PREDICTORS OF STANFORD-BINET INTELLIGENCE SCORES AMONG POTENTIALLY GIFTED FIRST AND SECOND GRADE STUDENTS

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CHAPTER I

THE RESEARCH PROBLEM

Introduction

The controversy stemming from efforts to conceptually define giftedness seems minor to the dissension created over how to identify and assess all the attributes contributing to giftedness, especially given the disinclination of educators to rely solely on intelligence test scores as the primary variable for placement of gifted and talented students (Alvino, McDonnel & Richert, 1981; Alvino & Weiler, 1979). Efficient and effective identification procedures of the gifted and talented continue to be a challenge to educators, particularly given the disparity between the intent and actual use of group and individual intelligence measures and the diversity among the constructs implied within the definitions of giftedness. Experts vary in their definitions of giftedness, especially with regard to the importance of and single weight of intelligence in determining giftedness. However, educators concur that a definition of giftedness should result in the identification of those students who require special educational provisions in order to best utilize their capabilities (Tongue & Sperling, 1976; Tuttle & Becker, 1980; White, 1979).

Extensive Research is available delineating the efforts to establish positve concurrent validity between specific group intelligence instruments and individual intelligence scales, i.e., Stanford-Binet Intelligence Scale (Terman & Merrill, 1972), Wechsler Intelligence Scale for Children-Revised (WISC-R) (Wechsler, 1974), and Wechsler Preschool and Primary Scale of Intelligence (WPPSI) (Wechsler, 1967). Research conclusively reports that group IQ tests are appropriate only for screening purposes and should not be a substitute for an individual intelligence test score, especially if an individual IQ score is a final criterion (Martinson, 1974). Martinson (1974, p. 40) further states that it is "not uncommon for a child's IQ to vary 30 points from an individual to a group test, especially at the upper levels of measured intellectual ability." Research studies further indicate that if group IQ tests are to be used in the selection process, then an IQ cutoff as low as 115 will be necessary in order to pick up 95 percent of the gifted in the final assessment process (Martinson, 1974; Pegnato & Birch, 1959). This presents a dilemma because the majority of school districts cannot afford to utilize individual intelligence tests in their final selection procedure. This is primarily due to the unavailability of psychometric services and their ensuing high cost. Numerous studies have been published depicting efforts to identify valid selection matrices which do not rely on the use of individual intelligence scales; consequently, modifications in the definition and identification of giftedness have evolved (Alvino et al., 1981; Chambers & Barron, 1978; Dirks & Quarfoth, 1981; Fox, 1981; Hillard, 1975; Lamkins, 1978; Prapjolenis & Storlie, 1979; Tongue & Sperling, 1976).

Until 1970, giftedness was usually defined in measures of high intelligence (Karnes & Collins, 1978; Tuttle & Becker, 1980). However, giftedness is now defined in much broader terms, thus allowing for a wider variety of identification procedures and measures. These identification models typically follow either the depth or breadth assessment process. The depth process stresses the importance of high IQ, usually 130 or above on the WISC-R or Stanford-Binet; the latter is the preferred test by most experts in the gifted and talented field because of its higher ceiling (Alexander & Muia, 1982; Martinson, 1974; Sellin & Birch, 1981). The breadth process attempts to integrate multiple criteria into a matrix, e.g., cumulative grade point, standardized achievement scores of three grade levels above placement in reading and/or math, 97 percent ranking on achievement composite, parent, teacher and/or peer nominations, biography, products of creative endeavors, and/or group intelligence scores. Dirks and Quarfoth (1981) reported that the children selected by breadth models had very high classroom grades and were well thought of by their teachers. However, depth models included more students with unusually high IQ scores and more promising underachievers than did breadth models.

The ultimate selection procedure should be defined by the type of gifted programming provided by the school district. For example, if a gifted program was structured to serve the highly creative students, then the entrance criteria of high IQ and/or high academic achievement would not be appropriate. Measures of creativity have consistently demonstrated weak correlations with high intelligence (Getzels & Jackson, 1962; Martinson, 1974; Rekdal, 1977; Schmitz, 1980). On the other hand, if a gifted program was designed to enrich and develop academic and reasoning skills, then entrance criteria of high intelligence and/or academic standing would be appropriate given their positive correlations (Clark, 1979; Tuttle, 1978).

How a school defines its gifted program mandates the type of assessment required in its eligibility and selection processes. Currently, the majority of gifted programs stress intellectual and academic enrichment (Alvino et al., 1981; Fox, 1981; Prehm & McDonald, 1979; Rubenzer, 1979). Therefore, a continued effort is perceived necessary in assisting school districts to formulate identification procedures which are both effective and efficient in selecting the highly intellectual gifted student.

A criticism of most matrices investigated is that they include criteria in their eligibility models which have been proven to have weak correlations with the type of programming offered (Baldwin, 1979; Clark, 1979; Khatena, 1982). Yet they continue to select, identify and label students as "gifted" and thus consequently expose some students to unnecessary failure because of the inappropriateness of the identification measures built into the selection model. Clark (1979) proposed the use of differential labeling in order to clarify this misconception, e.g., gifted and talented, gifted and creative, academically gifted, and intellectually gifted. These terms are not synonymous; a student may display evidence of one or all. A high level of development in one area may allow for the possibility of higher development in other areas, but not necessarily. The measurements used to assess one area of giftedness may not be the same measurements necessary to assess another area of giftedness. Yet educators tend to disregard these differences and lump a potpourri of criteria together and identify youngsters as gifted if they satisfy three out of five requirements.

Attempting to assess excellence in the areas of visual and performing arts, leadership and creativity is limited by the absence of valid and reliable instrumentation, particularly at the elementary school level

(Kogan & Pankove, 1974; Treffinger, 1980). Therefore, two areas are left for major consideration in identifying and programming for the gifted at the first and second grade levels: intellectual ability and scholastic achievement. Research has confirmed numerous group achievement tests valid and reliable for use in the selection process for the gifted (Churchill & Smith, 1974; Clark, 1979; Fox, 1981; Jenson, 1978; Keach, 1966; Martinson, 1974). It is the area of intellectual functioning which demands further investigation in locating appropriate group measures, singly or in combination, which will be effective yet inexpensive in accurately predicting intellectual potential in primary elementary-aged students.

Statement of the Problem

There is a wide assortment of tests available to assess the various dimensions of giftedness. Each of these tests, however, differ in content, construct, format, intent, response mode and age appropriateness. Group instruments are not considered as reliable as individually administered tests, especially those designed to assess intelligence (Clark, 1979; Fox, 1981; Martinson, 1974). However, individual assessments are quite expensive and time consuming. School districts need effective yet inexpensive group tests which can predict IQs derived from individual intelligence scales. The Stanford-Binet Intelligence Scale is considered by many authorities the better instrument in assessing superior intelligence in young children (Alexander & Muia, 1982; Clark, 1979; Mortinson, 1974; Sattler, 1982). Therefore, the primary objective of this study was to identify reliable group tests which could effectively and efficiently predict Stanford-Binet IQs among first and second grade students.

Legislation, in the state of Oklahoma, requires that school districts serve the gifted in the areas in which they are identified. Given the limitations of revenue and personnel resources, it seems likely that school districts will by necessity narrow their definition, inclusive of the intellectual and/or academically gifted. Reliable and expedient group measures and objective rating scales are perceived as paramount for this specific population and for the specific constructs of intellectual ability and academic achievement.

Authorities state that early intervention is necessary in order to fully develop and nurture the gifted's abilities (Alexander & Muia, 1982; Clark, 1979; Martinson & Lessinger, 1960; Renzulli, 1978). However, few studies have concentrated on the primary elementary population in establishing effective and efficient identification procedures for the gifted. The sample used in this study was composed of students from the first and second grades in the Sand Springs Public Schools, Oklahoma. Those students who achieved an IQ score of 115 or above on the Otis-Lennon Mental Ability Test (Otis & Lennon, 1968) were included in the initial sample.

The objective evaluation component of this study was to correlate IQ indices of the Cognitive Abilities Test (CogAT) (Thorndike & Hagen, 1978), the Short-Form Test of Academic Aptitude (SFTAA) (Sullivan, Clark & Tiegs, 1974), the Raven's Standard Progressive Matrices (SPM) (Raven, Court & Raven, 1958), and the Otis-Lennon Mental Ability Test (OTIS) with the Stanford-Binet Intelligence Scale (S-B) on the first and second grade sample. An additional objective evaluation component was to correlate the above IQ indices with each subject's academic achievement as measured by the SRA Achievement Series (SRA, 1978a), and to ascertain if a mean standard score difference existed which would typify the intellectually gifted child.

The subjective evaluation component of this study involved the development of a behavioral rating scale operationalizing the components of high general intellectual ability and aptitude. This rating scale was completed by the teacher and parent of each participant. The behavioral rating scale attempted to itemize, in performance-behavioral terms, the hypothetical constructs inferred in the definition of giftedness and the specific abilities assessed by the intelligence scales utilized in this study. In essence, the rating scale became a subjective evaluation of cognition, memory, evaluation, and convergent production. The objective was to isolate through analysis those items from the scale which would best correlate with high intellectual functioning and to discern who was more capable of subjectively identifying cognitive characteristics representing high intelligence--the parent or teacher.

Open-ended teacher nominations have been shown to have low reliability; however, checklists which are used to focus teacher attention to particular significant behaviors of gifted children have shown much higher reliability (Gear, 1976; Jacobs, 1971; Martinson, 1974; Renzulli & Smith, 1980). With teacher inservice on the usage of checklists, the reliability has been greatly increased (Gear, 1976; Mayfield, 1979). Parent nominations and checklist input are particularly useful and reportedly more reliable than teachers' (Jacobs, 1971). Therefore, inservice was conducted for all first and second grade teachers in an effort to increase their awareness of the characteristics of gifted and talented, and to clarify the items on the rating scale in order to increase reliability. The objective was to establish positive correlations between the behavior rating scale and the group and individual IQ indices. If significant correlations were verified by this study, then a contribution toward the development of efficient and effective screening procedures in identifying gifted students at the first and second grade levels would be achieved. The results of this research project will hopefully demonstrate that it is possible to distinguish between intellectually bright and intellectually gifted first and second grade students by using singly or in combination group intelligence measures (CogAT, OTIS, SFTAA, SPM) and a behavioral rating scale against the criterion of a 130 IQ on the Stanford-Binet Intelligence Scale.

Purpose of the Study

The primary purpose of this study was (1) to operationally define one component of giftedness, high intellectual functioning; (2) to objectively and subjectively measure this construct; (3) to establish a positive correlation and concurrent validity between the subjective measure of intellectual functioning and IQ indices from specific group and individual intelligence tests; and (4) to investigate the correlations between academic achievement and IQ indices.

The specific research questions for this sample were:

1. What are the concurrent validities between the Stanford-Binet Intelligence Scale, the Cognitive Abilities Test, the Short-Form Test of Academic Aptitude, the Raven's Standard Progressive Matrices, and the Otis-Lennon Mental Ability Test?

2. What is the predictive linear combination of the objective and subjective measures in estimating Stanford-Binet IQs?

3. What are the effectiveness and efficiency ratios of the four group IQ tests in estimating Stanford-Binet IQs?

4. What are the correlations between the Teacher and the Parent Rating Scales and between these rating scales and IQ indices?

5. What is the effectiveness of parents and teachers in identifying first and second grade students with high intellectual functioning by the use of a subjective rating scale?

6. What are the correlations between high academic achievement and high intelligence?

7. What are the mean standard score differences between SRA achievement subtests over a one-year period which would differentiate IQ levels and validate the reliability of SRA subtests at these different IQ levels?

8. What type of screening matrix which exhibits the highest concurrent validity in estimating intelligence quotients for the first and second grade students would evolve from this study?

