
<tr>
<td>Listening Comp.</td>
<td>-</td>
<td>.41 (.17)</td>
<td>-</td>
</tr>
<tr>
<td>Woodcock-Reading Mastery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word Ident.</td>
<td>.33 (.11)</td>
<td>-</td>
<td>.45 (.20)</td>
</tr>
<tr>
<td>Passage Comp.</td>
<td>.39 (.15)</td>
<td>-</td>
<td>.46 (.21)</td>
</tr>
<tr>
<td>Gilmore Oral Reading</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comprehension</td>
<td>-</td>
<td>.26 (.07)</td>
<td>-</td>
</tr>
<tr>
<td>PPVT-R</td>
<td>.33 (.11)</td>
<td>.57 (.32)</td>
<td>.35 (.12)</td>
</tr>
</tbody>
</table>

Note. Figures in () represent the variance accounted for in the K-ABC subtests.

Hypothesis #5
The last hypothesis of this study assumed there would be no significant correlation between the MPC score of the K-ABC and tests of verbal abilities and of perceptual abilities. In testing this hypothesis, two multiple
regression analyses were conducted. Regression coefficients were derived from the comparison of K-ABC MPC scores with scores on tests of perceptual abilities. Regression coefficients were also derived by comparing the MPC scores with tests of verbal abilities. A $t$ test was then used to determine if there were significant differences between the two multiple correlations. Results of this procedure yielded an $R^2$ of .43 for perceptual tests and an $R^2$ of .16 for verbal tests. The $t$ test analysis found a significant difference between the two multiple correlations, $t = 2.326$, $p < .05$. The multiple regression analyses indicated that the 10 perceptual measures accounted for 43 percent of the MPC variance while the 5 verbal measures accounted for 16 percent of the variance. The Discussion section will expand on the findings of this hypothesis. Table 5 presents the results of the multiple regression analyses used to test the hypothesis.
Table 5

R square values among K-ABC MPC and test of verbal and perceptual abilities.

<table>
<thead>
<tr>
<th></th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceptual tests (total)</td>
<td></td>
</tr>
<tr>
<td>WISC-R Block Design</td>
<td>.295</td>
</tr>
<tr>
<td>WISC-R Object Assembly</td>
<td>.337</td>
</tr>
<tr>
<td>ITPA Auditory Closure</td>
<td>.375</td>
</tr>
<tr>
<td>Verbal tests (total)</td>
<td>.161</td>
</tr>
<tr>
<td>WISC-R Information</td>
<td>.093</td>
</tr>
<tr>
<td>WISC-R Arithmetic</td>
<td>.126</td>
</tr>
<tr>
<td>WISC-R Comprehension</td>
<td>.155</td>
</tr>
</tbody>
</table>

Note. No other variables met the .100 significance level for entry into the model.

Results: Summary

Findings of this study indicated significant differences between WISC-R Full Scale IQ scores and the K-ABC Mental Processing Composite scores, with MPC scores falling 3.33 points lower than IQ scores. Significant correlations were found between the WISC-R Performance scores and K-ABC Simultaneous scores. Significant correlations were also found between the K-ABC Sequential and Simultaneous scores, and between WISC-R Performance and K-ABC Sequential scores. A significant 8 point difference
was found between Sequential and Simultaneous scores, with Sequential scores being lower.

Regarding K-ABC Achievement subtests, it was found that there were significant correlations between (a) K-ABC Arithmetic and WRAT Arithmetic, (b) K-ABC Reading Recognition and PPVT-R, and (c) K-ABC Reading Understanding and Woodcock Word Identification and Passage Comprehension. The K-ABC subtest Reading Understanding also correlated highly with WRAT Reading, WRAT Spelling, PPVT-R and Durrell Silent Reading. Regarding perceptual versus verbal skills, it was found that the MPC correlated higher with tests of perceptual ability than with tests of verbal ability.
CHAPTER IV
DISCUSSION

The purpose of this study was to determine the validity of the Kaufman Assessment Battery for Children when used with a homogeneous sample of learning disabled children. This section discusses the results of this study for better understanding the K-ABC and its usefulness with LD children. The significance of the findings is discussed and the section concludes with suggestions for further research.

