1985

Differential diagnosis of learning disabled, behaviorally disabled, and mentally disabled preschool children using the Kaufman-assessment battery for children (K-ABC)

Jackie Navara Loos
University of Northern Iowa

DIFFERENTIAL DIAGNOSIS OF LEARNING DISABLED, BEHAVIORALLY DISABLED, AND MENTALLY DISABLED PRESCHOOL CHILDREN USING THE KAUFMAN-ASSESSMENT BATTERY FOR CHILDREN (K-ABC)

An Abstract of a Thesis

Submitted

In Partial Fulfillment

of the Requirements for the Degree

Specialist in Education

Jackie Navara Loos

University of Northern Iowa

May 1985

This is to certify that

Jackie Navara Loos

✓ satisfactorily completed the comprehensive oral examination

did not satisfactorily complete the comprehensive oral examination

for the Specialist in Education degree with a major in Educational Psychology: School Psychology at the University of Northern Iowa at Cedar Falls

on April 18, 1985.

Examining Committee

Marlene Strathe

Chairperson

Donna B. Raschke

Member

Barry J. Wilson

Member

Member

Transmitted by:

Lawrence L. Kavich

Lawrence L. Kavich, Head
Department of Educational Psychology & Foundations

ABSTRACT

Many theories concerning intelligence have been proposed throughout the years and have served as the bases for the development of an array of intelligence measures. A relatively new theory, proposed by Luria (1966a), postulated that intelligence involved simultaneous and successive processing. The simultaneous-successive theory served as the underlying basis for the recently developed intelligence test, the Kaufman-Assessment Battery for Children (K-ABC). This test, published in 1983, has been correlated with many already established measures of achievement and intelligence (Kaufman & Kaufman, 1983). The K-ABC test includes a Simultaneous Processing scale, a Sequential Processing scale, a Mental Processing Composite scale, a Nonverbal scale, and an Achievement scale.

While the K-ABC purports to be able to differentiate between learning disabled, behaviorally disabled, and mentally disabled children by observing the child's test profile and the child's reactions to various K-ABC tasks, the studies for these differentiations have been done primarily with school-age children. Only limited information exists as to the effectiveness of the K-ABC in differentiating children of preschool age. This research study was designed to gather information concerning the K-ABC's effectiveness in differentiating "high-risk" preschoolers identified as learning disabled, behaviorally disabled, and mentally disabled in order to provide practicing school

psychologists with information relative to the appropriateness of the K-ABC for the differentiation of these groups of preschool children. It was hypothesized that there would be no significant differences among the three groups of preschool children on any of the K-ABC scales or subtests.

A random sample of 60 children, 20 each of preschoolers, ages 3 years, 0 months to 5 years, 11 months, previously identified by an area educational evaluation team as learning disabled, behaviorally disabled, and mentally disabled were drawn from lists of such identified children provided by the local Area Education Agency. Permission was obtained from the parent or guardian of each selected child before his/her participation in the study. Due to nonparental permission and removal of some children from the area program, the final number of subjects in the study was 52: 18 learning disabled, 19 behaviorally disabled, and 15 mentally disabled.

K-ABC administration to all subjects required a time span of 2 weeks and all tests were administered by a trained psychometrist at the preschool at which the child attended on a regular basis. Specific testing and scoring procedures were followed according to the K-ABC administration and scoring manual.

The data analysis was completed using an analysis of variance (ANOVA) procedure with an alpha level of .05 set as the required level of significance. Results revealed significant differences between the mentally disabled group and both the behaviorally disabled and learning disabled groups on the Simultaneous Processing scale, and between the behaviorally disabled and mentally disabled groups on the Mental Processing Composite scale and on the Gestalt Closure subtest. These findings suggest that behaviorally disabled and learning disabled preschool children, ages 3 years, 0 months to 5 years, 11 months, use better simultaneous processing skills than mentally disabled children of the same age. These findings also suggest that behaviorally disabled children use better gestalt closure skills than their counterparts identified as mentally disabled. These findings warrant further investigation in view of the fact that analysis of K-ABC test protocols in regard to learning disabled, behaviorally disabled, and mentally disabled definitions reclassified 29 of the 52 study participants.

DIFFERENTIAL DIAGNOSIS OF LEARNING DISABLED, BEHAVIORALLY DISABLED, AND MENTALLY DISABLED PRESCHOOL CHILDREN USING THE KAUFMAN-ASSESSMENT BATTERY FOR CHILDREN (K-ABC)

A Thesis

Submitted

In Partial Fulfillment

of the Requirements for the Degree

Specialist in Education

Jackie Navara Loos

University of Northern Iowa

May 1985

This Study by: **Jackie Navara Loos**

Entitled: **Differential Diagnosis of Learning Disabled, Behaviorally Disabled and Mentally Disabled Preschool Children Using the Kaufman-Assessment Battery for Children (K-ABC)**

has been approved as meeting the thesis requirement for the

Degree of **Specialist in Education**

Marlene Strathe

4-22-85
Date

Chairman, Thesis Committee

Barry J. Wilson

4-22-85
Date

Member, Thesis Committee

Donna B. Raschke

4-22-85
Date

Member, Thesis Committee

John C. Downey

7-22-85
Date

Dean of the Graduate College

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1

THE PROBLEM

Introduction

Many theories concerning intelligence have been proposed throughout the years and have served as the bases for the development of an array of intelligence measures. The two most prominent intelligence measures have been the Stanford-Binet Intelligence Test, based on the *g* or global intelligence theory (Sattler, 1982), and the Wechsler instruments, based on a verbal/performance dichotomy theory (Sattler, 1982).

A relatively new theory, proposed by Luria (1966a), postulated that intelligence involved simultaneous and successive processing. He hypothesized that simultaneous processing was located in the occipito-parietal area and successive processing was located in the fronto-temporal area. Das (1973), Das, Kirby, and Jarman (1975), and Das and Malloy (1975) used various tests to factor analyze abilities into simultaneous and successive processing modes, which suggested factor loadings for simultaneous processing in memory for designs, figure copying, and progressive matrices. Successive processing had high loadings in recall and short-term memory.

The simultaneous-successive theory served as the underlying basis for a recently developed intelligence test, the Kaufman-Assessment Battery for Children (K-ABC). This test, published in 1983, has been correlated with many already established measures of achievement and intelligence (Kaufman & Kaufman, 1983). Correlational studies with achievement measures included the Woodcock Reading Mastery Test, KeyMath, Peabody Individual Achievement Test, Wide Range Achievement Test, Stanford Diagnostic Reading, Science Reasearch Associates Achievement Series, Iowa Test of Basic Skills, Stanford Achievement Test, and California Achievement Test. Correlational studies with intelligence measures included the Stanford-Binet, the Wechsler Intelligence Scale for Children (WISC-R), and the Wechsler Preschool and Primary Scale of Intelligence (WPPSI). All of these measures are well established within the tests and measurements field.

The K-ABC, in addition to lending support to the simultaneous-successive processing theory (Kaufman & Kaufman, 1983), separates problem-solving ability and achievement by the use of two scales. A mental processing composite scale, consisting of a simultaneous processing scale plus a sequential processing scale, and an achievement scale are included in the K-ABC and have been standardized on the same population sample. It has been posited that this instrument could eliminate the use of two different instruments, standardized on two different populations, in determining the achievement-ability dichotomy used in the placement of children into special educational programs.

Also included within this measure of intelligence is a nonverbal scale. Some of the subtests have been standardized using nonverbal administration procedures, thus eliminating a barrier of language between the administrator and the subject. In addition, Kaufman and Kaufman (1983) cited, as additional instrument strengths, the avoidance of basic concepts that could be ambiguous to young children and the high interest level of the subtests.

The K-ABC standardization sample included handicapped children (learning disabled, mentally disabled, hearing/speech impaired, etc.) and Black and Native American subjects in approximately the same proportions as found in the school-age population (Kaufman & Kaufman, 1983). Although preschool children were included in the norming sample, only a comparatively small number were included in the 24-state selection.

A specific standardization study involved high-risk preschoolers. These children were defined as children previously identified by a preschool screening team as being "at risk for good adjustment to kindergarten." Subjects included children with speech impairments, language delays, high activity levels, and physical handicaps.

While the K-ABC purports to be able to differentiate between learning disabled, behaviorally disabled, and mentally disabled children by observing the child's test profile and the child's reactions to various K-ABC tasks, the studies for these differentiations have been done primarily with school age children. Only limited information exists as to the effectiveness of the K-ABC in differentiating children of preschool age.