Assumptions and Limitations

This study acknowledges the multiple components of giftedness, but will restrict its efforts to investigating the objective and subjective evaluation of high general intellectual ability and academic aptitude. Aptitude is defined by Sellin and Birch (1981, p. 40) as "the capacity to benefit from instruction . . . it is assumed that aptitude refers to intelligent behaviors applied and directed toward process and product, i.e., the ability to perceive data, memory, judgment and persistence." Intellectual ability is defined to include these three components: ability to deal with abstractions, ability to learn (aptitude), and ability to cope with new or novel situations (Sattler, 1982).

Given that the majority of the statistical outcomes in this study pivot on the assumption that the intelligence quotients derived from the Stanford-Binet are accurate, several limitations should be reviewed:

> It is important to recognize (a) that intelligence tests do not measure innate intelligence, (b) that IQs change, (c) that IQs are only estimates of ability, (d) that IQs reflect only a part of the spectrum of human abilities, (e) that IQs obtained from different tests might not be interchangeable, and (f) that a battery of tests cannot tell us everything we need to know about a child (Sattler, 1982, p. 67).

Furthermore, the stability of the IQ is affected by errors of measurement, genetically-based developmental trends, and environmental factors.

Measurement errors encompass such factors as errors of test administration and scoring, situational factors (e.g., fatigue, attitude, motivation, rapport, anxiety, attention span, self-confidence), and reliability of the testing instruments. Environmental factors contributing to fluctuations in intelligence test scores include physical and emotional factors (e.g., illness, trauma, family crises) and changes in motivation. The stability of IQ scores are usually greater with older children and when the time interval between retesting is short. IQ constancy also occurs in part because of genetic factors (Sattler, 1982).

Because there is always some uncertainty about an individual's true score, the standard error of measurement is employed to provide a level of confidence with which the obtained test score can be interpreted. The larger the standard error of measurement, the greater the uncertainty associated with the test score. Confidence intervals represent a range of scores in which there is a high probability that the true score is represented. The confidence intervals for the Stanford-Binet are reported in Appendix A.

Intelligence quotients derived from group IQ assessments should be interpreted more cautiously than those IQs obtained by individual assessment. All the limitations inherent to individual IQ tests are applicable to group tests. In addition, both group intelligence and achievement tests are designed for the average student and therefore the ceiling of these instruments may be too low to effectively discriminate the upper end of the normal distribution of a population. Also, barriers caused by reading and/or language difficulties would adversely affect group testing performance more than individual testing.

Subjective measures are more susceptible to threats of validity and reliability. By their nature, rating scales are opinion statements, subjective to bias and misinterpretation by the evaluator and to ranking variability over time and between evaluators. These factors frequently undermine the reliability and validity of rating scales. The following statistical procedures were implemented to assess the interference of such factors. Construct validity, the degree to which the rating scale (Behavioral Checklist of Intellectual Functioning) measures the hypothetical construct of intellectual functioning, was ascertained by factor or cluster analysis. With item homogeneity, construct validity for the Teacher Rating Scale as being an unidimensional representation of the construct of intellectual functioning was supported. Predictive validity establishing the rating scales' effectiveness in estimating S-B scores and concurrent validity substantiating the rating scales' positive correlations with specified group and individual tests were assessed. Reliability coefficients for both the Teacher and Parent Rating Scales were calculated for this sample by Cronbach's Alpha procedure (SPSS) (Nie, Hall, Jenkins, Steinbrenner, and Bent, 1975).

Additional limitations were inherent given the restrictive range within the sample. Because the participants were elicited from those first and second grade students who had achieved a 115 or above IQ score on the Otis-Lennon Mental Ability Test, one would anticipate that the ensuing sample would represent a negatively skewed population. Therefore, the research results are thus restricted in their generalizability to similarly defined populations. Concomitantly, correlation coefficients will likely be depressed because of the restriction imposed on the range.

Statement of Research Hypotheses

1. There is a positive statistical relationship between IQ indices on the Cognitive Abilities Test, the Short-Form Test of Academic Aptitude, the Otis-Lennon Mental Ability Test, and the Raven's Standard Progressive Matrices, and the IQ derived from the Stanford-Binet Intelligence Scale.

2. There is a positive statistical relationship between IQ scores yielded by the Stanford-Binet Intelligence Scale and a linear combination of IQ scores on the Cognitive Abilities Test, the Short-Form Test of Academic Aptitude, the Raven's Standard Progressive Matrices, and the Otis-Lennon Mental Ability Test.

3. There is a positive statistical relationship between IQ scores yielded by the Stanford-Binet Intelligence Scale and a linear combination of IQ scores on the Cognitive Abilities Test, the Short-Form Test of Academic Aptitude, the Raven's Standard Progressive Matrices, and the Otis-Lennon Mental Ability Test, the SRA Achievement Series, and the parent and teacher ratings on the Behavioral Checklist of Intellectual Functioning.

4. There is a positive statistical relationship between parent ratings on the Behavioral Checklist of Intellectual Functioning and group and/or individual IQ indices.

5. There is a positive statistical relationship between teacher ratings on the Behavioral Checklist of Intellectual Functioning and group and/or individual IQ indices.

6. There is a statistically significant difference between teacher's and parent's ability in identifying high intellectual functioning as assessed by ratings on the Behavioral Checklist of Intellectual Functioning against the set criteria on the Stanford-Binet Intelligence Scale.

7. There is a positive statistical relationship between achievement as assessed by the SRA Achievement Series and group and/or individual IQ indices.

8. There is a statistically significant mean standard score difference in the 1982 and 1983 SRA Achievement subtest scores between average (IQ 90-109), high-average (IQ 110-119), superior (IQ 120-129), and gifted (IQ 130>) first and second grade students.

CHAPTER II

REVIEW OF LITERATURE

Definitions of Giftedness

Most conceptual definitions of giftedness include some reference to intelligence. In 1971, a definition of gifted and talented was proposed for the first time at the national level by the United States Office of Education (Marland, 1972):

> Gifted and talented children are those identified by professionally qualified persons who by virtue of outstanding abilities, are capable of high performance. These are children who require differentiated educational programs and/or services beyond those normally provided by the regular school programs in order to realize their contribution to self and society.
>
> Children capable of high performance include those with demonstrated achievement and/or potential ability in any of the following areas, singly or in combinations: general intellectual ability, specific academic aptitude, creative or productive thinking, leadership ability, visual and performing arts, and psychomotor ability (p. 12).

Public Law 95-561, passed by Congress in 1978, revised the federal definition of gifted and talented (Tuttle & Becker, 1980):

> For the purpose of this part, the term gifted and talented children means children and, whenever applicable, youth, who are identified at the preschool, elementary, or secondary level as possessing demonstrated or potential abilities that give evidence of high performance in capability in areas such as intellectual, creative, specific academic, or leadership ability, or in the performing and visual arts, and who by reason thereof require service or activities not ordinarily provided by the school (p. 27).

This definition would include approximately three to five percent of the school age population in each ability and subability area.

Karnes and Collins (1978) reported that by 1978, 42 states had regulations and definitions modeled along the lines of the federal definition. General intellectual ability was a criterion in 85 percent of the states, while 60 percent of these states also included specific categories for academic aptitude and creative thinking. Most of these definitions inferred specific intellectual functioning ranges, varying between the upper 2 to 10 percent.

The five subcomponents of giftedness are defined as follows (Tuttle & Becker, 1980):

1. General Intellectual Ability. This category includes characteristics such as intellectual curiosity, exceptional powers of observation, ability to abstract, a questioning attitude and associative thinking skills.

2. Specific Academic Aptitude. This category includes those students who achieve consistent high grades, score at the upper percentile on tests, demonstrate superior ability in one or more academic subjects.

3. Creative and Divergent Production Thinking Skills. This category encompasses the processes involved in divergent production; i.e., the abilities of elaboration, originality, flexibility and fluency.

4. Leadership. This category includes such characteristics as willingness to accept responsibility for one's actions, belief in control over one's life and decisions, self-control, productive interactions with others, effective use of power, skills in organizing and facilitating groups.

5. Visual and Performing Arts Ability. The visual arts category includes outstanding or superior skills in one or more areas of the fine arts, i.e., painting, sculpturing, designing, composing, drawing, filmmaking. Visual arts imply forms of art whose products can be observed. Performing arts infers forms of art requiring performance, i.e., music, dance, oratory, drama, instrumentation, sports. Creativity and imagery are important components in the thinking and expression of this category (pp. 27-28).

These five components provide a broad view of the areas used in identifying and programming for the gifted. However, a further delineation was proposed by Marland (1972) between what is implied by giftedness and talent:

1. by giftedness, we mean intellectual processes such as is evidenced by scores on conventional intelligence tests and which is characterized by an ability to see and group relationships, proficiency in verbal abstract thought, persistence, intellectual curiosity, versatility, adaptability and creative thought;

2. by talent, we mean any specialized skill or ability in a particular field of endeavor, such as the creative and performing arts or sports, where the behavior involves some physical component of muscular coordination, visual acuity, manual dexterity, etc. (p. 14).

Most conceptual definitions of intellectual giftedness are based on psychometric theories of intelligence (Wechsler, 1975). Lewis Thurman operationalized giftedness in terms of performance on intelligence tests (Sattler, 1974). Definitions differ on whether or not evidence of potential alone is sufficient or whether excellence need be demonstrated in more than one area.

Renzulli (1978) defined giftedness in terms of the interaction between cluster traits: above-average ability in a given area or in general, above-average levels of task commitment, and above-average levels of creativity. These three traits are proposed to have equal weight in his identification model. Renzulli argued the limitations implied in the federal definition, stating that creative or productive thinking, leadership, and psychomotor ability are processes that are the application of general aptitude and that they should not be considered separate entities apart from specific performance areas to which they are applied.

Sternberg (1981) described giftedness in terms of an information-processing model. According to his theory, there are three broad components of giftedness:

> Metacomponents, such as the higher-order processes used in problem solving (e.g., selection of strategies for problem solving); performance components, the processes used in problem solving, such as inference; and acquisition, retention, and transfer components, the skills used in learning, storing, and applying information. Gifted individuals are those who are capable of 'higher quality and quantity of interaction among the various kinds of components in the system. . . . They are more sensitive to the feedback that the various components can provide' (p. 91).

Guilford's (1967) Structure of the Intellect model provided a theoretical basis for examining other facets of the individual apart from IQ. Other researchers such as Getzel and Jackson (1962), Khatena (1982). Torrance (1977), and Wallach and Kogan (1969) have all contributed to the development of creative assessments, thus broadening the dimensions of giftedness. For example, Torrance (1972) delineated creative thinking ability into six components: fluency, flexibility, originality, elaboration, synthesis, and closure.

As represented by Sellin and Birch (1981), Arieli suggested that giftedness was comprised of three interacting components: talent, creativity, and aptitude. Talent was defined as a product or demonstrated performance. Creativity was defined as a process which mediates aptitude and talent. Aptitude was defined as a capacity to benefit from instruction. Sellin and Birch (1981) supported this interactionist theory in that they considered genetic endowment and high intelligence as significant variables, but they also stressed the importance of such influences as social environment and personality factors (persistence, self confidence, and motivation), which is similar to the Renzulli model.

Clark (1979, p. 5) defined giftedness as those who have developed high levels of intellectual ability or who show promise of such development and who demonstrate superior abilities "to think in abstract, to generalize, to solve complex problems and to see universal and diverse relationships." Clark further defined talented as one who has a high level of development of sensation. Sense perception was referred to the use of the physical senses in interpreting or communicating with one's world. Therefore, giftedness and talent are separate entities. The high development of one area will likely enhance the development of the other.