The K-ABC versus WISC-R as Measures of Intelligence

The first research hypothesis addressed the relation between the MPC and intelligence by correlating the MPC with the broadly researched WISC-R Full Scale IQ. Jensen (1984) reports data supporting high g factor loadings on the WISC-R (r=+.79) suggesting that the WISC-R is a valid measure of intelligence. By comparing the K-ABC MPC with the WISC-R Full Scale IQ the attempt was made to see if the scores were similar enough to be able to use these two intelligence tests interchangeably. Findings indicate that although there is a significant 3.33 point difference between score means, the range of error allowed in both the MPC score and the Full Scale IQ score makes this difference negligible. The standard error of measurement (SEM) of the K-ABC MPC for school age children is ±3.5 points. The average SEM for the WISC-R at all ages is ±3.19 points. Kaufman and Kaufman
(1983b) explain that on the K-ABC, the SEM is a band of error around the child's obtained scores which gives the examiner 68 percent confidence that the child's true score falls plus or minus those points from the obtained score. But the K-ABC authors maintain that 68 percent is not enough confidence for most assessment purposes, allowing too great a margin of error. They advocate 90 percent confidence as an appropriate level in most circumstances. Data in Table 6 presents the standard errors of measurement as well as the recommended bands of error for the K-ABC Global Scales (Kaufman & Kaufman, 1983b, p. 160). The standard errors of measurement for the WISC-R scales are shown in Table 7.

**Table 6**

Standard Errors of Measurement for the K-ABC Global Scales

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Level of Confidence</th>
<th>Sequential Processing</th>
<th>Simul. Processing</th>
<th>Mental Process</th>
<th>Composite Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-0 to 68% (SEM)</td>
<td>+5</td>
<td>4.0</td>
<td>3.5</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>12-6 90%</td>
<td>+8</td>
<td>+7</td>
<td>+6</td>
<td>+4</td>
<td></td>
</tr>
</tbody>
</table>
Table 7
Average Standard Errors of Measurement for WISC-R Scales

<table>
<thead>
<tr>
<th>Scale</th>
<th>Average SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal IQ</td>
<td>3.60</td>
</tr>
<tr>
<td>Performance IQ</td>
<td>4.66</td>
</tr>
<tr>
<td>Full Scale IQ</td>
<td>3.19</td>
</tr>
</tbody>
</table>

The findings are conclusive that although there is significant difference between the intelligence scores of both K-ABC and WISC-R, the difference is negligible in terms of practical use of the tests. Jensen (1984) provides data showing mean $g$ loadings of the MPC subtests correlate highly with the $g$ factor of the WISC-R. Findings in this study are therefore consonant with the K-ABC's claims to measure intelligence, or $g$ in its Mental Processing Scales. The closeness of the scores on both K-ABC and WISC-R appears to allow these two tests to substitute each other when the intent is to measure $g$.

Further analyses of the first hypothesis presents a moderate correlation ($r=.45$) between the K-ABC MPC and WISC-R Full Scale IQ. There appears to be a significant difference between Kaufman's results and those obtained in the current study. Kaufman's findings suggest that what the
two tests are measuring is very similar. Results of this study indicate that although the two correlate to a moderate degree, they are not measuring the same abilities.