Statement of the Problem

The heterogeneity of the study's standardization sample warrants further investigation in order to understand specific preschool disability group children and their expected profiles on the K-ABC. Specifically those preschool disability children identified as learning disabled, behaviorally disabled, and mentally disabled which have been differentiated among school-age children on the K-ABC need to be studied. This research study was designed to gather information concerning the K-ABC's effectiveness in differentiating "high risk" preschoolers identified as learning disabled, behaviorally disabled, and mentally disabled. The following questions were addressed:

1. Are there significant differences in the simultaneous processing, sequential processing, or mental processing composite scores of preschool children, ages 3 years, 0 months to 5 years, 11 months, identified as learning disabled, behaviorally disabled, and mentally disabled?

2. Are there significant differences in the achievement scores of preschool children, ages 3 years, 0 months to 5 years, 11 months, identified as learning disabled, behaviorally disabled, and mentally disabled?

3. Are there significant differences in the nonverbal scores of preschool children, ages 3 years, 0 months to 5 years, 11 months, identified as learning disabled, behaviorally disabled, and mentally disabled?

4. Are there significant differences in subtest scores of preschool children, ages 3 years, 0 months to 5 years, 11 months, identified as learning disabled, behaviorally disabled, and mentally disabled?

Hypotheses

1. There are no significant differences in the K-ABC Simultaneous Processing scale scores of preschool children, ages 3 years, 0 months to 5 years, 11 months, identified as learning disabled, behavorially disabled, and mentally disabled.

2. There are no significant differences in the K-ABC Sequential Processing scale scores of preschool children, ages 3 years, 0 months to 5 years, 11 months, identified as learning disabled, behaviorally disabled, and mentally disabled.

3. There are no significant differences in the K-ABC Mental Processing Composite scale scores of preschool children, ages 3 years, 0 months to 5 years, 11 months, identified as learning disabled, behaviorally disabled, and mentally disabled.

4. There are no significant differences in the K-ABC Nonverbal scale scores of preschool children, ages 3 years, 0 months to 5 years, 11 months, identified as learning disabled, behaviorally disabled, and mentally disabled.

5. There are no significant differences in the K-ABC Achievement scale scores of preschool children, ages 3 years, 0 months to 5 years, 11 months, identified as learning disabled, behaviorally disabled, and mentally disabled.

6. There are no significant differences in subtest scores of preschool children, ages 3 years, 0 months to 5 years, 11 months, identified as learning disabled, behaviorally disabled, and mentally disabled.

Importance of the Study

Results of this study will provide practicing school psychologists with information relative to the appropriateness of the Kaufman-Assessment Battery for Children (K-ABC) for the differentiation of preschool children identified as having an exceptional educational need. Such information may be valuable by aiding in the differential diagnosis and appropriate identification of preschoolers with exceptional educational needs and consequently, in the delineation of an appropriate placement and remediation according to the simultaneous processing/ sequential processing model.

Assumptions

This study was based on the following assumptions:

1. Preschool children in the sample were appropriately identified as learning disabled, behaviorally disabled, and mentally disabled.

2. Each disability group was representative of preschool children identified as learning disabled, behaviorally disabled, and mentally disabled.

3. The K-ABC was administered according to its administration manual.

4. The K-ABC is a valid and reliable assessment measure for the measurement of intellectual functioning and achievement.

5. There are identifiable behavioral excesses and deficits which differentiate learning disabled, behaviorally disabled and mentally disabled preschool children.

6. Each disability category is mutually exclusive from other disability categories.

Limitations

The following were identified as limitations of the study:

1. The sample was drawn from a central Midwest urban area which may limit the generalizability of the findings.

2. The study did not control for the severity level of each child's disability.

3. The study did not control for the overlay of an additional disability.

Definition of Terms

The following definitions were used in the study:

1. Learning disabled. For purposes of this study, learning disabled was defined as those preschool children who were formally identified and labeled learning disabled by an area education agency evaluation team. A specific definition is found in Appendix A.

2. Behaviorally disabled. For purposes of this study, behaviorally disabled was defined as those preschool children who were formally identified and labeled behaviorally disabled by

an area education agency evaluation team. A specific definition is found in Appendix A.

3. Mentally disabled. For purposes of this study, mentally disabled was defined as those preschool children who were formally identified and labeled learning disabled by an area education agency evaluation team. A specific definition is found in Appendix A.

CHAPTER 2

REVIEW OF RELATED LITERATURE

This literature review will address the successive-simultaneous processing theory, the K-ABC battery, and the relationship of the theory and assessment battery. Specific areas to be addressed include a review of the successive-simultaneous processing theory, a review of studies involving various disability groups, a review of remediation studies, and an explanation of the K-ABC battery and studies conducted with this battery.

Successive-Simultaneous Processing Theory

A dichotomous theory of thought was first discussed by Sechenov in 1878 when he suggested that the human sense organs could be divided into two large categories. The first category was comprised of complexes of sound signals which are integrated into a successive series and the second category consisting of visual and tactile complex stimuli which reflected simultaneous spatial influences. Luria (1966b), building on Sechenov's ideas, developed a more elaborate cognitive processing theory which does not involve specific modality stimuli. Luria's theory of the working brain involves a hierarchical structure but suggests that simultaneous and successive processing are not hierarchical in nature.

Luria's theory of brain functioning involves three units of the brain. These are arousal, coding, and planning behavior. The location of these units is determined by complex interactions among the cortical zones. Mental activity is dependent upon the interaction of these three hierarchical units.

The first unit or block of the brain includes the upper and lower brain stem, the reticular formation, and the hippocampus and is concerned with regulating tone and maintaining an arousal state. It supplies the energy for various conscious and unconscious mental activities but is guided by the complex cognitive processes of intentions, plans, and programs.

The second block, composed of three zones, is concerned with obtaining, processing, and storing information and includes the occipital, temporal, and parietal lobes. The first zone receives information and analyzes it while the second zone organizes the material and codes it. The tertiary zone, where the cortical ends overlap, is responsible for the integration of the coded material. This zone includes the inferior parietal regions and is responsible for comprehension and abstract thinking.

The third block, located in the frontal lobes, is responsible for planning and programing behavior. The prefrontal division of this block plays the major role in the formation of most complex forms of human behavior. It is to these frontal lobes that Luria attributes the highest function of the brain, the supervision of all conscious activity.

This theory of brain functioning is the basis for Luria's cognitive processing theory of simultaneous and successive synthesis. There are three varieties of simultaneous syntheses and three varieties of successive syntheses.

Both simultaneous and successive synthesis involve direct perceptual processes, mnestic processes, and complex intellectual processes. Direct perceptual process is primarily spatial for simultaneous synthesis and primarily sequential for successive synthesis. Mnestic processes, for both types of synthesis, involve the organization of stimulus traces from earlier experiences, either short-term or long-term memory. Complex intellectual processes for simultaneous synthesis involve the exploration and determination of the relationships among components, while for successive synthesis it involves such successive relationships as human speech.

Simultaneous synthesis is "the possibility of synthesizing individual elements into simultaneous and, above all, spatial groups" (Luria, 1966b, p. 83). The simplest form of simultaneous synthesis is copying geometric figures, while more difficult tasks involve producing designs from blocks, drawing maps, and perceiving meaning from words in print. Research (Luria, 1966b) based on the analyses of patients with brain lesions in the occipito-parietal region has demonstrated a disturbance in the simultaneous synthesis ability, especially if the lesion is located in the dominant left hemisphere. These lesions are seen to lead to a "loss of ability to convert successively presented stimuli into simultaneously perceived structures"

(Luria, 1966b, p. 89). This loss of ability has been technically termed simultaneous agnosia. People with this type of agnosia typically have difficulty in putting on their clothes, copying material, understanding speech and written language, and performing numerical and arithmetical operations. These people also tend to easily lose their sense of direction. Yet with all of these difficulties, their successive synthesis remains undisturbed and they exhibit no narrative speech disturbances.

Successive synthesis is "the synthesis of individual elements into a successive series" (Luria, 1966b, p. 86). Simultaneous integration refers to a type of processing in which "any portion of the result is at once surveyable without dependence upon its position in the whole" (Das, Kirby, & Jarman, 1975, p. 89). The simplest test of successive synthesis is sensorimotor or acousticomotor, which involves the repeating of a sequence of sounds, rhythms, digits, or words. The difficulty of this task is in the retention of the required order of the stimuli. Patients with lesions in the frontal and fronto-temporal regions show no disturbances in simultaneous synthesis as evidenced in their spatial orientation, copying material, or even in retention ability which does not require order retention. They do, however, have difficulty in the performance of serial activities, such as reproducing a series of beats, written strokes, written symbols, words, or digits. Thus, these patients have difficulty in writing and in the smoothness of interchange between their actions.