The State of Oklahoma's definition of giftedness as specified in the SEA Regulations from Senate Bill 214 (1981) states:

> 'Gifted children' means those boys and girls identified in grades 1 through 12 as having demonstrated potential abilities of high performance capability and needing differentiated or accelerated education or services (regulation 1).
>
> Implementation of programming for students identified as being 'talented' shall be at the discretion of the local school (regulation 2).
>
> Local districts shall select nationally standardized tests to be used as a part of their multi-criteria evaluation procedures. The local district shall determine which test(s) will be used and which categories shall be tested. However, when nationally standardized tests are selected and used in any of the following categories, those students scoring in the top 3 percent shall be served provided they meet the standards of a multi-criteria evaluation. The categories are:
>
> a. Intellectual ability
> b. Creative thinking ability
> c. Leadership ability
> d. Visual and performing arts ability
> e. Specific academic ability (regulation 3).

Theories of Intelligence

According to Sattler (1982):

> Part of the confusion concerning definitions of intelligence and ways of measuring intelligence results from the failure to understand (a) that intelligence is an attribute, not an entity, and (b) that intelligence is the summation of the learning experiences of the individual. Tests with different names (e.g., intelligence, achievement or aptitude) are for the most part measuring similar abilities; the name merely reflects different criteria that have been selected for investigation. All ability tests measure what the examinee has learned (p. 36).

Factor analytic theories of intelligence are split between two factions: (a) those who postulate a general theory of intelligence, and (b) those who favor a factorial theory. Thorndike (1931), Thurstone (1938), and Guilford (1967) espoused the factorial theory, asserting that intelligence was the composite of many independent faculties (Sattler, 1982). Spearman (1923) and Vernon (1964) stressed the general theory, asserting that one major primary factor accounted for intelligence, while the factorial theorists emphasized the presence of a number of independent or primary factors. In essence, these two factions argued over the organization of intelligence and accepted the theory that general intelligence coexisted with separate independent abilities (Cattell, 1963; Hilgard & Bower, 1975; Perkins, 1974; Swenson, 1980).

As presented by Khatena (1982), Spearman (1923) proposed a two-factor theory, which yielded a general factor (g) and one or more specific factors (s), while Thorndike (1931) emphasized these distinct but interrelated clusters: social, concrete, and abstract. Thurstone (1938) maintained that intelligence was not unitary but was comprised of multiple primary entities of equal weight: verbal, perceptual speed, inductive reasoning, number, rote memory, deductive reasoning, word fluency, and space or visualization. However, through research these factors were found to correlate moderately, which led Thurstone (1938) to postulate a second-order factor which may relate to (g) general intelligence.

Guilford's (1967) multifactor theory presented a possible 120 factor model describing intelligence. His model organized the intellect in three dimensions: (1) operations (activities or operations performed); (2) content (materials or content on which the operations are performed); and (3) products (end results of operations). This model further proposed five different kinds of operations (cognition, memory, divergent and convergent thinking, and evaluation), four types of content (figural, symbolic, semantic, and behavioral), and six products (units, classes, relations, systems, transformation and implications) (Guilford, 1967; Meeker, 1969).

Vernon's (1964) hierarchical approach to intelligence emphasized the g factor, which was subdivided into Verbal-Educational and Spatial-Mechanical group factors. Both groups were then subdivided into minor group factors. Cattell (1963) postulated two types of intelligence: fluid (the capacity which is independent of experience) and crystallized (learned knowledge). Das, Kirby, and Jarman (1975) and Kaufman (1979) categorized cognitive abilities in terms of the information-processing: simultaneous processing (which occurs in an integrated, usually semi-spatial form) and successive processing (which is sequence dependent and temporally based).

Piaget (1963a,b) explained intelligence in degrees of biological adaptation, consisting of assimilation (processes responsive to inner promptings) and accommodation (processes responsive to environmental intrusions). Assimilation allows intelligence to go beyond a passive coping with reality, while accommodation operates to prevent intelligence from constructing representations of reality which have no correspondence with the real world. Intelligence represents the rational processes which show the greatest independence of environmental and internal regulation. Piaget viewed intellectual development as a series of stages marked by changes in adaptation. Piagetian and psychometric approaches are similar in that they both stress the genetic and maturational determinates while emphasizing the rational nature of intelligence (Wadsworth, 1971).

Identification of Intelligence

General

Out of necessity, school systems have usually relied on group intelligence tests in providing IQ indices in their assessment batteries and identification matrices of the gifted. However, research has continually demonstrated the general ineffectiveness of group IQ tests in discriminating those members of the gifted population who concurrently score 130 or above on individual intelligence tests. The classic study of Pegnato and Birch (1959) reported that for the junior high population, a cutoff of 130 on a group IQ test identified only 22 percent of those who scored 136 or higher on the Stanford-Binet, whereas an arbitrary cutoff of 115 would have identified 92 percent. Martinson and Lessinger (1960) found that only 50 percent of the 332 gifted students with IQs of 130 or higher on the Stanford-Binet scored 130 or higher on a group intelligence test. Research has supported the usage of 115 on group intelligence tests as a cutoff for screening purposes; however, the group IQ score should not be used as the final criterion for placement (Feldhusen, 1981; Fox, 1981; Martinson, 1974; Pegnato & Birch, 1959; Tongue & Sperling, 1976).

Group intelligence tests possess several important limitations. First, group intelligence and achievement tests are designed for the average student and therefore the ceiling of these instruments are characteristically too low to effectively discriminate between the bright and the gifted child (Martinson, 1974). Second, group intelligence tests heavily rely on proficiency in reading ability and competence of the English language. Consequently, group intelligence tests become poor measures of the gifted underachiever and the culturally different (Alexander & Muia, 1982).

Currently, the best single method of identifying children with superior cognitive abilities is the usage of a standardized individual intelligence test, i.e., Stanford-Binet Intelligence Scale (S-B), Wechsler Intelligence Scale for Children-Revised (WISC-R), Wechsler Preschool and Primary Scale of Intelligence (WPPSI). The major limitations in utilizing these tests are the expense involved in time and services of a psychologist. In an attempt to offset this dilemma, school systems have turned to utilizing group screening instruments. The following group and individual intelligence measures were reviewed:

Ammons Quick Test (Ammons & Ammons, 1958)

California Test of Mental Maturity (Sullivan, Clark & Tiegs, 1963a)

California Short Form Test of Mental Maturity (Sullivan, Clark & Tiegs, 1963b)

Cognitive Ability Test (Thorndike & Hagen, 1978)

Concept Assessment Kit (Goldschmid & Bentler, 1968)

D-48 (Black, 1963)

Goodenough-Harris Draw-a-Person Test (Goodenough & Harris, 1963)

Lorge-Thorndike Intelligence Test (Lorge, Thorndike & Hagen, 1954)

Otis-Lennon Mental Ability Test (Otis & Lennon, 1968)

Otis Quick Scoring Mental Ability Test (Otis, 1936)

Peabody Picture Vocabulary Test (Dunn, 1959)

Peabody Picture Vocabulary Test-Revised (Dunn, 1981)

Piaget Assessment Test of Conservation (Rader, 1975)

Preschool Inventory (Caldwell, 1965)

Raven's Standard Progressive Matrices (Raven, Court & Raven, 1958)

Short-Form Test of Academic Aptitude (Sullivan, Clark & Tiegs, 1974)

Slosson Intelligence Test (Slosson, 1963)

SRA Education Ability Series (SRA, 1978b)

SRA Primary Mental Abilities Test (Thurstone, 1962)

Stanford-Binet Intelligence Scale (Terman & Merrill, 1972)

Structure of Intellect Learning Abilities Test (Cunningham, Thompson, Alston & Wakefield, 1978)

Wechsler Intelligence Scale for Children-Revised (Wechsler, 1974)

Wechsler Preschool and Primary Scale of Intelligence (Wechsler, 1967).

Group Intelligence Tests

After a critical review of the literature, the Cognitive Ability Test (CogAt) and the Short-Form Test of Academic Aptitude (SFTAA) were chosen as the most appropriate group screening measures, in terms of reliability and validity, for the first and second grade school-aged population. James (1974) in his dissertation study established a .79 correlation between the CogAt and the Stanford-Binet, concluding that the CogAt was a valid group measure of intelligence and a valid predictor of first grade reading achievement. In the Lesiak (1973) study, a correlation of .57 was established between the CogAt and Slosson Intelligence Test (SIT), with the CogAt consistently scoring significantly lower than the attained (inflated) IQs achieved on the SIT. The renorming of the Stanford-Binet was based upon scores obtained from the 1970 standardization population for the Cognitive Ability Test. Pearce's (1981) dissertation study of fifth and sixth grade potentially gifted students concluded that the Raven's Standard Progressive Matrices (SPM) correlated highly with all IQ indices on the WISC-R.

The Short-Form Test of Academic Aptitude (STFAA) is a revision of the California Short-Form Test of Mental Maturity (CTMM-SF). The STFAA was found to demonstrate acceptable reliability and validity of general intellectual functioning, and was a better predicator of academic success among first and second graders than the CTMM-SF (Shoemaker, 1972).

Dirks, Wessels, Quarfoth, and Quenon (1980) supported Lowrance and Anderson's (1979) study in concluding that the SIT was a poor predictor of gifted elementary students, in that it was ineffective in discriminating 50 percent of the gifted population as identified by the WISC-R. Karnes and Brown (1979) reinvestigated the correlation between the SIT and the WISC-R in identifying gifted students in grades first through eighth. Their results suggested that if the SIT is used for screening, a cutoff of 105 or above should be employed in order to identify 95 percent of the gifted students as identified by the Stanford-Binet. SIT IQ scores centering around 120 tended to underestimate WISC-R full-scale IQs while SIT scores of 130 or above overestimated.

Machea's (1972) study of the gifted found that a SIT cutoff of 140 or higher was appropriate for placement; however, to prevent misclassification, children with SIT scores of 130 to 139 should be referred for individual assessment. Covin (1977), in screening special education children, also found the SIT to overpredict WISC-R scores. In Thurman's

(1974) study of preschool gifted children, it was determined that the Preschool Inventory, DAP (Goodenough-Harris Draw-a-Person), and the SIT all had questionable validity in discriminating giftedness at the preschool age, as determined by the Stanford-Binet.

Rust and Lose (1980) attempted to determine the accuracy of the SIT and the SRBCSS (Scale for Rating Behavioral Characteristics of Superior Students) in screening for gifted children. Their findings concurred with Karnes and Brown (1979) in that the SIT tended to significantly overestimate WISC-R full-scale IQ scores. The study further stipulated that the SRBCSS was not useful in predicting WISC-R scores. A .427 correlation was reported between the SIT and WISC-R; however, no matter what arbitrary SIT cutoff point was established, considerable accuracy error was made in identifying the gifted population. The SIT, however, was determined to be a far more useful screening device than was the SRBCSS.

In the studies of Raskin, Offenbach and Black (1974) and Coleman, Brown and Ganong (1980), it was concluded that the SIT and the PPVT (Peabody Picture Vocabulary Test) yielded qualitatively different types of scores and lacked comparability. The mean IQ on the SIT was substantially higher than expected, given the PPVT scores. However, the differences between the SIT and PPVT scores tended to decrease as age increased (Raskin et al., 1974).

Keach (1966), in identifying gifted children, compared the Lorge-Thorndike, Otis-Lennon, and the CTMM-SF with the Stanford-Binet and found all group measures to underestimate the IQ yielded from the Stanford-Binet and all had correlations less than .35 with the Stanford-Binet. Estes' (1965) investigation of an above-average population found the

Otis Quick Scoring Mental Ability Tests to be unreliable in predicting Stanford-Binet and WISC-R scores.

Thompson, Alxon, Cunningham, and Wakefield (1978) attempted to use the SOI Learning Abilities Tests to predict academic aptitude of kindergartners in arithmetic achievement, as measured by the Iowa Tests of Basic Skills (ITBS) (Linquist & Hieronymus, 1973). The SOI abilities which are hypothesized to be related to arithmetic skills were generally more highly correlated with arithmetic achievement than those involved in reading. A multiple correlation of nine SOI abilities hypothesized to be related to reading yielded .59 with the ITBS, while a multiple correlation of 17 SOI abilities hypothesized to be related to arithmetic was .83.