The second research hypothesis attempted to determine if significant correlations existed between the scales within the WISC-R and those within the K-ABC. A canonical correlation analysis indicated significant correlations among the scale means. The highest correlation was between the WISC-R Performance Scale and the K-ABC Simultaneous Scale, while the lowest was between the WISC-R Performance Scale and the WISC-R Verbal Scale. A significant correlation was found between the two scales of the K-ABC (Sequential and Simultaneous). These findings suggest a similarity between abilities being measured by the WISC-R Performance and the K-ABC Simultaneous Scales. Further, the abilities being measured in the two K-ABC scales are, as well, similar to a moderate degree and may therefore not constitute pure measures of either sequential or simultaneous processing. These findings are consonant with Sternberg's (1984) comments regarding the questionable utility of the two subscale scores as pure measures of sequential or simultaneous constructs.

**LD Diagnosis and K-ABC Scale Comparisons**

Kaufman & Kaufman (1983b) maintain that intellectual functioning on the K-ABC is predicated on a distinction between two types of problem solving or mental processing,
so the first global contrast to examine is whether the child's Sequential Processing and Simultaneous Processing standard scores differ significantly from each other. The average standard score differences required for significance when comparing the mental processing scales (Kaufman & Kaufman, 1983b, p. 170) are shown in Table 8.

Table 8

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Significance Level</th>
<th>Sequential versus Simultaneous Standard Score Difference Required for Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-0 - 12-5</td>
<td>.05</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>.01</td>
<td>16</td>
</tr>
</tbody>
</table>

According to Kaufman & Kaufman (1983b) a significant discrepancy indicates that the observed difference in the standard scores on the Sequential and Simultaneous Scales is too large to be attributed to chance fluctuations (i.e., to the errors inherent in measurement). This finding is interpreted by the K-ABC authors as evidence for the child's superiority and greater efficiency in processing information by one style rather than the other. When the discrepancy is not significant, examiners are encouraged to conclude that
the child's problem-solving abilities are consistently developed with no preference evident for either style of processing information. This conclusion should follow whether the standard score difference is a mere 1 or 2 points or falls just short of significance.

Analysis of this study's third research hypothesis examined the means of the Simultaneous Scale and the Sequential Scale. The Sequential Scale was 8 points lower. The significant lower scores of this LD population support Kaufman & Kaufman's (1983b) position that many learning disabled children have a strength in simultaneous processing and a weakness in sequential processing. It also lends support to Hooper and Hynd's (1982) study with LD children in which Simultaneous Scores averaged 2 to 5 points higher than Sequential Scores. While this seems to support LD diagnoses based on a Sequential lower than Simultaneous discrepancy, an examination of Table 6 indicates that the range of error allowed in the scores overlaps the 8 point difference for school age children. Further, 8 points does not reach the required 12 to 16 points required for significance at these ages as depicted by data in Table 7. This study thus concludes that while many learning disabled children may have a weakness in sequential abilities, the K-ABC Sequential and Simultaneous Scales are poor diagnostic indicators of LD.
It would appear in a diagnosis of LD that significant discrepancies between the Achievement Scale and the Mental Processing Scales would be required. Kaufman & Kaufman (1983b, p. 172) provide information regarding the requirements for significance when making K-ABC Achievement Scale comparisons in Table 9.

Table 9

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Significance Level</th>
<th>Sequential versus Achievement</th>
<th>Simultaneous versus Achievement</th>
<th>MPC versus Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Standard Score Differences Required for Significance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-0 -</td>
<td>.05</td>
<td>13</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>12-5</td>
<td>.01</td>
<td>17</td>
<td>14</td>
<td>13</td>
</tr>
</tbody>
</table>

According to Kaufman & Kaufman (1983b) children who score significantly higher on one or more Mental Processing standard scores than on Achievement display a real superiority in their ability to process information and solve new problems over their prior acquisition of facts and skills. The K-ABC authors suggest that this difference may be due to a learning disability or to other factors. The
test manual encourages clinicians to integrate data from other tests to understand the meaning of the discrepancy.

Data in Table 2 shows the mean K-ABC Achievement score to be 5 points lower than the mean Simultaneous score. The mean Sequential score is 3 points lower than the mean Achievement score, and the Achievement score is less than 2 points lower than the MPC. Because of the range of error allowed in the scores as well as the higher number of points which the test requires for significance, findings of this study do not support LD diagnoses based on a discrepancy between Achievement and any of the other scales of the K-ABC.