Another symptom of persons with successive synthesis disruptance is an appearance of perseveration when doing a task that requires successive synthesis. Many studies (Cummins, 1973; Das, 1972, 1973; Das & Cummins, 1978; Das, Leong, & Williams, 1978; Das & Molloy, 1975; Jarman & Das, 1977; Kirby & Das, 1978) have been done to support this theory and provide evidence across intelligence quotient (IQ) groups, socioeconomic status, cultures, and achievement levels.

Review of Disability Group Studies

All of the following studies, unless stated otherwise, used the same basic battery of tests to factor simultaneous and successive processing. The battery included: (a) Raven's Progressive Matrices, (b) Graham-Kendall's Memory for Designs, (c) a cross-modal coding task in which subjects were asked to code auditory sounds to visual dots; (d) a visual short-term memory task involving the viewing of a grid, presentation of a neutral filler, and recall of the digits on an empty grid, and (e) auditory serial recall and free recall involving recalling short lists of four words each.

Kirby and Das (1978) studied 104 fourth-grade males in order to relate simultaneous and successive processing with reasoning and memory. Results of the analysis of the test battery revealed that simultaneous processing, alone, related to spatial ability, memory, and inductive reasoning. No evidence was found to support the idea that simultaneous and successive processing fall into a hierarchy.

A definite split of simultaneous and successive processing for IQ groups of 60 nonretarded and 60 retarded children was found by Das (1972). Simultaneous processing loaded highly for Raven's Progressive Matrices, cross-modal coding, and visual short-term memory for both retarded and nonretarded subjects. Successive processing loaded highly for serial and free recall for both groups. A discrepancy was found between the groups for the loading of Memory for Designs. For nonretarded subjects this loaded highly in successive, while for retarded subjects this loaded highly in simultaneous.

In relation to age Das and Molloy (1975), in a study of 6- and 10-year-olds, found three factors to emerge: simultaneous integration, successive integration, and a speed factor. Speed was seen in two additional tests of word reading and color reading. Factor loadings were free and serial recall on the successive variable and Raven's Progressive Matrices and figure copying on the simultaneous variable for both groups. A discrepancy between the groups existed in Memory for Designs and visual short term memory. Memory for Designs loaded on successive processing for 10-year-olds and on speed for 6-year-olds. Visual short-term memory loaded on successive processing for 10-year-olds and simultaneous processing for 6-year-olds.

In a study of the relationship of socioeconomic status (SES) and simultaneous-successive processing, 60 low SES children and 60 middle to high SES children in fourth grade (Das & Molloy, 1975) were tested. The same three factors were identified as in previous studies, with only a discrepancy in cross-modal coding. Cross-modal coding loaded highly first, in the speed factor and secondly, in simultaneous processing for the high SES group while in the low SES group speed was not a factor on this task.

The stability of simultaneous-successive factors across cultures was demonstrated in a study of Canadian children and high-caste children from Orissa, India (Das, 1973). Results from this study indicated a cultural preference for the successive mode of processing because of the equally high loading of the Raven's Progressive Matrices on both the simultaneous and successive processing factors.

Cummins (1973) administered a different battery of tests to high school students in an effort to reveal the same results as the Das, Kirby, and Jarman test battery. This new test battery included syllogisms, similarities, paired-associate learning-concrete words, memory span-abstract words, digit span, paper folding, and utility testing. Results revealed high simultaneous loadings for syllogisms, similarities, paired-associate learning-concrete words, and paper folding. The successive factor contained high loadings in digit span, paired-associate learning-abstract words, and memory span-abstract and concrete words.

In summation, Luria (1966a) observed in his patients two diverse modes of processing information, simultaneous and successive. The Das (1972, 1973), Das et al. (1975), and Das et al. (1978) studies provided supporting evidence for Luria's processing theory across IQ groups, cultural groups, age groups, achievement levels, and socioeconomic status.

Various studies have provided evidence to support ideas that various disability groups use different cognitive strategies. Again, Das (1972, 1978), Jarman and Das (1977), and Das et al. (1978) studied various IQ groups and learning disability children to lend support to this theory.

The Das (1972) study not only lent support to the theory but also yielded support for the premise that exceptionality groups utilize alternative cognitive strategies. The 60 nonretarded subjects not only scored higher on each test but also used a reasoning factor for Raven's Coloured Progressive Matrices, Cross-factor for short-term memory (auditory) and short-term memory (auditory free recall). The retarded subjects used reasoning for only Raven's Coloured Progressive Matrices and Memory for Designs and memory for only short-term memory (auditory) and short-term memory (auditory free recall). This study suggested that retarded individuals use different methods of solving problems on some tasks.

Jarman and Das (1977) studied 120 fourth-grade males of high, average, and low intelligence as measured by the Lorge-Thorndike.

The Verbal IQ was the primary criterion for the distinction of low IQ, 71-90, average IQ, 91-110, and high IQ, 111-130. Results for the low IQ group yielded high loadings on the simultaneous factor for Raven's Progressive Matrices, figure copying, and Memory for Designs, high loadings on the successive factor for auditory-visual matching and serial recall, and high loadings on the successive and speed factors for word reading. Average IQ group results yielded high simultaneous loadings in the same tests as the low IQ group but also yielded a high loading for auditory-visual matching. Successive synthesis and speed had high loadings in serial recall, visual short-term memory and word reading for this group. The high IQ group simultaneous loading matched that of the low IQ group. It's successive loading also matched that of the low IQ group but also included visual short term memory. The speed factor loaded only in Word Reading. In summary, this study supports that various IQ groups use different cognitive strategies.

In 1978 Das and Cummins studied 52 educable mentally retarded subjects, 27 males and 25 females, whose IQs were between 55 and 80 as measured by the Wechsler Intelligence Scale for Children (WISC). Four tests from the Das battery, two measuring simultaneous processing and two measuring successive processing, the Wide Range Achievement Test (WRAT) and the Schonell Silent Reading Test were administered. Results revealed a simultaneous processing correlation with the WISC Performance IQ and WRAT

Arithmetic. Successive processing correlated with WRAT Spelling and WRAT Oral Reading and negatively correlated with the WISC Performance IQ. The Schonell Test and the WISC Verbal IQ had no significant correlation with either processing mode. The negative correlation between successive processing and the WISC Performance IQ suggests that successive strategies are inefficient for the spatial/simultaneous processing tasks in the WISC Performance scale. Implications for remediation suggest that remediation in successive processing skills would be effective in improving educable mentally retarded children's processing strategies.

Two groups of learning disabled males were involved in two processing studies (Das, Leong, & Williams, 1978). One study involved 60 subjects classified as hyperkinetic, hypokinetic, or normokinetic as measured by classroom behavior. Results indicated no significant processing differences either between the learning disability group and the control group or between the three classifications of learning disabilities. The results may have been due to a small relationship between behavior rating of activity and cognitive processing as measured by this study.

The second study involved 58 dyslexic males diagnosed as "retarded" in reading by two and one half or more grades, although having average intelligence. In addition to the Das battery, two subtests from the Illinois Test of Psycholinguistic Abilities (ITPA), Visual Sequential Memory and Auditory Sequential Memory, were administered. Results indicated the experimental and control groups to be similar but not identical. For the dyslexic group, auditory visual coding loaded equally on both processing modes, visual short-term memory loaded on a perceptual organization factor, and the ITPA Visual Memory subtest loaded highly on the simultaneous mode. This is in contrast to the control group for which Auditory Visual Coding, Visual short-term memory and the ITPA Visual Memory loaded on the simultaneous factor, the successive factor and the perceptual organization factor, respectively. In summary, the learning disabled students appeared to use no peculiar coding processes but did have a lower level of performance than normal subjects (Das, Leong, & Williams, 1978).

Review of Remediation Studies

Other studies have attempted to remediate identified deficits according to the simultaneous-successive processing theory (Das, Kirby, & Jarman, 1975; Krywanuik & Das, 1976). These studies suggest that since simultaneous-successive processing are cognitive skills, these skills can be taught and improved.

Das, Kirby, and Jarman (1975) attempted simultaneous-successive processing remediation techniques with 34 fourth-grade white Canadian children. The examiners hypothesized that the children who underwent remediation would adopt strategies that ensure integration of information, thus improving their performance on tests. Also expected was that the training to use successive strategies appropriately would lead to improved performance in academic tasks related to successive processing.