Pearce (1981) found the SOI Screening Form for Gifted to have poor correlation with the WISC-R in identifying fifth and sixth grade gifted students. However, the SFTAA proved to be an effective screening instrument when using a cutoff of the top 10 percent. The Raven's SPM also yielded significant correlations with the WISC-R scores.

The Concept Assessment Kit (CAK) has been used in several studies with kindergarten and first grade potentially gifted students. Rader (1975) demonstrated that the CAK could be used to accurately identify first grade children who were nominated by teachers and peers. However, all identified students ceilinged the CAK; therefore, it is logical to assume that the CAK would be more effective in discriminating potentially gifted children at the kindergarten level.

The SRA Primary Mental Abilities (PMA) battery, now revised to the SRA Education Ability Series, has been compared to the CAK using kindergartens (McNary, Michael, & Richards, 1973). This study stipulated that the CAK was significantly related to chronological age and to quantitative thinking as measured by the PMA Number Facility subtest but was relatively independent of verbal ability as measured by the PMA Verbal Meaning subtests.

Hirsh and Hirsh (1980) investigated the Ammons Quick Test's concurrent validity with the Stanford-Binet. Their findings indicated that with a cutoff of 130 on the Ammons, one would have been able to identify 40 percent of the gifted students in their sample. The Ammons underestimated the cognitive abilities by 2 to 34 points, with a mean of 19 points.

Hazender (1981) attempted to identify disadvantaged gifted third and fourth graders by using the D-48, Raven's SPM, Stanford-Binet, Behavior Characteristics of Observing Giftedness Among Culturally Different (BCOG) and Piagetian Assessment Test (PAT). This study reported that the D-48, SPM, and PAT were all effective predictors of giftedness for this particular sample.

The Peabody Picture Vocabulary Test (PPVT) has been subjected to numerous validity research studies in screening the gifted. The Peabody Picture Vocabulary Test-Revised (PPVT-R), a 1981 revision, purportedly measures a mean 10 points below the PPVT on the average population, and tends to yield more than a half standard deviation standard score discrepancy on the gifted population (Pedriana & Bracken, 1982). The PPVT typically scores 10 to 20 points below the Stanford-Binet in the upper IQ range (Concannon, 1975; Ritter, Duffy & Fischman, 1974). Therefore, the comparability of the PPVT-R and the Stanford-Binet would then be more disparate (Pedriana & Bracken, 1982). This would necessitate using a lower PPVT-R cutoff point if the PPVT-R were to be useful in discriminative screening.

The DAP (Goodenough-Harris Draw-a-Person) has also been widely utilized in studies searching for valid predictors of giftedness (Brown, 1977; Durrant & Herman, 1972; Gayton, Tovarmina, Evans, & Schuh, 1974; O'Keefe, Leskosky, O'Brien, Yater, & Barclay, 1971; Pihl & Nimrod, 1976; Reisman & Yamokoski, 1973; Ritter et al., 1974). Reisman and Yamokoski's (1973) study of average intelligence children found the DAP to correlate .44 with the Stanford-Binet, and to significantly underestimate IQ on the Stanford-Binet, thus being a useless discriminator between average and superior intelligence. Ritter et al. (1974), for their sample of average kindergartners, reported correlations of .55 between the DAP and Stanford-Binet, .65 between the PPVT and Stanford-Binet, and .37 between the DAP and PPVT. The DAP was less variable in its IQ estimates than the PPVT; but it also significantly underestimated IQ, as assessed by the Stanford-Binet. It was concluded that the DAP was grossly inadequate as a measure of intelligence in above-average children, and that the PPVT produced IQ results comparable to the Stanford-Binet only for children of average intelligence and significantly underestimated IQ scores of children in the superior range (Ritter et al., 1974).

Research implied that the use of the PPVT or the DAP as measures of intelligence in screening matrices of the gifted would be futile and meaningless. The majority of studies concurred that the PPVT should not be relied upon in yielding valid measures of intelligence and that the DAP was only a reliable estimator of intelligence in average ability children (Brown, 1977; Coleman et al., 1980; Concannon, 1975; Durrant & Herman, 1972; Gayton et al., 1974; O'Keefe et al., 1971; Pihl & Nimrod, 1976; Raskin et al., 1974; Reisman & Yamokoski, 1973; Ritter et al., 1974; Ryan, 1975; Thurman, 1974).

Based upon this review of the literature for group intelligence measures, three instruments which evinced both high reliability and validity with the Stanford-Binet Intelligence Scale were selected. These were the Cognitive Abilities Test, the Short-Form Test of Academic Aptitude, and the Raven's Standard Progressive Matrices.

Individual Intelligence Tests

The Stanford-Binet Intelligence Scale is considered the best overall individual assessment of intelligence of elementary students with superior cognitive abilities (Alexandria & Muia, 1982; Clark, 1979; Evans & Richmond, 1976; Lazow & Nelson, 1974; Martinson, 1974; Sellin & Birch, 1981). According to Evans and Richmond (1976, p. 13), "For testing young children and children at the extreme ranges of intelligence, the Stanford-Binet still seems to be the best instrument." Although several researchers would argue its applicability toward identifying the culturally different or minority-group children (Chambers & Barron, 1978; Haznedar, 1981), other researchers would argue its fairness (Cox, 1974; Evans & Richmond, 1976; Oakland, 1971, 1973; Rader, 1975; Ryan, 1975).

The Stanford-Binet has been reported to consistently score higher than the WISC, WISC-R, and WPPSI, with the discrepancy increasing as the IQs become higher (Estes, 1965; Oakland, King, White, & Eckman, 1971). On the above-average preschool and kindergarten population, the Stanford-Binet's correlation with the WPPSI reportedly varied between .445 (Ruscheval & Way, 1971) and .75 (Oakland et al., 1971). The WPPSI, in turn, tended to underestimate the WISC, especially on lower SES children (Crockett, Rardin & Pasework, 1975; Oakland et al., 1971; Rellas, 1969). The WISC usually scored seven to ten points higher than the WISC-R

(Sattler, 1982), while the Stanford-Binet tended to score on the average seven points higher than the WISC and four points higher than the WPPSI (Oakland et al., 1971). The WISC's correlation with the Stanford-Binet has been reported to vary between .41 and .75 (Oakland et al., 1971; Sattler, 1982). Rasburg, McCoy, and Perry (1977) and Oakland et al. (1971) documented correlations from .65 to .90 between the WPPSI and WISC, and .61 between the Stanford-Binet and WISC. Therefore, it is hypothesized that the point difference between the Stanford-Binet and WISC-R would be greater than ten points in above-average intellectual children (Sattler, 1982).

Researchers have concluded that the WPPSI has limited value in assessing intelligence in preschool and primary elementary children with superior ability (Crockett et al., 1975; Oakland et al., 1971; Ruscheval & Way, 1971). In Rasburg et al.'s (1977) study of above-average middle class children, the WISC-R consistently scored four to five points below the WPPSI, in contrast to the one to three points difference as reported in the WISC-R manual.

Research has concluded that the WPPSI and Stanford-Bient scores are not interchangeable, especially for lower SES populations (Crockett et al., 1975; Oakland et al., 1971; Ruscheval & Way, 1971). Monahan (1980), in his study of the predictive value of the Stanford-Binet in identifying gifted kindergartners and first graders, established that significant regression tended to occur between the first and fifth grades among identified gifted students. Stanford-Binet subtests which tended to remain stable were those in the factors of general comprehension and judgment and reasoning. Monahan stipulated that apparent inflation occurred in the subtests of memory-concentration and vocabulary-verbal fluency which tended to artificially inflate IQ scores of children from highly enriched environments. However, these subtests also tended to deflate over the four-year span between grades one through five, thus yielding lower IQ scores. Monahan recommended postponing the identification of kindergartners and first graders, especially using the Stanford-Binet. However, this reported depression could also be attributable to inappropriate curriculum rather than to developmental disparities in abilities as assessed by the Stanford-Binet.

Sheverbush (1974) attempted to determine functional clusters in the Stanford-Binet to ascertain quantitative differences between superior and average IQ samples. The gifted sample passed proportionally higher number of subtests classified in the language and vocabulary clusters. Teachers were requested to subjectively rank these students by functional clusters. The teachers rated those gifted students who had the highest rank in the reasoning cluster as the most successful, whereas the students who scored highest in the verbal cluster tended to be rated by their teachers as unsuccessful.

Numerous researchers have attempted to validate the use of streamlined formats of individual intelligence assessment in effectively and efficiently identifying the gifted. Studies have found that abbreviated forms of the WISC-R do correlate significantly with the full-scale IQ (Dirks et al., 1980; Elman, Blixt & Sawicki, 1981; Karnes & Brown, 1980, 1981; Killan & Hughes, 1978; Silverstein, 1970).

The combination of V-BD (vocabulary-block design) correlation with the full-scale IQ on the WISC-R varied in the gifted studies from .63 (Karnes & Brown, 1980), .81 (Elman et al., 1981), .86 (Silverstein, 1970), .91 (Sattler, 1974), and .92 (Killan & Hughes, 1978). Elman et al.'s (1981) study demonstrated that 86 percent of the gifted candidates with sums of 32 (V-BD) or higher had full-scale IQs of 130. The study concluded that the V-BD dyad could be used as a screening device. Those with V-BD scores below 25 could be deleted from candidacy, while V-BD scores of 26 to 31 would necessitate a full WISC-R battery. V-BD scores of 35 to 38 proved to be 100 percent accurate in identifying gifted first through fourth grade candidates.

The V-BD dyad would appear to be the most effective short-form combination in predicting the IQ of gifted candidates (Karnes & Brown, 1981; Killan and Hughes, 1978), although several other combinations have been the subject of research, S-V-BD-OA (similarities-vocabulary-block design-object assembly) and S-OA-V (similarities-object assembly-vocabulary) (Dirks et al., 1980; Karnes & Brown, 1981). In terms of the gifted, the Karnes and Brown (1981) study found the S-V-BD-OA combination to be the most efficient short form in terms of time and reliability. Dirks et al. (1980) stipulated in their study that the S-OA-V triad was the only measure which did not significantly differ between boys and girls in estimating IQs. Those subtests which tap school-related information (arithmetic, vocabulary, information) were among the poorest predictors of high full-scale IQs on the WISC-R.

One of the criticisms in using the Stanford-Binet as a criterion in assessing IQ of potentially gifted children is that it is factored to be a heavily-loaded verbal assessment. It is then hypothesized that the Stanford-Binet would adversely discriminate against the culturally different, lower SES, bilingual, and disadvantaged populations who may also be gifted. Numerous studies have researched the use of nonverbal and multi-dimensional batteries in accurately identifying the gifted.

Pearce's (1981) study on fifth and sixth grades reported the Raven's Standard Progressive Matrices (SPM) to correlate highly with the WISC-R. Rader's (1975) study demonstrated the effectiveness of using the Concept Assessment Kit (CAK), which correlated highly with the Stanford-Binet in identifying culturally disadvantaged children. Haznedar's (1981) study of third and fourth grade gifted candidates established the D-48, SPM, and Piagetian Assessment Test (PAT) to be effective as screening measures of the culturally disadvantaged.

Assessment Models and Limitations

In the field of psychometric testing, a controversy exists whether any current assessment instruments, including non-verbal measures, are culturally-fair. Overall attempts to devise less culturally-biased tests and screening matrices specifically for the identification of the disadvantaged gifted candidate have produced mixed results. Tuttle and Becker (1980) cited a number of studies which indicated that:

1. practice with verbal tests did not compensate for long-established environmental deficits;

2. larger proportions of black children perform higher on verbal measures than on tests of reasoning, space and number;

3. multiple cultural variations within a minority, race or low SES group vary significantly which likely impede the development of a truly culturally-fair intelligence test; and

4. children from disadvantaged or culturally different environments should be evaluated individually and allowance be made in the cutoff points to account for the deprivation.