K-ABC Achievement Subtests versus other Achievement Tests

The manner in which the K-ABC measures arithmetic, phonic skills and reading comprehension seems to add creativity and interest to skills assessment with pictures in Arithmetic and with printed commands in Reading Understanding. One purpose of this study was to ascertain how scores on K-ABC reading and arithmetic tests compared with other tests which measure reading and arithmetic. The goal was to see if more traditional tests could be substituted with K-ABC subtests in a battery used to diagnose LD.

Data presented in Table 4 of the Results section shows the significant correlations between tests. A Pearson correlation coefficient of .51 between WRAT Arithmetic and K-ABC Arithmetic indicates a moderate degree of similarity.
between these two subtest scores. It suggests the two tests are measuring similar abilities and yielding similar standard scores. It further suggests the K-ABC Arithmetic subtest is no better and no worse than the WRAT Arithmetic Subtest in terms of the standard scores obtained.

In regards to reading skills assessment it was somewhat unexpected to find that the K-ABC Reading Recognition Subtest did not show a significant correlation with either of the other two reading tests which have identical task demands: WRAT Reading and Woodcock Reading Mastery Word Identification. Further analysis would be required to investigate the reason for this finding, but the indication is that those three tests do not adequately substitute each other in measuring a child's ability to call out words from a printed list.

The K-ABC Reading Understanding subtest had the greatest number of significant correlations with other achievement tests. It correlated .73 with WRAT Reading and .65 with WRAT Spelling. It correlated .46 with Woodcock-Passage Comprehension, .45 with Word Identification, and .31 with Durrell Silent Reading. The K-ABC Reading Understanding subtest was also moderately correlated (.35) with the Peabody Picture Vocabulary Test-Revised, a measure of intelligence based on receptive language.
This study purposely omitted Riddles and Faces and Places from analyses because the goal was to research the reading and arithmetic components of the K-ABC. Findings indicate that the K-ABC Arithmetic subtest yields very similar scores to the WRAT Arithmetic subtest. Further, the Reading Understanding Subtest of the K-ABC is very similar (in terms of obtained scores) to reading tests of the WRAT, Durrell, and Woodcock Reading Mastery Tests. Because of the Reading Understanding subtest's correlation of .35 with the PPVT-R, the indication is also that this subtest is measuring a degree of intelligence and of language components in addition to reading comprehension.

Perceptual versus Verbal Assessment and the K-ABC

Sternberg (1984) makes the claim that the K-ABC intelligence scale shows its best prediction with respect to sensory-motor kinds of tests, and he questions the appropriateness of referring to these as measures of intelligence. Kaufman (1984) strongly objects to such claims and cites data indicating the MPC shows about its lowest correlation (.43 on the average) with sensory-motor tests. This study's fifth hypothesis investigated the relationship between verbal and perceptual measures with the K-ABC MPC. Results indicate the K-ABC Mental Processing Composite score correlated higher with tests of perceptual ability than with tests of verbal ability.
Multiple regression analyses on 5 tests of verbal ability and 10 tests of perceptual ability indicate the perceptual measures accounted for 43 percent of the variance of MPC scores, while the verbal measures accounted for 16 percent of the variance. The K-ABC showed its best prediction with the WISC-R Block Design subtest, $R^2 = .295$, meaning almost 30 percent of the MPC variance was accounted for by this subtest. WISC-R Block Design was followed by WISC-R Object Assembly and ITPA Auditory Closure as second and third best predictors of MPC. The verbal measures, which accounted for 16 percent of the total variance, indicated WISC-R Information to be the best predictor of MPC, $R^2 = .093$. This was followed by WISC-R Arithmetic and WISC-R Comprehension.