Based on the Metropolitan Achievement Test (MAT) students were divided into average and below average and alternately selected for the control and experimental groups. The experimental group received 17 weeks of individual training, one 35-minute period per week, receiving a total of 10 hours of intervention. The remediation tasks were dissimilar to the tests used. They included puzzles, sequencing tasks, and various filmstrips regarding memory and matching. Results yielded improvements in all tests for all subjects and significant improvement for the experimental pre-post treatment group, especially in regard to word attack skills, math computation, and math concepts. The implication of this study is that strategies should be taught instead of specific tasks, therefore promoting transfer to academic and nonacademic situations.

Krywanuik and Das (1976) suggested that cognitive functioning is based upon the appropriateness of the strategy used. Therefore, strategies can be taught and changed where inappropriate. Their subjects were 40 third- and fourth-grade students on a Canadian Indian reservation. In addition to tests from the Das battery, the examiners administered the WISC and Schonell Graded Readiness Vocabulary Test. Results of testing indicated that these children had good simultaneous processing strategies but poor successive processing strategies. During remediation, 15 hours total for the experimental group, memory and recall tasks and filmstrips were presented. Results of remediation revealed improvement in a number of tests. There were no significant improvements in WISC scores, although serial and free recall improved significantly. Schonell performance significantly improved which suggests that word attack strategies, successive in nature, improved.

The results of the studies reviewed support the contention that remediation in processing skills will improve processing performance. Further, the results indicate that remediation programs which do not allow for generalization will be ineffective and that education programs should be designed to take advantage of the specific favored processing mode. Further, the training of exceptional learners to use simultaneous-successive cognitive strategies might be the most appropriate remedial approach.

These theoretical and remediational studies cite evidence that, with identification of cognitive strategy weaknesses regarding simultaneous-successive processing, remediation according to this theory will improve performance. Therefore, using the K-ABC, which is said to measure simultaneous-successive processing, identified processing deficits are open to remedial techniques which will lead to improved student performance.

The K-ABC

The K-ABC uses the Luria theory as a basis for its test battery. It uses similar tasks for its subtests as were in the Das, Kirby and Jarman test battery. The test battery contains a Sequential Processing scale, a Simultaneous Processing scale, a

Mental Processing Composite scale, a Nonverbal scale, and a separate and discrete, Achievement scale.

The Mental Processing Composite scale is similar to an IQ, but does not predict school success as does the Wechsler Preschool and Primary Scale of Intelligence (WPPSI) IQ score. For this type of prediction the Achievement scale is used. In this way problem-solving ability and acquired knowledge are kept separate, even though the same standardization sample was used for both scales. The Nonverbal scale allows for a fair intellectual assessment for children whose handicap might otherwise depress their score.

The K-ABC was designed to be used for children from 2 1/2 to 12 1/2 years of age. Therefore, many provisions were taken in its construction to make the subtests interesting and enjoyable. They are colorful, game-like, and child-oriented so as to aid the administrator in establishing and maintaining rapport. The first two subtests administered are also of high interest value. Developmental patterns and age were taken into account in the tailoring of subtests for interest value and subtest items for difficulty. These considerations were also taken into account in establishing the length of the test battery for various ages. For example, perceptually oriented tasks are administered early in the test battery for preoperational stage children. Photo Series, a visual simultaneous processing task, is not included until year six, which approximately coincides with a child's transition from Piaget's preoperational stage to the concrete operations stage.

The K-ABC directly avoids using basic concepts and tries to reduce required verbal interaction so as not to inhibit the shy, nonverbal child. The easy administration and objective scoring of the K-ABC allows the administrator to devote more time to observing the child and maintaining rapport. The K-ABC also provides a continuous measure of intelligence and achievement for a wide range of age spans, from preschool to elementary. Children assessed at age 2 1/2 can be followed with the same instrument until the age of 12 1/2.

K-ABC Disability Group Studies

Several studies involved in the K-ABC standardization process (Kaufman & Kaufman, 1983) utilized the K-ABC with disability groups of children. These groups included learning disabled, mentally retarded, behaviorally disordered, and high-risk preschool children.

Learning disabled children, totaling 304 subjects, averaged 2 to 5 points higher on the Simultaneous Processing scale than on the Sequential Processing scale. Analysis of test profiles revealed that these children performed well on Gestalt Closure and Riddles, and poorly on the Sequential Processing subtests.

The studies involving mentally retarded children, 111 total subjects, revealed that the Global scale scores are commensurate with the children's diagnostic classification. These children performed their best on Gestalt Closure, Hand Movements, and

Triangles, consecutively. They performed poorly on Word Order, Photo Series, and all Achievement scale subtests.

Forty-four behaviorally disordered children performed similar to the learning disabled samples. They scored highest on Gestalt Closure and Triangles, and lowest on Word Order, Hand Movements, and Matrix Analogies. Two subtest performances were strikingly different from the learning disabled samples: Number Recall, third highest for the behaviorally disordered children and Spatial Memory, a weakness for the behaviorally disordered children. On the Achievement scale, this sample scored 2 points higher than they did on the Mental Processing Composite. These children also outperformed the learning disabled children on all Achievement subtests, while both samples performed their relative best on Riddles.

A single study of preschool children identified as "high risk for good adjustment to kindergarten" included children classified as having speech impairments, language delays, high activity levels, or multiple problems with some degree of physical handicap. These children performed equally well on all scales, earning highest scores on Hand Movements, Triangles, Matrix Analogies, and Spatial Memory. Lowest scores were earned on Number Recall, Magic Window, Word Order, Arithmetic, and Riddles.

Summary

Luria (1966a) proposed a cognitive processing theory involving three units of the brain. This theory of brain functioning is the basis for Luria's cognitive processing theory of simultaneous and successive synthesis. Simultaneous synthesis is "the possiblity of synthesizing individual elements into simultaneous and, above all, spatial groups" (p. 83) while successive synthesis is "the synthesis of individual elements into a successive series" (p. 86).

Studies using a successive-simultaneous test battery (Das, 1972, 1973; Das et al., 1975; Das et al., 1978; Jarman & Das, 1977; Kirby & Das, 1978) lend evidence to support Luria's theory. Other studies (Das, Kirby, & Jarman, 1975; Krywanuik & Das, 1976) lend support for the ability of successive and simultaneous skills to be taught and improved.

The K-ABC uses the Luria theory as a basis for its test battery and contains a Sequential Processing scale, a Simultaneous Processing scale, a Mental Processing Composite scale, a Nonverbal scale, and an Achievement scale. Studies utilizing this test battery (Kaufman & Kaufman, 1983) support the premise that the K-ABC can aid in the differential diagnosis of various disability groups of children.

CHAPTER 3

METHODOLOGY

The purpose of this study was to investigate the K-ABC's ability to differentiate learning disabled, behaviorally disabled, and mentally disabled exceptional preschool children. This chapter describes the study participants, the diagnostic instrument, the procedure, and the analysis of the data used in the study.

Subjects

A list of all children placed in special education preschools in a 30-mile radius was obtained from the local education agency. Of the 106 children on the list, those children identified other than learning disabled, behaviorally disabled, or mentally disabled were excluded. Also excluded were children younger than 3 years, 0 months and children older than 5 years, 11 months, thus leaving 83 children eligible for participation in the study: 20 learning disabled, 33 behaviorally disabled, and 30 mentally disabled. The eligible participants were further subdivided into categories by handicapping condition. A sample of 20 children from each subgroup of learning disabled, behaviorally disabled, and mentally disabled ages 3 years, 0 months to 5 years, 11 months previously identified by an area educational evaluation team was randomly selected.

Instrument

The K-ABC assessment instrument was used in this study for all administrations. This test battery, developed by Kaufman and Kaufman (1983) contains a Simultaneous Processing scale, a Sequential Processing scale, a Mental Processing Composite scale, a Nonverbal scale, and a separate and discrete, Achievement scale. The K-ABC was normed on more than 2,000 children in 34 test sites located in 24 states. This sample included learning disabled, mentally disabled, speech/language impaired, talented and gifted, and emotionally disabled children as well as White, Black, Hispanic and Native American children in approximate proportion to the school-age population in the United States.

Reliability studies of the K-ABC have investigated split-half, test-retest, and alternate level reliability. Split-half reliability coefficients for K-ABC subtests across age ranges indicate mean values of .80 and above for 12 of the 16 subtests and no coefficients below .70. Split-half coefficients for K-ABC Global scales of Mental Processing Composite and Achievement exceeded .90 across all ages. Other Global scale coefficients were not below .84 (Kaufman & Kaufman, 1983).