Several states have attempted to implement a culturally-fair process in identifying the gifted population. Prapjolenis and Storlie's (1979) final report on such a project in Michigan reported these conclusions:

1. the modified identification process selected a greater percentage of ethnic students than the traditional process.

2. those students selected by the modified process did not differ from the children selected by the traditional process with respect to the criteria variables; and

3. those children found by the selection committee to be most eligible for participation ranked higher with respect to the selection criteria.

This modified selection process in Michigan was based upon parent nominations, teacher recommendations, achievement test scores, and review of candidates by a specifically formed selection committee.

The majority of states have implemented multiple criteria standards because of the following difficulties in identifying potentially gifted students: variability discrepancies between group IQ measures, limited resources of individual intelligence batteries, and diversity in states' definitions of giftedness (Dirks & Quarfoth, 1981; Fox, 1981; Karnes & Collins, 1978; Lamkins, 1978). However, the criteria within these standards vary significantly.

In the breadth model, student selection is contingent upon attainment of above-average scores on several instruments simultaneously. In the depth model, student selection is contingent upon the superior performance on one assessment, regardless of their scores on other assessments. The depth model, according to Dirks and Quarfoth (1981), is more likely to identify the students with unusually high IQ scores and those not achieving to their apparent potential. An example of a breadth model would select a student who scored within the top 10 percent in three of five areas: school grades in major subjects, creativity test scores, teacher nomination on behavioral checklists, and intelligence test scores. The depth model would subscribe to those students who scored within the top 2 or 3 percent on at least one of the above areas.

Dirks and Quarfoth's (1981) comparison between these two models showed that the breadth model tended to identify students with moderately high IQs (Full-Scale WISC-R over 120) and who were above-grade level achievers but missed identifying 60 percent of the students with WISC-R IQs of 130. Dirks and Quarfoth concluded that the different types of identification models tended to identify different types of students. The breadth model tended to identify students who were well-thought of by their teachers and who were multiply talented. While the depth model tended to select students who were underachievers, relative to their cognitive potential and those students who had unusually high IQs, abilities, and talents.

Both models become vulnerable when school districts indiscreetly choose inappropriate or poorly validated group IQ tests as the intelligence criteria or when they attempt to use a combination of tests in a matrix model which do not demonstrate significant inter-correlations. A review of the states' identification matrices reports a typical combination for selection criteria to comprise two or three of five areas: group IQ of 120 or above, top 5 to 10 percent ranking on standard achievement tests (composite and/or math and reading), 2 to 3 above grade level performance in reading and math, nomination by teacher and parent (e.g., Renzulli-Hartmann SRBCSS), and top 20 to 50 percent ranking on creativity assessment (Barthe, 1980; Fortna & Bastos, 1976; Lamkins, 1978; Otey, 1978; Rubenzer, 1979; Tuttle & Becker, 1980).

Renzulli and Smith (1977) supported the use of a multi-factor assessment procedure referred to as the case-study approach. This format usually included: aptitude and achievement scores, teacher rankings, cumulative record information, parent rankings, and student self ratings. This data would then be reviewed by a select committee to determine eligibility. Renzulli reported a higher selection efficiency in both time and cost in the identification of the gifted by using this case-study approach. In evaluating the utility of the data supplied to the selection committee, parent rankings and health-background information was judged the least useful, while peer and teacher nomination rankings were judged the most useful. However, this conclusion has been contradicted by other studies (Carroll & Laming, 1974; Gowan, 1971).

Teacher Nomination

Perhaps the most variable and yet useful subjective data frequently used in the identification process are teacher recommendations. Research tends to support its continued use and has shown that if given specific behavioral checklists and inservice training, teachers' effectiveness and efficiency ranking can improve (Gear, 1976; Mayfield, 1979; Shipley, 1978). However, some authorities would argue teacher rankings' utility and espouse that they should not be used as a criterion in the selection matrix (Alvino & Wieler, 1979; Lowrance & Anderson, 1977). In fact, Rust and Lose (1980) stated even more emphatically that the most popular teacher ranking scale, the SRBCSS (Scale for Rating Behavioral Characteristics of Superior Students) has consistently proved to have poor correlation with IQ scores and therefore was shown to be an inadequate predictor of high intellectual functioning. In its defense, however, the SRBCSS was not designed to predict IQ scores but to be an objective instrument to aid teachers in their judging the characteristics of superior students (Burke, Haworth & Ware, 1982). However, Rust and Lose (1980) did not find the Renzulli Scale to be successful in aiding teachers in the identification process. In their study, the SIT correlated .43 with the WISC-R; this was more accurate than the SRBCSS, which demonstrated low negative correlations. Lowrance and Anderson (1977) also reported low positive correlations (< .25) between the SRBCSS subareas and WISC-R IQs and recommended that the Renzulli Scale not be used as a criterion in the selection process.

In Gear's (1976) survey reviewing elementary teachers' reliability in accurately identifying gifted children, estimates of teachers' efficiency rating ranged between 26 to 57 percent, with efficiency defined as the number of gifted correctly identified divided by the total number nominated (Jacobs, 1971; Martinson, 1974; Walton, 1961). Teachers' effectiveness (number correctly identified divided by the total number of confirmed) varied between 10 to 61 percent (Gear, 1976). Teachers' reliability in recognizing and identifying slow learners appeared substantially higher (Lesiak, 1973).

The literature abounds with examples of discrepancies between teacher perceptions of student ability and student performance on various standardized tests (Chissom & Thomas, 1973; Cunningham, Thompson, Alston, & Wakefield, 1978; Jacobs, 1971; Lesiak, 1973; Lowrance & Anderson, 1977; Mayfield, 1979; Pegnato & Birch, 1959; Rust & Lose, 1980; Shipley, 1978). Teacher inservice training covering the characteristics of the gifted and talented, and the specifics of the nomination checklist has been reported to double teacher effectiveness but not their efficiency (Gear, 1976). It has been hypothesized that teacher judgment is inadequate as a screening device, but that it could prove useful if inservice training and objective measures were combined (Gear, 1976). However, there are several inherent difficulties associated with ranking scales that must be considered, some of which are: ambiguity of items, misinterpretation of items, and variability in perception of raters.

Mayfield (1979) examined the relationship between students' test performance on standardized intelligence, achievement, and creativity tests and teachers' perceptions of these abilities. It was demonstrated in her sample that teachers' perceptions adequately correlated with standardized measures of intelligence and achievement, but that teachers were unable to judge creativity.

The failure of teachers to effectively identify gifted students may reflect their inability to recognize inherent characteristics of giftedness. Teachers often fail to identify the gifted because they tend to stress academically accepted behavior such as good grades, neatness, punctuality, and obedience (Fox, 1981). The gifted are often penalized for the very characteristics indicative of giftedness.

Parent Nomination

Parents are frequently neglected as sources in identifying gifted children. However, several research studies have discovered that parents are a reliable input source (Jacobs, 1971; Martinson, 1974). Jacobs (1971) found in his study of kindergartners that while teachers were able to only correctly identify 10 percent of the gifted students, parents were able to select 61 percent; parents also showed less tendency than teachers to overestimate abilities. Parental accuracy in identifying older elementary students has not been documented (Jacobs, 1971; Martinson & Lessinger, 1960; Otey, 1978). Although many screening matrices utilize parent nominations, little or no weight is given to health-background, biographical information (Renzulli & Smith, 1980; Shipley, 1978; Tuttle & Becker, 1980).

Peer Nomination

Many studies have shown that peer nominations can provide valuable insights into the ability levels of their peers (Grazin & Grazin, 1969; Martinson, 1974; Renzulli & Smith, 1977; Shipley, 1978). In the Renzulli comparison study between traditional and case-study approaches, peer nominations received the highest usefulness ranking in aiding the selection of candidates by the committee. Shipley (1978) utilized sociometric techniques to obtain peer nominations with third through fifth graders and found that 79 percent of the students selected later qualified for program entrance.

Academic Assessment

Academic achievement tests attempt to measure what learning has occurred and the ability to apply these learned skills in more complex situations, while IQ tests assess the capacity to achieve. However, a large number of gifted students will not be identified by their performances on achievement tests; this proportion increases with each grade (Alexander & Muia, 1982; Dirks & Quarfoth, 1981). Multiple safeguards are needed in each screening matrix to offset this reality.

The attainment of achievement scores within the upper third to fourth percentile ranking is standard criterion in most eligibility matrices for placement in gifted programs. However, the usefulness and accuracy of these percentiles have been under scrutiny for two important reasons. One, in-grade achievement tests generally cannot provide an accurate estimate of an academically gifted individual's ability because of the insufficient ceilings which are built into the instruments themselves. Two, these in-grade achievement tests give no indication of how such students differ from one another in their abilities and learning styles (Keating, 1975). In-grade primary academic achievement batteries are therefore ineffective in delineating the academically bright from the academically gifted, mainly because the test questions on these academic batteries are usually aimed at the lower cognitive skill levels (recall and comprehension) and do not tap reasoning and evaluation skills inherently characteristic of the gifted. While advanced or specialized achievement batteries, especially those in areas of math and science do tend to tap higher reasoning and evaluation thinking skills.

Group in-grade achievement batteries are only considered useful as screening instruments in identifying possible gifted candidates (Alvino & Wieler, 1979; Fox, 1981; Martinson, 1974). Students who obtain the required percentile ranking to become candidates would then qualify for the second phase of assessment. This secondary achievement battery would include the administration of specific academic subject aptitude tests (e.g., Differential Aptitude Tests [Bennett, Seashore & Wesman, 1972] and Test of Standard Written English (1976) or higher level in-grade tests (i.e., Scholastic Aptitude Test [1970], given to seventh to ninth grade candidates or SRA Achievement Series [1978a] designed for junior high level given to upper elementary candidates). Final program eligibility would be contingent upon the candidates' performance on these tests.

Individual achievement tests have been widely used in screening the gifted (Churchill & Smith, 1974; Hunter & Lowe, 1978; Martinson, 1974). The Peabody Individual Achievement Test (PIAT) (Dunn & Markwardt, 1970), used to assess preschool gifted candidates, showed a .73 correlation with the Stanford-Binet (Shorr, Jackson & Robinson, 1980). It was purported that the PIAT was an appropriate instrument for assessing the academic skills of intellectually gifted preschoolers. The PIAT demonstrated acceptable levels of internal consistency and stability, and adequate concurrent validity with general intelligence test performance (Shorr et al., 1980). Davenport (1976) in her study of third graders found the PIAT and Otis-Lennon Mental Ability Test to have a .79 correlation.

Research literature has illustrated that although the popular individual achievement tests have moderately high correlations with group intelligence tests, most screening and selection committees still rely on group achievement batteries. In these comparative studies, the following group achievement tests were the most widely used: SRA Achievement Series (SRA, 1978a), Iowa Tests of Basic Skills (Linquist & Hieronymus, 1973), Stanford Achievement Tests (Karlsen & Merwin, 1964), California Achievement Tests (Tiegs & Clark, 1970), Metropolitan Achievement Tests (Prescott & Balow, 1970), and Comprehensive Tests of Basic Skills (1968).

Summary and Implications

On the basis of existing research, the most defensible approach for identifying the primary elementary gifted children would appear to use a two-tier screening model. The initial screening phase in selecting possible candidates would include: teacher, parent and/or peer nominations, cumulative record data, top 10 percent scores on standardized group achievement and general intelligence tests, two to three above grade level performance in reading and/or mathematics, and satisfactory performance on tests of creativity, if applicable to the specific gifted program. Candidates successfully progressing through this initial phase would then qualify for the secondary screening, which would include the administration of an advanced or above in-grade achievement battery and/or individual intelligence test. Those candidates attaining a score(s) in the top 3 percent would qualify for placement. Special consideration should be given those candidates from culturally different, lower SES, and bilingual backgrounds.