Earlier findings showing high correlation between the K-ABC Simultaneous Scale and the WISC-R Performance Scale indicate the two scales are measuring similar abilities. Because a significant correlation was also found between the two intelligence scales within the K-ABC, the indication is that the MPC and the WISC-R Performance Scale are very similar indeed. The data clearly support the finding that the MPC is more a measure of perceptual ability than of verbal ability.

In regards to learning disabilities, the K-ABC Interpretive Manual (Kaufman & Kaufman, 1983b, p. 112) cites data indicating that LD children show a tendency to have a
higher correlation between their MPC scores and the WISC-R Performance scores than with the WISC-R Verbal scores. Learning disabled children scored lower, by about 3 points, on their Verbal IQs than they did on Performance WISC-R IQs. Kaufman and Kaufman (1983b) explain that the problem solving abilities required for success on the K-ABC MPC may correlate well with WISC-R Verbal IQ for children with normal language development and school achievement, but this relationship may be attenuated for children whose Verbal IQ is depressed by language or school-related difficulties, and therefore does not truly reflect their intelligence.

In light of information furnished by the test authors, it would appear the K-ABC is a more fair measure of intelligence to use with children with verbal and language difficulties than is the WISC-R. It is important to remember, however, that many learning disabled children often have strengths in verbal and language abilities and weaknesses in perceptual organization types of skills. Would not then then K-ABC be just as inappropriate a measure of intelligence to use with them? While it is true that intelligence as measured by the K-ABC MPC is based on fluid problem solving and more perceptual than verbal language ability, this in itself does not appear to make the K-ABC any more fair measure of intelligence than intelligence tests with a heavy language component.
Suggestions for Future Research

Regarding learning disabilities diagnosis and use of the K-ABC in general, additional research would seem to be welcome by clinicians who plan on using this test. The K-ABC is a relatively new test. There are other new intelligence and aptitude tests in the market which have yet to undergo much needed independent empirical research. The new 1986 edition of the Stanford Binet Intelligence Scale (Thorndike, Hagen, & Sattler, 1986) and the revised Detroit Test of Learning Aptitude (DTLA-2) (Hammill, & Bryant, 1986) should be researched in relation to the K-ABC. If the simultaneous-sequential dichotomy is indeed valid, then the model could be taken as a criterion for factor analytic research on other tests. Results of such studies would not only add to the validation research findings on the K-ABC, but also help in understanding these other new measures and how they relate to the K-ABC.

One purpose of this study was to ascertain how the K-ABC Mental Processing Composite compared with measures of verbal and of perceptual abilities. The WISC-R Verbal scale is an accepted measure of language functions and it was therefore appropriate to use in the study, but some valuable information was missed due to the limited number of verbal measures used. Further research needs to be conducted on the K-ABC in relation to other verbal and language measures. The current study employed a very restricted range of verbal
abilities measures due to restrictions placed by the facility from which the sample population was drawn. Tests such as the Test of Language Development (TOLD) (Hammill & Newcomer, 1982) should be used in correlational studies to indicate more clearly what the relation is between language and MPC, between language and the Achievement Scale, and between language and the Sequential-Simultaneous dichotomy.

Further research should also be conducted on the K-ABC's Achievement component. Although the current study employed an appropriate choice of instruments and procedures in its data analysis, future correlational studies of K-ABC Achievement subtests with other reading and math measures would be useful. The WRAT Arithmetic subtest, for example, was the only available math measure used in the comparison with K-ABC Arithmetic. Although WRAT Arithmetic provides an adequate measure of computational math, it does not tap the application of concepts to mathematical problem solving. The K-ABC Arithmetic subtest is the exact opposite. It assesses knowledge of math concepts but does not include a computational paper and pencil task. Future research on the K-ABC Arithmetic component with additional measures of math is clearly necessary.