Test-retest reliability, with intervals of 2 to 4 weeks, was determined by administration of the K-ABC to 246 children across the 2 1/2 to 12 1/2 year age range. The reliability coefficients increased with age on the Mental Processing Scales. Achievement score reliability coefficients ranged from .95 to .97. Practice effects were most noticeable on the Simultaneous Processing Scale. Practice effects were in a 2-point range on the Achievement scale and had a 4-point increase on the Nonverbal scale. "These practice effects are generally smaller than the gains found for the WISC-R over similar intervals" (Kaufman & Kaufman, 1983, p. 84). Practice effects were seen on specific subtests in a 1.0 to 1.5 range on Gestalt Closure, Triangles, Magic Window, and Matrix Analogies and in a 3.0 to 4.0 range on Riddles.

Alternate level reliability was determined in a study of the 4- and 5-year age levels. Of the 246 children given test-retest situations on the K-ABC, a subsample of 4 1/2- to 5 1/2-year-olds were given counterbalanced administration. These alternate level reliability coefficients ranged from .83 to .95.

Validity studies of the K-ABC have included investigations of construct, predictive, and concurrent validity. Construct validity studies included developmental changes, internal consistency, factor analysis, convergent and discriminate validation, and correlations with other tests. The developmental changes study showed a steady progression of mean values from age to age. Wider age ranges yielded higher relationships (Kaufman & Kaufman, 1983).

Internal consistency coefficients on the Mental Processing Composite ranged from .40 to .76. Achievement scale internal consistency coefficients ranged from .69 to .89. Factor analysis of subtests into either the Simultaneous Processing scale or

Sequential Processing scale were done by principal factor analysis and confirmatory factor analysis. Both analyses support the construct of the Processing and Achievement scales.

Convergent and discriminant validation was done with the Das-Kirby-Jarman successive-simultaneous test battery. Results of these studies support the K-ABC construct validity.

Correlations with the Stanford-Binet Intelligence Scale and Wechsler scales for children were moderate. The Stanford-Binet IQ correlated .61 with the K-ABC Mental Processing Composite, .78 with the K-ABC Achievement scale, and in the lower .50s with the Simultaneous Processing, Sequential Processing and Nonverbal scales. The K-ABC Mental Processing Composite correlated .70 with the WISC-R Full scale IQ. The K-ABC Achievement Scale correlated .76 with the WISC-R Full scale IQ. The K-ABC Simultaneous Processing scale and Nonverbal scale correlated in the mid .60s with the WISC-R Performance IQ and in the low .50s with the WISC-R Verbal IQ. The K-ABC Sequential Processing scores correlated .49 with the WISC-R Verbal IQ and .30 with the WISC-R Performance IQ. K-ABC Achievement scale scores correlated more highly with the WISC-R Verbal IQ than with the Performance IQ.

Predictive validity studies were done with the Peabody Individual Achievement Test (PIAT), .67 to .82 with the K-ABC Achievement scale, and the Woodcock-Johnson Psycho-educational Battery, .73 and .84 with the Preschool and Knowledge Clusters with the Achievement Scale. The Mental Processing Composite correlated .61 and .63 with the Preschool and Knowledge Clusters, respectively. Two additional predictive validity studies used group-administered achievement tests. The Iowa Test of Basic Skills (ITBS) Composite correlated .89 with the K-ABC Achievement scale score and .58 with the Mental Processing Composite. The California Achievement Test (CAT) Total correlated .77 with the Achievement scale.

Concurrent validity studies were done with individually administered achievement tests, group-administered achievement tests, and comprehensive tests of general cognitive ability. Individual achievement tests included the Woodcock Reading Mastery Test-Passage Comprehension, KeyMath, PIAT, the Wide Range Achievement Test (WRAT), and the Stanford Diagnostic Reading Test. Group Achievement tests included the Science Research Associates Achievement Series (SRA), the Gates-MacGinitie Reading Tests, the ITBS, the Stanford Achievement Test (SAT), and the California Achievement Test.

With individual achievement tests the K-ABC Achievement scale correlated from .45 to .89 and the Mental Processing Composite scale correlated from .39 to .69. The Sequential Processing scale correlated from .22 to .60 and the Simultaneous Processing scale correlated from .42 to .56. The Nonverbal scale correlated from .36 to .67 with the individual tests.

With group-administered achievement tests the K-ABC Achievement scale correlates ranged from .58 to .86, with the

Mental Processing Composite Scale from .40 to .83. Simultaneous Processing, Sequential Processing, and Nonverbal scale correlates were in the high .40s to .75.

Validity studies with tests of general cognitive ability included the McCarthy Scales of Children's Abilities, the Woodcock-Johnson Psycho-educational Battery, and the Cognitive Abilities Test (CAT). The K-ABC Achievement scale correlates ranged from .20 to .79 and Mental Processing scale correlates from .41 to .68. The Sequential Processing scale correlated .70 and the Simultaneous Processing scale correlated .51 with the McCarthy General Cognitive Index.

The K-ABC battery was also correlated with the Luria-Nebraska Children's Battery. Two studies were done with learning disabled children, one study yielding coefficients of approximately .70 for both the Sequential and Simultaneous Processing scales, .73 for the Mental Processing Composite scale, .68 for the Achievement scale and .67 for the Nonverbal scale. In the second study coefficients were .86 for the Mental Processing Composite scale, .81 for the Sequential Processing scale, and from .73 to .75 for the other three scales.

Concurrent validity with short tests of cognitive ability or visual-motor ability included the Columbia Mental Maturity Scale, the Slosson Intelligence Test, the Bender-Gestalt Test, the Developmental Test of Visual-Motor Integration (VMI), and the Peabody Picture Vocabulary Test-Revised (PPVT-R). Correlation coefficients ranged from .08 to .65 for Sequential Processing, from .30 to .71 for Simultaneous Processing, and from .29 to .75 for the Mental Processing Composite. Coefficients for the Achievement scale ranged from .27 to .90 and for the Nonverbal scale from .24 to .71.

Procedure

A random sample of 60 children, 20 each of preschoolers previously identified as learning disabled, behaviorally disabled, and mentally disabled, were drawn from lists of such identified children provided by the local Area Education Agency. Permission was obtained from the parent or guardian of each selected child before his/her participation in the study (Appendix B). Due to nonparental permission and removal of some children from the area program, the final number of subjects in the study was 52: 18 learning disabled, 19 behaviorally disabled, and 15 mentally disabled.

Testing required a time span of 2 weeks and all tests were administered by a trained psychometrist at the preschool at which the child attended on a regular basis. Specific testing and scoring procedures were followed according to the K-ABC administration and scoring manual.

Analysis of Data

The data analysis was completed using an analysis of variance (ANOVA) procedure. An alpha level of .05 was set as the required level of significance. Significant difference testing among the mean scores of the three groups was done on the Simultaneous Processing scale, the Sequential Processing scale, the Mental Processing Composite scale, the Nonverbal scale, the Achievement scale, and individual subtests.

CHAPTER 4

RESULTS

This chapter presents the results of the analyses of data. Analyses were completed for each hypothesis using an analysis of variance (ANOVA) procedure with an alpha level of .05 set as the required level of significance.

Fifty-two of 60 randomly selected preschool children participated in the study. In the learning disabled group, ages 3 years, 0 months to 5 years, 11 months, with a total sample size of 18, 14 were males and 4 were females. Three of these children were from 3 years, 0 months to 3 years, 11 months in age, while 6 were from 4 years, 0 months to 4 years, 11 months in age; 9 were from 5 years, 0 months to 5 years, 11 months in age. The mean age of this group was 4 years, 8 months. Of the 19 preschool children, ages 3 years, 0 months to 5 years, 11 months identified as behaviorally disabled, 15 were males and 4 were females. Seven of these 19 preschool children were in the age range of 3 years, 0 months to 3 years, 11 months; 9 were in the age range of 4 years, 0 months to 4 years, 11 months; and 3 were in the age range of 5 years, 0 months to 5 years, 11 months. The mean age of this group was 4 years, 4 months. The mean age of the mentally disabled preschool group, ages 3 years, 0 months to 5 years, 11 months, was 4 years, 4 months. Of the 15 children previously identified as mentally disabled, 12 were males and 3 were females. Only 3 children were in the age range of 3 years, 0 months to 3 years, 11 months; 10 were in the age range of 4 years, 0 months to 4 years, 11 months; and 2 were in the age range of 5 years, 0 months to 5 years, 11 months.