The type of assessment used in the selection process must be tied to the type of program being offered. Caution must be exercised in the selection of the specific instruments used to assess each criterion, with particular concern directed at each test's demonstrated reliability and validity as applied to specific populations. For example, the selection of tests would differ from programs designed to service the academically gifted versus the creatively gifted.

Authorities still promote the use of the Stanford-Binet Intelligence Scale as the best predictor of intelligence in gifted children. However, considerably more controversy exists over which group intelligence test is the most accurate in predicting IQs as assessed by the Stanford-Binet. Based on the review of research, it was conjectured that the Raven's Standard Progressive Matrices, the Cognitive Abilities Test, and the Short-Form Test of Academic Aptitude would be the most appropriate group measures for such purposes in assessing primary elementary students.

Given evidence of teachers' ineffectiveness in identifying the gifted, it was promoted that with inservice training and the use of objective checklists, teachers could provide viable input into the screening phase. Parents, conversely, have been noted for their effectiveness in identifying the gifted.

Creativity is rather difficult to define and assess at the elementary level, given the scarcity of reliable and valid instruments purporting to measure creativity (Gowan, 1971; Khatena, 1982; Torrance, 1972), teachers' ineffectiveness in identifying behavioral constructs of creativity (Mayfield, 1979; Treffinger, 1980), poor correlation between creativity, academic excellence, and high intelligence (Getzels & Jackson, 1962; Rekdal, 1977; Torrance, 1977; Tuttle, 1978), and poor correlation among measures of creativity themselves (Bastos, 1973; Crockenburg, 1972; Kogan & Pankove, 1974). As a result of these significant limitations, inclusion of a criterion for creativity in a secondary screening phase was judged inappropriate for the first and second grade population.

CHAPTER III

METHODOLOGY

Sample Description and Collection

The research sample was comprised of first and second grade students from the six elementary schools in a town with an estimated population of 25,000, which is adjacent to a large metropolitan city in Oklahoma. An array of socio-economic levels are represented in the school population, with the majority wavering between the low-middle to middle class socio-economical status (SES) range. All first and second grade students, excluding those who had repeated a grade, who attained a 115 or above on the Otis-Lennon Mental Ability Test (Otis & Lennon, 1968) were selected as prospective participants (Pegnato & Birch, 1959).

The Otis-Lennon Mental Ability Test was administered school-wide in November, 1982. The instrument was scored by each classroom teacher. Compilations of Otis-Lennon IQ scores were then scanned to locate qualified candidates. This selection process yielded a prospective sample size of 192. A minimal sample of 150 was deemed necessary for statistical analysis.

The following information was gathered and recorded on data collection cards for each of the 192 candidates (Appendix B): student's name, parent's name, address, phone number, birth date, school, grade, teacher, 1982 SRA Achievement scores, and Otis-Lennon IQ score. A parental consent form, along with a cover letter explaining the research study, the

Parent Rating Scale, and a stamped, addressed envelope (Appendices C, D, E, respectively) were mailed to all parents of the 192 candidates. A return deadline of two weeks was requested. This sampling procedure yielded 166 returns, a return rate of 87 percent. The distribution of the sampled population elicited by this study is referenced in Table I.

TABLE I

SAMPLE DISTRIBUTION BY SEX AND OTIS-LENNON SCORES

Sample Distribution	Boys	Girls	Total
First Grade	44	55	99
Second Grade	31	36	67
Total	75	91	166
Non-Return Distribution			
First Grade	6	8	14
Second Grade	5	7	12
Total	11	15	26

Distribution of Otis-Lennon Scores

	115-19	120-24	125-39	130-34	135-39	140
Sample	59	50	21	19	12	5
Non-Returns	12	8	4	2	0	0
Total	71	58	25	21	12	5

Instrumentation

Short-Form Test of Academic Aptitude

The Short-Form Test of Academic Aptitude (SFTAA) (Sullivan, Clark &

Tiegs, 1974) was derived from the California Test of Mental Maturity (CTMM) (Sullivan, Clark & Tiegs, 1963a) series, a group measure originally designed to parallel the Stanford-Binet Intelligence Scale (Terman & Merrill, 1972). The SFTAA was developed to assess the level of intellectual development and to predict rate of progress and level of success in school.

The SFTAA is a series of academic aptitude tests for use with grades 1.5 through 12.9, divided into five levels. Each level contains two sections: Language and Nonlanguage. The Language section includes two separately timed subtests: Vocabulary and Memory; while the Nonlanguage section is comprised of Analogies and Sequences.

A variety of summary and derived scores are attainable, i.e., language, nonlanguage and total scores, mental age, intelligence quotient, reference scale score, percentile rank, standard scores, and stanines. The national norms for the SFTAA are computed on both age and grade groups. The IQ is a form of normalized standard score with a mean of 100 and a standard deviation of 16 based on school students in a particular age group. The means and standard deviations for the SFTAA are reported in Table II.

The SFTAA was standardized by administration in the spring of 1970 to a national sample of 197,912 students in grades 1 through 12. It was standardized jointly with the California Achievement Tests (CAT-70) (Tiegs & Clark, 1970). The sample was stratified by geographic region, school district enrollment, and an index of community type.

Indices of internal consistency were based on Kuder-Richardson formula (KR #20) correlation coefficients computed for all SFTAA scores for each grade at each test level. The KR #20s and their corresponding standard errors of measurement for raw scores were based on the cross-sectional subsample of the total standardized sample. KR #20s for the first and second grades for the four subtests and totals ranged between .77 to .93.

TABLE II

SHORT-FORM TEST OF ACADEMIC APTITUDE: MEANS AND STANDARD DEVIATIONS

	Vocabulary		Analogies		Sequences		Memory	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Grade 1	13.6	4.6	10.5	4.5	11.0	5.8	10.0	4.2
Grade 2	16.8	4.3	13.1	4.0	14.1	4.5	13.0	3.9
	Language		Nonlanguage		Total			
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD		
Grade 1	24.5	7.9	21.4	8.0	46.0	14.4		
Grade 2	29.8	7.3	27.2	7.3	57.0	13.1		

Based on national norms (Sullivan et al., 1974).

The stability of SFTAA scores was demonstrated by the Pearson product-moment correlation coefficients for samples from grades 1 through 12, who were tested and retested with the same level at an interval of approximately two weeks. These test-retest correlations for the first and second grade samples on Level I ranged between .85 through .91 on Language, .86 through .87 on Nonlanguage, and .90 through .93 on Total. Long-term reliability for those students who were retested on

Level 1 at a 14-month interval varied between .73 through .81 on Language, .49 through .56 on Nonlanguage, and .68 through .75 on Total.

In validity studies, the SFTAA was correlated with the California Achievement Test-70 and the Comprehensive Test of Basic Skills (CTBS, 1968). SFTAA Level 1 Total demonstrated a .76 correlation with CAT-70 Level 1, while the SFTAA Level 1 Total showed a .67 correlation with CAT-70 Level 2. SFTAA Level 1 Total correlated .63 through .66 with CTMM-SF Level 1 (Sullivan, Clark & Tiegs, 1963b). On the average, the CTMM-SF Level 1 scored 5 to 10 points higher than the SFTAA Level 1.

Raven's Standard Progressive Matrices

The Raven's Standard Progressive Matrices (SPM) (Raven, Court & Raven, 1958) consists of five sets of twelve problems. Each set starts with a matrix problem which becomes progressively more difficult. By this format, it attempts to deduce the consistency of one's intellectual activity in five successive lines of thinking. The SPM may be used for individual or group assessment, in timed or untimed settings; appropriate norms are provided. Performance on the SPM is reported in percentile rankings, which can be converted into standard scores resulting in a ceiling score of 130. This limitation lowers the SPM's effectiveness in differentiating between the above-average and superior intellectual functioning levels.

The Raven's SPM was designed to assess a person's capacity to apprehend meaningless figures, to deduce the relationship between them and to select from a field of 6 to 8 options the correct pattern to complete each relationship. Evidence from factor analytic research suggests that SPM is a relatively good measure of general intelligence with slight loadings on spatial ability and inner verbalization (Raven et al., 1958).

The SPM was standardized in 1972 on representative samples of British people, 6 to 65 years of age, and of Irish children 6 to 12 years of age. The SPM item difficulties were calculated separately for children of different SES, regional backgrounds, total scores on the test, sex, and age. Significant mean score variations existed on SES and area of residence; test results declined with SES and with urban to rural residence.

The majority of studies giving interval consistency data report correlations ranging between .76 through .97, depending on the age level and sample size. Consistency of SPM appears more stable with age of the participants. Split-half reliability for the Raven scores varied from .83 to .95. Test-retest reliability differed widely due to time intervals; however, the shorter intervals (one week to four month interval) were associated with higher reliability correlations of .78 through .90. Satisfactory reliability correlations were reported from interval periods up to one year (Raven et al., 1958).

The concurrent and predictive validites of SPM varied with the age of the sample and criterion used. For English speaking children, correlations between the SPM and the Stanford-Binet and WISC (Wechsler, 1949) ranged from .54 to .86 (Raven et al., 1958). Correlations with verbal intelligence and vocabulary tests tended to fall below .70. Correlations between SPM and performance on achievement tests or actual scholastic achievement were generally lower than correlations with intelligence tests. Correlations with the California Achievement Test and SPM ranged from .26 through .61. When external criterion for comparison was actual school achievement as assessed by grades, correlations generally fell between .20 to .70.

The content validity of SPM, measured by the internal consistency of the test, varied markedly when different test items were considered. The average correlation between SPM items and the combined results of three IQ tests was .45; for different test items, correlations ranged from .20 to .80.

Cognitive Abilities Test

The Cognitive Abilities Test (CogAT) (Thorndike and Hagen, 1978) is comprised of a Primary Battery for use in kindergarten and grades 1 and 2 and a multilevel edition of three batteries for grades 3 through 12. The Primary Battery is a single score untimed nonreading group test of general cognitive skills, designed to assess verbal, quantitative, and nonverbal reasoning and problem-solving abilities. The Primary Battery is divided into four subtests: Relational Concepts, Object Classification, Quantitative Concepts, and Oral Vocabulary. The Primary Battery yields standard age scores, grade level percentile rankings, universal scale scores and percentile ranks, stanine equivalents of standard age scores, and national curce equivalents (NCE).

The Primary Battery was nationally standardized during 1978, along with the administration of the Iowa Tests of Basic Skills (Linquist & Hieronymus, 1973), and the Tests of Achievement and Proficiency (1970). School districts across the nation were stratified according to socioeconomic status, size of enrollment, and geographic region. After each standardization was complete, the percentage of students in the samples within each category was determined. The percentage of sample within each category was adjusted by weighting so they would resemble the national percentages more closely.

Internal consistency reliability data for the Primary Battery fell around .90 (KR #20), while the standard error of measurement in standard age scores for the Primary Level fluctuated around ±6 points. Intercorrelations between subtests on the Primary Battery ranged between .42 to .60. In concurrent studies against school grades, the highest correlation with grade point average appeared for Quantitative Battery being the best predictor of grades in science and mathematics. The Verbal Battery proved to be an adequate predictor of grades in English and social studies. Correlations of the CogAT with the Standard-Binet, based on the 1972 restandardization, were reported to be .75 Verbal, .68 Quantitative, and .65 Nonverbal.

Otis-Lennon Mental Ability Test

The Otis-Lennon Mental Ability Test (OTIS) (Otis & Lennon, 1968) was designed as a group measure to assess general mental ability or scholastic aptitude. The Otis-Lennon is a revision of the Otis Quick Scoring series (Alpha, Beta, and Gamma Tests) (Otis, 1939). The Otis-Lennon is comprised of six levels covering grades K-12. Primary I, II, and Elementary I levels for grades K-3 do not require reading skills. At each level two parallel forms of the test are available, equivalent in content, difficulty, and discriminating power.