The reading tests used in this study were appropriate, some having almost identical task demands as in K-ABC reading tests. Nevertheless, use of additional reading
measures would have made the findings more conclusive. Further correlational research on K-ABC reading and math subtests is understandably necessary in order to assess the true utility of these subtests. Further research on the K-ABC, and how it relates to language and to achievement should be conducted on normal as well as learning disabled population samples. The studies should also follow the K-ABC authors' request that research on the test be conducted on clearly defined homogeneous populations. The gradual accumulation of empirical findings will ultimately lead to judgements about the utility and validity of the K-ABC in the assessment of learning disabilities.
APPENDIX A

Definitions

Except where other sources are cited, the following glossary was taken from Sattler (1982).

**Ability test.** A test that measures the extent to which a person is capable of performing a certain task.

**Achievement test.** A test designed for the specific purpose of assessing prior learning.

**Bias.** Any one of a number of factors that cause test scores to be consistently higher or lower than they would if measurement were not accurate.

**Ceiling.** The upper limit of an ability that can be assessed by a test; the maximum score obtainable on a test.

**Coefficient of internal consistency.** An index of the extent to which various parts of a test measure the same function.

**Coefficient of stability.** The type of reliability coefficient obtained when the same test is administered twice to the same subjects.

**Cognitive processes.** Modes of thought, knowing, and symbolic representation, including comprehension, judgment, memory, imagining, and reasoning.

**Cognitive style.** An individual characteristic approach to problem solving and cognitive tasks.
Concurrent validity. The extent to which a measurement correlates with the criterion when both are obtained at approximately the same time.

Confidence level. A statistical "degree of certainty" (e.g., 68, 95, or 99 percent) indicating the probability of an obtained value represents the population (or true) value.

Construct validity. A type of validity that establishes the degree to which a particular test measures a specified psychological construct.

Content validity. A type of validation that, through a logical analysis of the test content, establishes whether the test measures what it is supposed to measure.

Correlation. A statistical procedure for determining the degree of relationship between two variables.

Correlation coefficient \((r)\). An index of the degree of relationship between two variables. The index varies from +1.00 (perfect positive relationship) through .00 (absence of a relationship) to -1.00 (perfect negative relationship).

Criterion. A standard against which a test may be validated.

Crystallized intelligence. Type of intelligence that results from interaction with the culture.

Cultural bias. Refers to test items that may be unfair to a particular group because of undue emphasis on a specific set of learned behaviors and customs.
Face validity. The extent to which test items appear to measure what the test is supposed to measure.

Factor analysis. A statistical technique used to isolate underlying relationships between sets of variables.

Fluid intelligence. Type of intelligence that is independent of education and experience; it is the basic capacity for learning and problem solving.

g. A term referring to general intellectual ability.

Intelligence. Definitions of intelligence usually include three concepts: (a) the ability to deal with abstractions, (b) the ability to learn, and (c) the ability to cope with new or novel situations.

Learning disability. (LD) A disorder in which there is an educationally significant discrepancy between estimated intellectual potential and actual level of performance. In this study, LD diagnoses will be based on a one or greater standard deviation (SD) discrepancy, as required by Texas State Board of Education guidelines. Intelligence will be assessed with the WISC-R and achievement with various standardized achievement tests listed in the methodology section.

Mean. The arithmetical average attained by adding up scores and dividing.

Mental Processing Composite (MPC). The MPC is a global
score encompassing both sequential and simultaneous processing. The MPC is intended as the measure of total intelligence in the K-ABC (Kaufman & Kaufman, 1983b).

**Norms.** A list of scores and the corresponding percentile ranks, standard scores, and other transformed scores of a group of examiners on whom a test was standardized.

**Perception.** The process whereby sensory stimuli are organized, interpreted, and imbued with meaning; dependent on the past experiences of the organism.

**PL 94-142.** The Education for All Handicapped Children Act of 1975.

**Predictive validity.** The extent to which scores on a test are predictive of performance on some criterion measure assessed at a later time; usually expressed as a correlation between the test (predictor) and the criterion.