Means and standard deviations for the Simultaneous Processing scale, Sequential Processing scale, Mental Processing Composite, Nonverbal scale and Achievement scale are displayed in Table 1. Means and standard deviations for subtests are summarized in Table 2. The Nonverbal scale n is smaller than the n for the other scales since 3-year-olds do not receive this score. Varying n totals on the subtests are accounted for in that children of different ages are given fewer or additional subtests.

Hypothesis 1 stated that no significant differences would be found between the three groups of children on the Simultaneous Processing scale. Analysis of the K-ABC Simultaneous Processing scale scores of the three groups yielded significant differences among the groups $F(2, 49) = 5.80$, $p < .05$. (See Table 3.) A post-hoc Scheffé test of significance revealed significant differences between the mentally disabled group and both the learning disabled group and the behaviorally disabled group. The mean score for the mentally disabled group was 13.56 points lower than the behaviorally disabled group mean and 11.57 points lower than the learning disabled group mean. Thus, Hypothesis 1 was rejected.

Hypothesis 2 stated that there are no significant differences between the three groups of children on the Sequential Processing scale. Analysis of the K-ABC Sequential Processing scale scores

Table 1

Mean Standard Scores and Standard Deviations of Behaviorally Disabled (BD), Learning Disabled (LD), and Mentally Disabled (MD) Groups on the K-ABC Simultaneous Processing Scale (SIM), Sequential Processing Scale (SEQ), Mental Processing Composite (MPC), Nonverbal Scale and Achievement Scale (ACH)

	BD			LD			MD		
Scale	n	M	SD	n	M	SD	n	M	SD
SIM*	19	93.16	13.85	18	91.17	11.31	15	79.60	10.93
SEQ	19	92.05	9.19	18	86.72	15.28	15	84.27	8.01
MPC*	19	91.21	11.21	18	88.67	11.73	15	79.47	9.62
Nonverbal	12	90.92	16.94	15	90.07	11.15	12	81.75	6.05
ACH	19	91.00	10.71	18	87.17	11.37	15	83.20	5.56

* $p < .05$

Table 2

Mean Standard Scores and Standard Deviations for K-ABC Individual Subtests

	BD			LD			MD		
Subtest	n	M	SD	n	M	SD	n	M	SD
Magic Window	16	9.38	3.69	9	10.11	2.39	13	7.77	3.61
Face Recognition	16	8.44	3.12	9	9.56	1.81	13	7.31	2.46
Hand Movements	19	9.47	7.32	18	7.22	2.53	15	6.80	1.61
Gestalt Closure*	19	9.11	2.79	18	7.33	2.52	15	5.80	1.82
Number Recall	19	10.00	2.40	18	8.56	3.47	15	8.07	3.17
Triangles	12	8.75	1.86	15	8.80	1.93	12	7.67	1.72
Word Order	12	8.00	.85	15	7.80	2.18	12	7.50	1.38
Matrix Analogies	3	11.67	2.52	9	10.00	1.58	2	7.50	2.12
Spatial Memory	3	8.00	4.58	9	7.44	2.70	2	5.00	0.00
Expressive Vocabulary	16	96.13	12.80	9	88.89	14.60	13	86.62	6.91
Faces and Places	19	90.32	15.74	18	86.33	14.82	15	84.00	10.76
Arithmetic	19	92.79	12.93	18	89.61	10.14	15	86.20	10.16
Riddles	19	91.53	10.83	18	88.00	9.32	15	84.27	6.37
Reading/Decoding	3	85.67	2.89	9	94.44	19.03	2	94.00	7.07

* $p < .05$

Table 3

ANOVA Summary for the K-ABC Simultaneous Processing Scale

Source	DF	SS	Mean Squares	F
Between groups	2	1728.20	864.10	5.80*
Within groups	49	7300.63	149.00	
Total	51	9028.83		

*$p < .05$

yielded no significant differences between groups $F(2, 49) = 2.11$, $p > .05$. The greatest difference of means, 7.78, occurred between the mentally disabled group and the behaviorally disabled group. The difference in means between the behaviorally disabled group and the learning disabled group was 5.33 and between the learning disabled group and the mentally disabled group was 2.45. Thus, Hypothesis 2 failed to be rejected.

Hypothesis 3 stated that no significant differences would be found between the groups on the Mental Processing Composite scale scores. Analysis of the K-ABC Mental Processing Composite scale scores of the three groups did yield significant differences among the groups $F(2, 49) = 5.15$, $p < .05$. (See Table 4.) A Scheffé test revealed significant differences between the behaviorally disabled group and the mentally disabled group. The behaviorally disabled group mean was 11.74 points higher than the mentally disabled group mean. Thus, Hypothesis 3 was rejected.

Table 4

ANOVA Summary for the K-ABC Mental Processing Composite (MPC) Scale

Source	*DF*	*SS*	Mean Squares	*F*
Between groups	2	92.73	46.37	7.72*
Within groups	49	294.19	6.00	
Total	51	386.92		

*$p < .05$

Analysis of the K-ABC Nonverbal scale scores of the three groups yielded no significant differences $F(2, 35) = 2.15$, $p > .05$. The greatest mean score difference was between the behaviorally disabled group and the mentally disabled group at 9.17. The smallest difference was between the behaviorally disabled group and the learning disabled group at .85 while the mean difference between the learning disabled group and the mentally disabled group was 8.22. Therefore, Hypothesis 4, which stated that there would not be significant differences between groups on the Nonverbal scale, was not rejected.

As stated in Hypothesis 5, no significant differences were to be found between the groups on the Achievement scale. Analysis of the K-ABC Achievement scale scores of the three groups did not yield significant differences $F(2, 49) = 2.67$, $p > .05$. Mean differences were 3.83 between the behaviorally disabled and learning disabled groups, 3.97 between the learning disabled and mentally disabled groups, and 7.80 between the behaviorally disabled and mentally disabled groups. Therefore, Hypothesis 5 failed to be rejected.

Hypothesis 6 stated that there are no significant differences between the groups on the individual subtests. Analysis of the individual subtest scores of the three groups yielded no significant differences on Magic Window $F(2, 35) = 1.35$, $p > .05$, Face Recognition $F(2, 35) = 1.95$, $p > .05$, Hand Movements $F(2, 49) = 1.62$, $p > .05$, Number Recall $F(2, 49) = .29$, $p > .05$, Triangles $F(2, 36) = 1.50$, $p > .05$, Word Order $F(2, 36) = .29$, $p > .05$, Matrix Analogies $F(2, 11) = 3.08$, $p > .05$, Spatial Memory $F(2, 11) = .67$, $p > .05$, Expressive Vocabulary $F(2, 35) = 2.62$, $p > .05$, Faces and Places $F(2, 49) = .88$, $p > .05$, Arithmetic $F(2, 49) = 1.44$, $p > .05$, Riddles $F(2, 49) = 2.61$, $p > .05$, or

Reading/Decoding $F(2, 11) = .33$, $p > .05$. A significant difference was found on Gestalt Closure $F(2, 49) = 7.72$, $p < .05$. (Table 5) A Scheffé test revealed significant differences between the behaviorally disabled group and the mentally disabled group, with the behaviorally disabled group mean being 3.31 points higher than the mentally disabled group mean. Given that only 1 of the 14 subtests yielded significant differences between groups, there does not seem to be enough evidence to reject Hypothesis 6.

Table 5

ANOVA Summary for the K-ABC Gestalt Closure Subtest

Source	DF	SS	Mean Squares	F
Between groups	2	92.73	46.37	7.72*
Within groups	49	294.19	6.00	
Total	51	386.92		

*$p < .05$

CHAPTER 5

DISCUSSION AND SUMMARY

Discussion

The purpose of this study was to investigate the K-ABC's ability to differentiate preschool children identified as learning disabled, behaviorally disabled, and mentally disabled. Previous studies (Kaufman & Kaufman, 1983) which used the K-ABC and these three special populations primarily involved school-age children. Results of this study yielded significant differences between the groups of preschool children for only Simultaneous Processing, the Mental Processing Composite, and the subtest of Gestalt Closure.

Hypothesis 1 stated that no significant differences would be found between the three groups of children on the Simultaneous Processing scale. As previously stated, Hypothesis 1 was rejected at the .05 level of significance. Significant differences on the Simultaneous Processing scale were found between the behaviorally disabled group and the mentally disabled group, and the learning disabled group and the mentally disabled group. The behaviorally disabled group mean was 13.56 points higher than the mentally disabled group mean. This suggests that behaviorally disabled preschool children, ages 3 years, 0 months to 5 years, 11 months, use significantly better simultaneous processing skills than their counterparts identified as mentally disabled.