Standardization occurred in 1966-67 on a 200,000 pupil population nationwide, concurrent with the Stanford Achievement Test (Karlsen & Merwin, 1964). Sampling was based upon stratified random-cluster procedures with variables of SES, geographic location, size, and type of school district. Derived scores based on age include Deviation IQ (DIQ) scores, percentile rank, and stanine equivalents. Performances by grade are reflected in percentile rank and stanine scores. The DIQ has a mean of 100 and a standard deviation of 16. The Otis-Lennon DIQ scores have greater variability than IQ scores earned on the Quick-Scoring series and therefore are not directly comparable. The standard error of measurement is about six DIQ points for students aged five through nine years and about five DIQ points for those older than nine years.

Reliability coefficients for the Otis-Lennon have been determined on the basis of corrected split-half correlations and the Kuder-Richardson and alternative-forms procedures. These are reported in Table III.

TABLE III

OTIS-LENNON MENTAL ABILITY TEST: RELIABILITIES, MEANS, AND STANDARD DEVIATIONS

Split-Half	KR #20	Alternate-Form	Mean	SD
Primary II (Grade Level One)				
0.90	0.90	0.87	35.1	9.8
Elementary (Grade Level Two)				
0.89	0.88	0.85	37.4	11.1

In validity studies against academic achievement on the Peabody Individual Achievement Test (Dunn & Markwardt, 1970), the Otis-Lennon demonstrated a .79 correlation on the third grade population. In concurrent studies, correlations of the Otis-Lennon with the Stanford-Binet fluctuated around .63 and .67 with the WISC. Research studies generally concluded that the Otis-Lennon was unreliable in accurately assessing intellectual potential in above-average ability students (Churchill & Smith, 1974; Estes, 1965; Fox, 1981; Hunter & Lowe, 1978; Keach, 1966; Martinson, 1974).

SRA Achievement Series

The SRA Achievement Series (1978a) is a battery of standardized tests in basic curriculum areas, designed to measure what students have learned. The SRA series is comprised of eight levels spanning grades K-12. Academic performance is reported in grade-equivalents, percentiles, growth scale values (GSV) and national percentile bands. For Level B, scores are yielded in Reading, Math and Composite, while Level C also includes scores in Language Arts.

The SRA was standardized in 1978 by stratified sampling procedures, based on the variables of size and enrollment, SES, geographic location and size, ethnic distribution and student ability. Sample weighting procedures were then used to improve the representativeness of the standardization.

Internal consistency (KR #20) reliabilities for Level B, grades 1 and 2, reportedly are 1.0 Reading Total, .91 Math Total, and .96 Composite; Level C, grade 2, were .94 Reading Total, .92 Math Total, and .97 Composite. The Educational Ability Series (EAS) (SRA, 1978b), designed to assess scholastic potential, demonstrated KR #20 reliability of .77 to .80 on grades 1 and 2. The EAS quotient scale is a standard score scale with a mean of 100 at kindergarten level that increases by 0.5 each grade year until the end of grade 10, when it is 105.0. The standard deviation is 16. EAS is also reported in percentiles, stanines and quotient ranges, and is based on grade level instead of age. Therefore, it is not directly comparable to derived age IQ scores of other group aptitude-ability tests.

Stanford-Binet Intelligence Scale

The Stanford-Binet Intelligence Scale (S-B) (Terman & Merrill, 1972) has undergone three revisions since it was originally devised from the Binet-Simon Intelligence Scale in 1916 and was restandardized in 1972. The 1960 revision incorporated in a single form (L-M form) combination of the most reliable and valid subtests from the two scales of the 1937 scales. The Stanford-Binet Intelligence Scale is an individual assessment designed to measure general intelligence from ages 2 to 18. Factor analysis delineates six clusters: general comprehension, visual-motor ability, arithmetic reasoning, memory-concentration, vocabulary-verbal fluency, and judgment-reasoning. The Stanford-Binet derives a standard score IQ with a mean of 100 and a standard deviation of 16.

Validity of the 1960 scale is derived from three sources: equivalency in the percent of population passing subtests at a given age level between 1937 and 1960 revisions, equivalency in the increase in mental age from one age to the next checked with the increase in percent passing from one chronological age to the next, and biserial correlation of each subtest with the total. The mean biserial correlation is .66. According to Terman and Merrill (1972):

> Studies of internal consistency, whether employing factorial methods or correlation of items with total score, agree closely in showing tests such as abstract words, vocabulary, analogies, verbal absurdities and the like to have higher efficiency in differentiating degrees of general intellectual ability than do manipulative items in the scale (p. 12).

External validity studies comparing the Stanford-Binet and the WISC varied between .41 to .75, while correlations fluctuated between .45 to .75 when compared with the WPPSI (Wechsler, 1967). It has been generally concluded that the Stanford-Binet tends to yield higher IQs than the WISC, WISC-R (Wechsler, 1974), and WPPSI, with the discrepancy increasing as IQs exceed 140 (Crockett, Rardin & Pasework, 1975; Estes, 1965; Oakland, King, White, & Eckman, 1971; Rasburg, McCoy & Perry, 1977; Rusheval & Way, 1971; Sattler, 1982).

The restandardization of the Binet was conducted with 2100 subjects, 100 subjects for each age level, based on the large-scale stratified norming for the Cognitive Abilities Test (CogAT) completed in the fall of 1970. The CogAT was standardized on a population of 20,000 students ranging in ages 8 through 17. In order to obtain normative data for ages 2 through 8 and 17 through 18, siblings of the participants included in the CogAT norming were used to maintain consistency and uniformity in sampling criteria.

Behavioral Checklist of Intellectual Functioning

The Behavioral Checklist of Intellectual Functioning initially evolved from a compilation of checklists, scales, and behavioral characteristics of cognitive functioning which resulted in 27 clusters emulating high intelligence (Appendices F and G). From these clusters, 100 statements were generated. After completion of a pilot study, a final revision of 40 items was developed. The items were then randomly ordered. The scale was reproduced in reduced print on a single legal-size paper, blue for parents (Appendix E) and yellow for teachers (Appendix I). The rating scale was constructed in a five-point Likert format to facilitate data analysis and to improve scoring efficiency.

Reliability refers to the degree of consistency and stability of the scale. The internal consistency for both the Teacher and Parent Rating Scales was computed by the Alpha Model procedure (SPSS) (Nie, Hall, Jenkins, Steinbrenner, & Bent, 1975). As referenced in Table IV, the Cronbach's Alpha coefficient for the Teacher Rating Scale was .9767 and .9619 for the Parent Rating Scale.

TABLE IV

TEACHER AND PARENT RATING SCALES: RELIABILITIES, MEANS, AND STANDARD DEVIATIONS

Rating Scales	Cronbach's Alpha Coefficient	Mean	Standard Deviation
Teacher	0.9767	144.6584	31.9663
Parent	0.9619	160.3043	22.6432

Because of the interdependency of raters on the Teacher Rating Scale, cluster analysis (BMDP-1M, 1977) was utilized, while factor analysis (SPSS) (Nie et al., 1975) was executed on the Parent Rating Scale because of the independence of raters. Factor analysis apprised five factors within the Parent Rating Scale as representing the construct of intellectual functioning, while cluster analysis as performed upon the Teacher Rating Scale substantiated the scale as unidimensional. Concurrent validity, as ascertained by the correlation between the Stanford-Binet and Teacher Rating Scale was .43; however, the correlations were negligible between the Parent Rating Scale factors and the Stanford-Binet. As projected by these statistics, the Parent Rating Scale, while it may be considered a reliable instrument in this sample, was not proven to be a valid instrument as a measurement of the construct of intellectual functioning. However, the Teacher Rating Scale maintained respectable correlations with most of the intelligence tests utilized in this study. A paradox exists in that both scales are identical; therefore, it would appear that the perspective of the rater is the pivotal point in determining the usefulness of this subjective rating scale.

Data Collection

Preliminary

The Otis-Lennon Mental Ability Test was administrated school-wide in November, 1982. From this, the sample was identified and solicited for permission to participate in the study. A one-month allowance was given for permission returns and completion of the Parent Rating Scale. With a return rate of 87 percent, no follow-up procedures were deemed necessary.

Teacher Rating Scale

At each of the six elementary schools, the procedures were identical.

An initial teacher staffing was conducted before actual testing occurred. The objectives of these meetings were to elicit the first and second grade teachers' willingness to participate in the research project and to provide them with information regarding the characteristics of high intellectual functioning. An informal discussion outlining the research goals, the schedule of testing times and dates, and the explanation of the Teacher Rating Scale was held with the teachers, counselor, and principal. Several handouts were presented and reviewed in an effort to clarify the construct clusters of high intellectual functioning and behavioral characteristics of the gifted (Appendix H). The teachers were given until April 15 to complete their rating scales. Confidentiality of their responses was assured; special school mailing envelopes were provided. A total of 37 teachers were involved in this project.

Testing Procedures

All individual and group testing at each school site was completed within a four-week period. All testing was completed between February 1 and April 15, 1983. A roster of participating students by school site was prepared; when the sample size per school was about 20, the students were subdivided to ensure smaller numbers for group testing. Of the group measures, the SPM was administered first, followed by the SFTAA and CogAT. One group test was given per week per school site, with the Stanford-Binet individually administered throughout the four-week period. An average of 45 minutes was required in administering each group and individual measure of intelligence, resulting in a total testing time of three hours per student. All group and individual testing was administered by either a school psychometrist or school psychologist, depending upon the school site, except for those who were absent for a group test; these were administered by the school counselor.

The group testing facilities varied between school sites. In two schools, the cafeteria was used for testing, with each student spaced two chairs apart. In two other schools, individual classrooms were utilized, while resource-library rooms were used in the last two schools. Constructed table-top partitions were used to ensure honesty when testing in the library setting.

Data Compilation

Each of the four IQ tests were scored by the examiner, with all results tabulated on individual data cards (Appendix B). This allowed for easy transference onto computer data cards. All derived scores permissible per test were recorded, i.e., standard scores, percent rankings, mental age or grade equivalents, IQ, and stanines.

The SRA Achievement Series is administered school-wide in April of each year. The 1982 SRA subtest scores were previously recorded during the preliminary stage. The 1983 SRA subtest scores were posted on the data cards at the end of May, 1983. Both the Teacher and Parent Rating Scales were summed and item tabulated for factor or cluster analysis in order to ascertain their validity as variables for subsequent statistical analyses.

Analyses of Data

The Teacher Rating Scale was subjected to cluster analysis (BMDP-1M, 1977), while factor analysis (SPSS) (Nie et al., 1975) was applied to the Parent Rating Scale. Reliability coefficients were calculated for both the Teacher and Parent Rating Scales. All variables were analyzed by stepwise multiple regression. Residual analyses and cross-validation procedures were executed. Pearson and/or Spearman correlations were computed between all objective and subjective measures, and between SRA subtests differentiated by IQ levels. Mean standard scores for each SRA subtest differentiated by IQ levels were also calculated. Efficiency and effectiveness ratios were compiled for each group IQ test.

Dissemination of Information

The parents of all participants were informed of their child's testing performance on the Stanford-Binet Intelligence Scale via a form letter (Appendix L). These letters were mailed by April 25, 1983. Individual conferences were held at the parent's request with the school psychologist for further interpretation.

Teachers were allowed to request the results of the group and individual assessment of their students after they had completed their Teacher Rating Scales. This was done to avoid contaminating or prejudicing the teacher's perception of a child prior to completion of the checklist.

A summary of the research conclusions bearing significance in the screening and identification of primary elementary students for the gifted program was conveyed in a written report to the Superintendent of Schools and the Board of Education.

CHAPTER IV

RESULTS

Introduction

The purpose of this chapter is to present the results of the statistical analyses for the seven research questions formulated in this study. The results will be organized around each research question.