**Reliability.** The degree to which a test is consistent in its measurements.

**Sample.** A group drawn from a population which is considered to be representative of that population so that statistical conclusions based on the sample will also be valid for that population.

**Screening.** A general term for any rapid selection process, usually not very precise, to select applicants.

**Sequential processing.** This emphasizes the arrangement of stimuli in sequential or serial order for successful
problem solving. In every instance, each stimulus is linearly or temporally related to the previous one (Kaufman & Kaufman, 1983b) creating a sort of serial interdependence.

**Significant difference.** A discrepancy between two statistics, computed from separate samples, which is of such a magnitude that the probability that the samples were drawn from different populations is greater than some previously set limit.

**Simultaneous processing.** This is the mental ability of the child to integrate input simultaneously to solve a problem correctly. Simultaneous processing frequently involves spatial, analogic, or organizational abilities (Kaufman & Kaufman, 1983b) as well as problems solved through the application of visual imagery.

**Socioeconomic status (SES).** An individual's position in a given society as determined by wealth, occupation, education and social class.

**Space perception.** Awareness of the spacial properties of an object, including position, direction, size, form, and distance.

**Split-half reliability.** Estimating the reliability of a test by splitting it into comparable halves, correlating the scores from the halves, and adjusting for length using the Spearman-Brown formula.
Spearman-Brown formula. A formula giving the relationship between the reliability of a test and its length.

Standard deviation (SD). A measure of the variability or dispersion of a distribution of scores. Computation of the SD is based on the square of the deviation of each score from the mean.

Standardized test. A test of empirically selected items which has unambiguous directions for use, adequately determined norms, and reliability and validity data.

Subtest. A division of a test designed to measure a particular aspect of that which the test as a whole measures.

Test of significance (t). A statistical procedure that determines whether the observed variations under various treatment conditions are due to the changes in conditions or to chance fluctuations.

Validity. The extent to which a test actually measures what it purports to measure.

Variability. The spread or dispersion of test scores around their average value, best indicated by their standard deviation.

Variance. A measure of variability of test scores, computed as the mean of the squares of the deviations of raw scores from their arithmetic mean; the square of the standard deviation.
Visual-motor coordination. Skills normally performed through visual perception and an integrated motor response; of ten involves spatial relations and tactile perception.
Appendix B

Analysis of the K-ABC

The K-ABC has 16 subtests, but a maximum of 13 are administered to any particular child. The number of subtests administered varies with the age of the child. The following describes each subtest in the Kaufman battery.

**Sequential Processing Subtests**

(a) Hand Movements (age 2 1/2 to 12 1/2). Performing a series of hand movements in the same sequence as the examiner performed them (also part of nonverbal scale).

(b) Word Order (age 4 to 12 1/2). Touching a series of silhouettes of common objects in the same sequence as the examiner said the names of the objects. More difficult items include an interference task between the stimulus and response.

(c) Number Recall (age 2 1/2 to 12 1/2). Repeating a series of digits in the same sequence as the examiner.

**Simultaneous Processing Subtests**

(a) Magic Window (age 2 1/2 to 4). Identifying a picture that the examiner exposes by moving it
past a narrow opening, making the picture only partially visible at any one time.

(b) Face Recognition (age 2 1/2 to 4). Selecting from group photograph the one or two faces that were exposed briefly in the preceding photograph (also part of nonverbal scale.)

(c) Gestalt Closure (age 2 1/2 to 12 1/2). Naming the object or scene pictured in a partially completed "inkblot" drawing.

(d) Triangles (age 4 to 12 1/2). Assembling several identical triangles into an abstract pattern that makes a model (also part of nonverbal scale).

(e) Matrix Analogies (age 5 to 12 1/2). Selecting the picture or abstract design that best completes a visual analogy (also part of nonverbal scale).