The learning disabled group mean was 11.57 points higher than the mentally disabled group mean. This suggests that learning disabled preschool children, ages 3 years, 0 months to 5 years, 11 months, have significantly better simultaneous processing skills than their counterparts identified as mentally disabled. This supports the Kaufman and Kaufman (1983) findings that learning disabled children do perform at least 2 to 3 points better on the Simultaneous Processing scale.

No significant difference was found between the behaviorally disabled group and the learning disabled group. This suggests that these identified preschool populations do not differ on their use of simultaneous processing skills. This also supports the findings of Kaufman and Kaufman (1983) that behaviorally disabled children perform similar to learning disabled children on the Simultaneous Processing scale.

Hypothesis 2 stated that there were no significant differences between the three groups of children on the Sequential Processing scale. No significant differences were found between the three groups on this scale, suggesting that none of the groups utilizes sequential processing skills better than any other group.

Hypothesis 3 stated that there were no significant differences between the groups on the Mental Processing Composite scale but a significant difference was found between the behaviorally disabled group and the mentally disabled group. The behaviorally disabled group mean was 11.74 points higher than the mean for the mentally disabled group. This suggests that behaviorally disabled preschool children, ages 3 years, 0 months to 5 years, 11 months, have significantly higher Mental Processing Composite scores, or IQs, than their counterparts identified as mentally disabled. Further investigation of this discrepancy is warranted in that an analysis of individual protocols revealed that 7 of the 19 children identified as behaviorally disabled obtained Mental Processing Composite scores that, by definition, would qualify them as mentally disabled. Subsequently, 5 of the 15 children identified as mentally disabled obtained Mental Processing Composite scores that would not qualify them as being mentally disabled.

No significant difference was found between the learning disabled group and either of the other two groups. This finding also warrants further investigation in that, by definition, learning disabled children must have an IQ score within the normal range while mentally disabled children must have an IQ below one standard deviation below the mean, or, in other words, a Mental Processing Composite score of 85 or below on the K-ABC. As previously stated, 5 children identified as mentally disabled did not qualify as mentally disabled when tested with the K-ABC. Subsequently, analysis of protocols revealed that the Mental Processing Composite scores of 9 of the 18 children identified as learning disabled would qualify these children as mentally disabled.

Hypothesis 4 stated that there would not be significant differences between groups on the Nonverbal scale. No significant differences were found between any of the groups on this scale, suggesting that no group performs better on a scale in which simultaneous-sequential subtests can be given with limited verbal interaction.

As stated in Hypothesis 5, there were no significant differences between the groups on the Achievement scale. Again, this finding also warrants further investigation in view of the fact that, by definition, learning disabled children must have a significant discrepancy between IQ and achievement scores, whereas behaviorally disabled children do not and mentally disabled children obtain depressed scores on all subtests. As tested on the K-ABC, 7 of the 9 children previously identified as learning disabled, excluding the 9 children who would qualify as mentally disabled, would not qualify as learning disabled. Subsequently, 1 of the 12 children identified as behaviorally disabled, excluding the 7 children who would qualify as mentally disabled, would qualify as learning disabled, and 1 of the 5 children identified as mentally disabled, who would not qualify as mentally disabled using the K-ABC, would qualify as learning disabled.

Hypothesis 6 stated that there were no significant differences between groups on the K-ABC subtests. Significant differences between groups were not found for any subtest except Gestalt Closure. For this subtest a significant difference was found between the behaviorally disabled and mentally disabled groups. The mean score for the behaviorally disabled group was

3.31 points higher than the mean for the mentally disabled group. Therefore, behaviorally disabled children perform better than mentally disabled children on tasks that require the ability to interpret a whole picture when seeing pieces of an entire picture in a single viewing.

Summary

Behaviorally disabled preschool children, ages 3 years, 0 months to 5 years, 11 months, appear to use significantly better simultaneous processing skills and obtain significantly higher Mental Processing Composite scores, or IQs, than their counterparts identified as mentally disabled. This group of behaviorally disabled preschool children also uses better gestalt closure skills than the mentally disabled group. Likewise, learning disabled preschool children from the same age range also use significantly better simultaneous processing skills than their counterparts identified as mentally disabled. No significant differences were found between the behaviorally disabled and the learning disabled groups on any scale or subtest of the K-ABC. These findings warrant further investigation in view of the fact that analysis of K-ABC test protocols in regard to learning disabled, behaviorally disabled and mentally disabled definitions reclassified 29 of the 52 study participants. Seven children previously identified as learning disabled did not qualify as learning disabled when comparing the Achievement scale score to the Mental Processing Composite score. Nine children of the remaining learning disabled sample qualified as mentally disabled using the K-ABC Mental Processing Composite score. Five children previously identified as mentally disabled did not qualify using the K-ABC Mental Processing Composite score of which 1 of these 5 children did qualify as learning disabled. Of the 19 preschool children previously identified as behaviorally disabled, 7 qualified as mentally disabled, while 1 child qualified as learning disabled.

Explanations for these findings are varied. The assumption that these preschool children were appropriately identified may have been erroneous. It is possible that some of the children were inappropriately identified. The assumption that each disability group is exclusive from other disability categories may also have been erroneous. It is possible that the categories of learning disabled, behaviorally disabled, and mentally disabled are not mutually exclusive. Also, the study did not control for an overlay of an additional disability which may have interfered with the child's performance. Some children may have been identified under the category which posed the greater need for remediation, thus placing the child under a category of learning disabled, behaviorally disabled, or mentally disabled and allowing their subsequent inclusion into the study sample.

Other explanations include that the K-ABC may not be a valid instrument, although it has medium to high correlations with other established instruments. Also, contrary to what is proposed by

Kaufman and Kaufman (1983) for school-age children, the K-ABC may not clearly differentiate preschool children identified as learning disabled, behaviorally disabled, and mentally disabled. Another factor which may have contaminated the results is that the time between the child's identification and the K-ABC testing was different for each child. Therefore, some children had received more remediation, of some kind, longer than other children. This remediation could possibly have significantly altered the child's performance on any test, thus possibly reclassifying the child. The findings of this study do not suggest that the K-ABC will provide the school psychologist with information which will clearly identify learning disabled, behaviorally disabled, and mentally disabled preschool children ages 3 years, 0 months to 5 years, 11 months.

The K-ABC does yield additional information regarding the child's skills and abilities on various tasks and could either lend support for or provide data to question the diagnosis. Since the K-ABC seems to have a relatively short administration time, as experienced by the examiner of the study to be approximately 30 to 45 minutes, it is recommended that the K-ABC be administered, in addition to the regular test battery, to preschool children seen as having exceptional educational need. In this way various strengths and weaknesses not seen in the regular test battery could be identified and the Mental Processing Composite score and Achievement scale scores could be compared with other test results in order to either support or question the previous findings. In this way the K-ABC could aid in the appropriate identification of preschool children with perceived exceptional educational needs. Because of the K-ABC's recent development, it is not advised that it be used as the sole criterion for identifying children, although it has moderate to high correlations with both intelligence and achievement measures already established in the field. More research is needed regarding the K-ABC's reliability and validity in regard to differential diagnosis before professionals in the field will give credibility to this instrument.

Further research suggestions for the K-ABC and differential diagnosis of preschool children include replication of this study with a much larger sample, comparison of the child's K-ABC scores with the child's previous test scores that led to the diagnosis, and a longitudinal study of the K-ABC scores of special education preschool children in order to view reliability and stability of the instrument in its ability to differentially diagnose. Further research is also needed in the area of remediation using the K-ABC as the basis for remediation techniques in order to discover how K-ABC results could be used to improve a child's abilities.

References

Das, J. P. (1972). Patterns of cognitive ability in nonretarded and retarded children. American Journal of Mental Deficiency, 77, 6-12.

Das, J. P. (1973). Structure of cognitive abilities: Evidence for simultaneous and successive processing. Journal of Educational Psychology, 65, 103-108.

Das, J. P. (1978). Academic performance and cognitive processes in educable mentally retarded children. American Journal of Mental Deficiency, 83, 197-199.

Das, J. P., Kirby, J. R., & Jarman, R. F. (1975). Simultaneous and successive synthesis: An alternative model for cognitive abilities. Psychological Bulletin, 82, 87-103.

Das, J. P., Kirby, J. R., & Jarman, R. F. (1979). Simultaneous and successive cognitive processes. New York: Academic Press.