(f) Spacial Memory (age 5 to 12 1/2). Recalling the placement of pictures on a page that was exposed briefly (also part of nonverbal scale).

(g) Photo Series (age 6 to 12 1/2). Placing photographs of an event in chronological order (also part of nonverbal scale).

Achievement Subtests

(a) Expressive Vocabulary (age 2 1/2 to 4). Naming the object pictured in a photograph.
(b) Faces and Places (age 2 1/2 to 12 1/2). Naming the well known person, fictional character, or place pictured in a photograph or illustration.

(c) Arithmetic (age 3 to 12 1/2). Answering a question that requires knowledge of math concepts or the manipulation of numbers.

(d) Riddles (age 3 to 12 1/2). Naming the object or concept described by a list of three characteristics.

(e) Reading/Decoding (age 5 to 12 1/2). Naming letters and reading words.

(f) Reading/Understanding (age 7 to 12 1/2). Acting out commands given in written sentences.

**Standardization.** The K-ABC was standardized on a sample of 2,000 children using the 1980 U.S. census figures. The sample was stratified by (a) age, (b) sex, (c) geographic region, (d) race/ethnic group, (e) parental educational attainment (used as a measure of SES), (f) community size, and (g) educational placement (regular class placement or placement in one of several programs for exceptional children). Attempts were made to include in the standardization sample representative proportions of speech impaired learning disabled, mentally retarded, gifted and talented, and other (healthy impaired, orthopedically
impaired, multihandicapped, and hard of hearing) special populations according to data provided by the National Center for Education Statistics and the U.S. Office of Civil Rights. The combined exceptional populations formed 6.9% of the K-ABC standardization sample compared to 8.9% for the U.S. school-age population.

Administration and scoring. Administration and scoring procedures are delineated in the K-ABC Administration and Scoring Manual (Kaufman & Kaufman, 1983a). The notion of teaching items is an important aspect of administration which stands out. The first three items of each mental processing subtest (the sample and the first two items appropriate for a child's age group) are designated as teaching items. On these the examiner can teach the task if the child fails on the first attempt at solving the time. While teaching the task, it is permissible for the examiner to practice flexibility in using alternate wording, gestures, physical guidance, or even a language other than English to communicate to the child the demands of the task.

Reliability. Split-half reliability coefficients for the K-ABC global scales ranged from .89 to .97 (mean = .93) for children aged 5 to 12 1/2 years, and from .86 to .93 (mean = retest reliability study that showed good estimates of stability that improved with increasing age. According to
Kaufman and Kaufman (1983b) the reliability coefficients of the K-ABC subtest typically meet or exceed those for comparable intelligence tests. Mean internal consistency reliability coefficients for the K-ABC subtests ranged from .72 to .89 for preschool children and from .71 to .92 for school age children.

Validity. The K-ABC Interpretive Manual (Kaufman & Kaufman, 1983b) includes the results of 43 validity studies. Construct, concurrent, and predictive validity studies were conducted. Topics of the validation studies include developmental changes, internal consistency, factor analysis, and convergent and divergent relationships to other measures. Several prepublication factor analytic studies were conducted, all of which support the division of the intelligence scales into sequential and simultaneous processing scales (Kaufman, Kaufman, Kamphaus, & Naglieri, 1982; Naglieri, Kaufman, Kaufman, & Kamphaus, 1981). For further information on validity see section on K-ABC validity in the Review of the Literature chapter.
Appendix C

Means, Standard Deviations, and Ranges Across Age Groups Within Tests Used in the Study.

Table 10
PPVT-R Standard Scores

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WISC-R Verbal IQ

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### Table 17
**K-ABC Sequential Scores**

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K-ABC Simultaneous Scores

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Table 19
K-ABC MPC

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REFERENCES


Clark, R. (1984, April). Research with the K-ABC and an Appalachian sample. Paper presented at the meeting of the National Association of School Psychologists, Philadelphia, PA.