Das, J. P., Leong, C. K., & Williams, N. H. (1978). The relationship between learning disabled and simultaneous/ successive processing. Journal of Learning Disabilities, 11, 16-23.

Das, J. P., & Molloy, G. N. (1975). Varieties of simultaneous and successive processing in children. Journal of Educational Psychology, 67, 213-220.

Iowa Department of Public Instruction. (1982). Iowa rules of special education. Des Moines, IA: Author.

Iowa Department of Public Instruction. (1984). Iowa rules of special education. Des Moines, IA: Author.

Jarman, R. F., & Das, J. P. (1977). Simultaneous and successive synthesis and intelligence. Intelligence, 1, 151-169.

Kamphaus, R. W., Kaufman, A. S., & Kaufman, N. L. (1982, August). A cross-validation study of sequential-simultaneous processing at ages 2 1/2 to 12 1/2 using the Kaufman Assessment Battery for Children (K-ABC). Paper presented at annual meeting of the American Psychological Association, Washington, DC. (ERIC Document Reproduction Service No. ED 222 242)

Kaufman, A. S. (1973). The relationship of WPPSI IQs to SES and other background variables. Journal of Clinical Psychology, 29, 354-357.

Kaufman, A. S. (1978). The importance of basic concepts in individual assessment of preschool children. Journal of School Psychology, 16, 207-211.

Kaufman, A. S., & Kaufman, N. L. (1983). Kaufman Assessment Battery for Children: Interpretive manual. Circle Pines, MN: American Guidance Service.

Kaufman, D., & Kaufman, P. (1979). Strategy training and remedial techniques. Journal of Learning Disabilities, 12, 63-66.

Kirby, J. R., & Das, J. P. (1978). Information processing and human abilities. Journal of Educational Psychology, 70, 58-66.

Krywanuik, L. W., & Das, J. P. (1976). Cognitive strategies in native children: Analysis and intervention. The Alberta Journal of Educational Research, 22, 271-280.

Luria, A. R. (1966a). Higher cortical functions in man. New York: Basic Books.

Luria, A. R. (1966b). Human brain and psychological processes. New York: Harper & Row.

Luria, A. R. (1973). The working brain. New York: Basic Books.

Molloy, G. N., & Das, J. P. (1979). Intellectual abilities and processes: An exploratory study with implications for person-teaching method interactions. Australian Journal of Education, 23, 83-91.

Molloy, G. N., & Das, J. P. (1980). Simultaneous-successive synthesis, planning strategies and education: A process approach toward an integrated theory. Australian Journal of Education, 24, 28-301.

Sattler, J. M. (1982). Assessment of children's intelligence and special abilities (2nd ed.). Boston: Allyn & Bacon.

Telzrow, C. F. (1984). Applications of the K-ABC in the identification of handicapped preschoolers. Journal of Special Education, 18, 311-324.

APPENDICES

Appendix A

Learning Disabled

The Iowa Rules of Special Education (1982) define learning disability as the "inclusive term denoting the inability to learn efficiently in keeping with one's potential when presented with the instructional approaches of the regular curriculum" (p. 24). The following criteria are used in identifying a student as learning disabled:

1. "Hearing must be within normal limits unless the hearing loss is temporary or not educationally relevant" (p. 24).

2. "Vision must be within normal limits after correction" (p. 24).

3. "Intellectual functioning must be at or above one standard deviation below the mean as measured by an instrument recognized as a valid measure of intellectual functioning. A total or full-scale score shall be used in applying the intellectual criterion" (p. 24).

4. "A severe discrepancy between current achievement and intellectual functioning exists when a pupil has been provided with learning experiences that are appropriate for the pupil's age and ability levels, and obtained scores in the achievement area(s) of concern are below the pupil's present grade placement and are greater than one standard deviation below the mean on the distribution of achievement scores predicted from obtained

intellectual functioning scores. In establishing the difference of one standard deviation, the effects of regression toward the mean and errors of measurement must be applied. If the technical data necessary to account for the effects of regression are not available, the discrepancy between the obtained achievement and intellectual functioning standard scores must be at least two standard errors of measurement for the difference" (p. 24).

5. "A member of the diagnostic-educational team must observe the pupil's performance in the regular classroom setting to determine the degree to which the learning disability affects classroom performance" (p. 25).

6. "The severe discrepancy between achievement and intellectual functioning must not be primarily attributable to emotional disabilities, chronic health problems, physical impairments, environmental disadvantage, cultural difference, or a history of an inconsistent educational program" (p. 25).

Behaviorally Disabled

The definition of behaviorally disordered in the Iowa Rules of Special Education (1982) was revised in 1984. The revised definition states that behaviorally disordered is the "inclusive term for patterns of situationally inappropriate behavior which deviate substantially from behavior appropriate to one's age and significantly interfere with the learning process, interpersonal relationships, or personal adjustment of the pupil to such an extent as to constitute a behavioral disorder" (p. 26). These behaviors include:

1. "Significantly deviant disruptive, aggressive or impulsive behaviors" (p. 26).

2. "Significantly deviant withdrawn or anxious behaviors" (p. 26).

3. "Significantly deviant thought processes manifested with unusual communication or behavioral patterns or both" (p. 26).

4. "Significantly deviant behavior patterns characterized by deficits in cognition, communication, sensory processing or social participation or a combination thereof that may be referred to as autistic behavior" (p. 26).

"The determination of significantly deviant behavior is the conclusion that the pupil's characteristic behavior is sufficiently distinct from his or her peer group to qualify the pupil as requiring special education programs or services on the basis of a behavioral disorder. It must be determined that the behavioral disorder is not maintained by primary intellectual, sensory, cultural or health factors" (p. 26).

The following areas of data collection shall be gathered when identifying a pupil as behaviorally disordered:

1. "'Setting Analysis' data includes: information gathered through informal observation, anecdotal record review and interviews describing the setting from which a pupil was referred; documented prior attempts to modify the pupil's educational

program so as to make behavioral and academic achievement possible in the current placement; and social functioning data that includes information, gathered from sources such as teacher interviews and sociometric measures, regarding the referred pupil's interaction with his or her peers" (p. 26).

2. "'Pupil Behavioral Data' includes: measures of actual behavior that include the specific recording, through systematic formal observations, of a pupil's behavior including the frequency of behaviors of concern; and measures of reported behavior that includes information gathered through checklists or rating scales and interviews that document the perceptions of school personnel regarding the behavioral pattern of the referred pupil and information regarding the perception of the pupil's home and school behavior obtained from the parent or surrogate parent" (p. 23).

3. "'Indidivual Trait Data' includes: information about the unique personal attributes of the pupil. This information, gathered through pupil and teacher interviews and relevant personality assessments, describes any distinctive patterns of behavior which characterize the pupil's personal feelings, attitudes, moods, perceptions, thought processes, and significant personality traits" (p. 27).

Mentally Disabled

The Iowa Rules of Special Education (1982) define mental disability as "the inclusive term denoting significant deficits in adaptive behavior and subaverage general intellectual functioning. For educational purposes, adaptive behavior refers to the individual's effectiveness in meeting the demands of one's environment and subaverage general intellectual functioning as evidenced by performance greater than one standard deviation below the mean on a reliable individual test of general intelligence valid for the individual pupil" (p. 23).

Appendix B

Jackie Loos
Educational Psychology
and Foundations
University of Northern Iowa
Cedar Falls, IA 50614

February 8, 1985

Dear Parents:

I am a graduate student in school psychology at the University. I plan to investigate the appropriateness of a new ability test. This test may identify preschool children who have trouble adjusting to kindergarten.

I hope that you will allow your child to participate in my study. Your or your child's name will not appear anywhere in the study. Also, the test will not be a part of your child's school records. Area Education Agency 7, the school, and the principal approve and support my study.

As a participant, your child would be given the Kaufman-Assessment Battery for Children, (K-ABC). Approximately 1 hour of your child's school time would be necessary.

I need your and your child's cooperation for my project to be successful. If you do not want your child to participate, please sign and return the attached form in the enclosed self-addressed envelope or telephone me at 273-2694 before February 28, 1985. If you have any questions or would like further information regarding the study, please call me.

Jackie J. Loos
Graduate Student

I, ____________________, do not consent to allow a trained student
Parent's Name

to administer the K-ABC to ________________________.
Student's Name

Signed ____________________
Parent or Guardian

Date ______________

Mail to: Jackie Loos
Educational Psychology and Foundations
UNI
Cedar Falls, IA 50614

Mail before Wednesday, February 28, 1985 if you DO NOT want your child to participate.