The final sample size included 163 first and second grade students; 161 completed pairs of Teacher and Parent Rating Scales were available for analysis; 151 sets of 1982 SRA scores and 159 sets of 1983 SRA scores were accessible of those students selected for this study. Three original students were eliminated from the study because they moved out of the district before test completion. The final distribution of the sample delineated by the participants' achieved IQ as assessed by the Stanford-Binet is tabulated in Table V.

TABLE V

SAMPLE DISTRIBUTION OF STANFORD-BINET IQ SCORES
(N = 163)

S-B <99	S-B 100-109	S-B 110-119	S-B 120-129	S-B 130+
5	35	60	39	24
3.1%	21.5%	37.3%	24.3%	14.9%

The distribution of the research sample delineated by both normal and sample derived means and standard deviations was addressed to investigate the assumption of normality. The Kolmogorov-Smirnov Goodness of Fit Test (SPSS) (Nie et al., 1975) substantiated that by restricting the range of the sample by enforcing a plus one standard deviation cutoff on the OTIS, the resultant sample would in turn be negatively skewed. The sample mean for the dependent variable, S-B, was 117.56 with a 12.45 standard deviation. The calculated K-S z-score of 1.155 signified that the mean of the dependent variable for the sample was at plus one standard deviation. The meaningfulness of this statistic reinforces the idea that all ensuing results and conclusions are only generalizable to similarly defined populations.

By examining Tables VI and VII and the distribution of graphs in Appendix M, it is exemplified that the research sample within itself imposed a normal distribution on the variables S-B, CogAT, and SFTAA, while the SPM was slightly negatively skewed and the OTIS was positively skewed. The SPM skewness was hypothesized for several reasons: (1) the high intercorrelation between nonverbal (SPM) and verbal reasoning (S-B) at the above-average levels of intelligence; (2) errors due to lack of homoscedasticity at the higher levels of IQ; and (3) percentile conversion scores. The OTIS' skewness was likely the result of the imposed cutoff of 115, which created an inflated mean on the OTIS for this sample.

Research Question One

What are the correlations and concurrent validities between the Stanford-Binet Intelligence Scale (S-B) and the Cognitive Abilities Test (CogAT), the Short-Form Test of Academic Aptitude (SFTAA), the Raven's

TABLE VI

SAMPLE DISTRIBUTION PER IQ TEST BASED UPON NORMAL MEANS AND STANDARD DEVIATIONS
(N = 163)

		-1	Prop.	+1	Prop.	+2	Prop.	+3	Prop.
	Expected No.	59		59		20		3	
S-B	Observed No.	5	0.09	70	0.84	68	0.29	20	0.15
	$\bar{X}$ 100 SD 16								
	Expected No.	59		59		20		3	
CogAT	Observed No.	35	0.59	85	0.69	37	0.54	6	0.50
	$\bar{X}$ 100 SD 16								
	Expected No.	59		59		20		3	
SFTAA	Observed No.	21	0.36	80	0.74	48	0.42	14	0.21
	$\bar{X}$ 100 SD 16								
	Expected No.	55		55		23		**	
SPM	Observed No.	14	0.25	38	0.69	111	0.21		
	$\bar{X}$ 100 SD 15								
	Expected No.			137*		20		3	
OTIS	Observed No.			14	0.09	122	0.17	27	0.11
	$\bar{X}$ 100 SD 16								

*Skewed numbers given sample cutoff of 115.

**SPM does not compute scores above 130.

TABLE VII

SAMPLE DISTRIBUTION PER IQ TEST BASED UPON DERIVED SAMPLE MEANS AND STANDARD DEVIATIONS (N = 163)

		-3	Prop.	-2	Prop.	-1	Prop.	+1	Prop.	+2	Prop.	+3	Prop.
S-B	Expected No.	3	0.33	23	0.85	55	0.88	55	0.89	23	0.74	3	0.43
	Observed No.	1		27		62		49		17		7	
	$\bar{X}$ 118 SD 12												
CogAT	Expected No.	3	0.33	23	0.91	55	0.97	55	0.90	23	0.87	3	1.00
	Observed No.	1		21		57		61		20		3	
	$\bar{X}$ 109 SD 12												
SFTAA	Expected No.	3	0.00	23	0.92	55	0.93	55	1.00	23	0.83	3	0.60
	Observed No.	0		25		59		55		19		5	
	$\bar{X}$ 113 SD 12												
SPM	Expected No.	3	0.38	23	0.78	55	0.64	55	0.98	23	0.50	3	
	Observed No.	8		18		35		56		46		*	
	$\bar{X}$ 118 SD 13												
OTIS	Expected No.	3	0.00	23	0.61	55	0.69	55	0.84	23	0.74	3	0.50
	Observed No.	0		14		80		46		17		6	
	$\bar{X}$ 124 SD 8												

*SPM does not compute scores above 130.

Standard Progressive Matrices (SPM), and the Otis-Lennon Mental Abilities Test (OTIS)? Referring to Table VIII, it is evident that the CogAT with a correlation of .67 was the group intelligence test with the highest correlation to the S-B, followed by the SFTAA, OTIS, and SPM, with respective correlations of .54, .44, and .28.

TABLE VIII

CORRELATIONS BETWEEN INDIVIDUAL AND GROUP IQ TESTS*

Scales	S-B	CogAT	SFTAA	SFTAA-L	SFTAA-NL	SPM	OTIS
S-B	1.00						
CogAT	0.67	1.00					
SFTAA	0.54	0.63	1.00				
SFTAA-L	0.56	0.59	0.84	1.00			
SFTAA-NL	0.32	0.46	0.81	0.39	1.00		
SPM	0.28	0.35	0.43	0.26	0.48	1.00	
OTIS	0.44	0.53	0.40	0.36	0.32	0.28	1.00

*All correlations were significant at $\underline{p} < .01$.

Examination of the correlations among the group intelligence scales also explicated that the CogAT had the highest correlation with all other group scales, with the exception of the correlation between the SFTAA and SPM. Logically, the SPM correlated the highest with the SFTAA-NL (nonlanguage subtest), given that both tests are conceptually assessing nonverbal reasoning ability.

The standard score mean and standard deviation of all objective standardized instruments are reported in Table IX. The OTIS obtained the highest mean of 123.6, while the CogAT yielded the lowest, 108.7. All remaining means fluctuated between 110.4 to 118.3.

TABLE IX

MEANS AND STANDARD DEVIATIONS OF STANDARDIZED TESTS

Variable	Mean	Std. Dev.	Cases
S-B	117.56	12.45	163
CogAT	108.65	11.87	163
SFTAA	113.01	11.67	163
SFTAA-L	110.37	11.42	163
SFTAA-NL	113.37	13.08	163
SPM	118.14	13.08	163
OTIS	123.62	7.70	163
SRAIC*	114.95	13.13	151
SRAIR	115.09	12.42	151
SRAIM	113.61	13.79	151
SRA2C**	118.10	12.19	159
SRA2R	114.80	12.69	159
SRA2M	118.30	10.99	159

*1982 SRA scores.

**1983 SRA scores.

Research Question Two

What is the predictive linear combination of the objective and subjective measures in estimating Stanford-Binet IQs? By utilizing stepwise multiple regression analysis (Nie et al., 1975), three independent variables were extracted as being significant with a probability level less than .001. The variables were the CogAT, Teacher Rating Scale (TSCALE), and the Short-Form Test of Academic Aptitude, Language subtotal (SFTAA-L).

Referring to Table X, it is ascertained that the multiple R increased from .67 to .74 with the addition of the TSCALE and SFTAA-L variables, culminating in 55 percent variance of the dependent variable, S-B, being accounted for by the linear combination of these three variables: CogAT, TSCALE, and SFTAA-L. These variables' respective beta's, part and partial correlations are documented in Table XI. The F-test of the three beta's were significant at $p < .001$, signifying that this sample was not likely drawn from a population in which the multiple correlation was zero (as reported in Table XII). The regression formula was as follows:

$$Y' = 20.1914 + (0.44526*CogAT + 0.11298*TSCALE + 0.30087*SFTAA\text{-}L)$$

The CogAT accounted for 45 percent of the predicted variance, with the TSCALE and the SFTAA-L each contributing an additional 5 percent. Standardized scatterplot, probability plot, and residual analyses (Table XIII) validated all underlying assumptions of linearity, homogeneity of variance, homoscedasticity, and normality, and affirmed that the statistical design was appropriate and goodness of fit was maximized for the dependent variable.

Given a casewise plot of standardized residuals, ten outliers were identified within a ±1.5 standard deviation. Eight of these ten outliers were due to underestimating by the predicted criterion. These eight cases obtained S-B IQs above 122, with the underestimated discrepancy ranging between 14 to 22 points. The two extreme overestimations were of cases with IQs within the average range of intelligence.

The standardized residuals in the casewise plot revealed that the standardized residuals fell between the boundaries of ±1.5 standard deviations, except for the prementioned ten outliers. Positively and

TABLE X

MULTIPLE REGRESSION SUMMARY TABLE PREDICTING STANFORD-BINET IQS

Step	MR	R^2	Adj. R^2	F	Signif. Level	R^2 Change	Variable IN	BETA IN	Corr
1	0.6700	0.4489	0.4451	118.922	0.000	0.4489	CogAT	0.6700	0.67
2	0.7066	0.4993	0.4924	72.293	0.000	0.0504	TSCALE	0.2375	0.43
3	0.7409	0.5489	0.5395	58.415	0.000	0.0497	SFTAA-L	0.2761	0.56

TABLE XI

STATISTICS ON THE VARIABLES IN THE MULTIPLE REGRESSION EQUATION

Variable	b	SE_b	BETA	SE_b	CORR	Part CORR	Partial CORR	T
CogAT	0.4453	0.0762	0.4246	0.0727	0.6700	0.3270	0.4378	5.843
TSCALE	0.1130	0.0264	0.2541	0.0594	0.4313	0.2396	0.3359	4.279
SFTAA-L	0.3009	0.0756	0.2761	0.0693	0.5609	0.2229	0.3150	3.981
Constant	20.1914	7.5995	---	---	---	---	---	2.657

TABLE XII

ANALYSIS OF VARIANCE OF REGRESSION EQUATION

	DF	SS	MS	F	Signif.
Regression	3	12503.64	4167.88	58.42	0.0001
Residual	144	10274.28	71.35	---	---

TABLE XIII

RESIDUAL ANALYSES STATISTICS

	Min.	Max.	Mean	Std. Dev.	N
*PRED	90.1923	148.9215	117.5910	9.2343	162
*ZPRED	-2.9672	3.4006	0.0035	1.0013	162
*SEPRED	0.7087	2.5697	1.3366	0.3814	162
*ADJPRED	89.4296	148.6075	117.5782	9.2208	162
*MAHAL	0.0417	12.6116	2.9850	2.3449	162
*COOK D	0.0000	0.1038	0.0079	0.0137	162
*RESID	-16.1826	22.8920	0.0325	8.3784	162
*ZRESID	-1.9158	2.7101	0.0038	0.9919	162
*SRESID	-1.9827	2.7818	0.0046	1.0072	162
*DRESID	-17.3325	24.1198	0.0453	8.6397	162
*SDRESID	-2.0034	2.8498	0.0058	1.0132	162

negatively signed residuals were of equal frequency. Analysis substantiated that the regression equation tended to underestimate IQs within the superior range of intelligence (>130). The normal probalility plot evidenced no dramatic departure from normality. The plot of the predicted values versus the residuals verified no clear model inadequacies.

By inspecting the casewise plot, calculation of the prediction accuracy of the regression equation in estimating S-B IQ was feasible. Table XIV itemizes the prediction accuracy within each specified IQ range. The highest degree of preciseness was achieved within the 110 to 119 IQ range, affirming that the regression formula was able to estimate S-B IQs with 66 percent accuracy. The regression formula tended to overestimate IQs within the 100 to 109 IQ range while underestimating IQs at the 120 to 129 IQ range. At the 130 IQ level, a 50-50 chance existed in accurately predicting within the S-B IQ range.

Shrinkage is the tendency of a prediction equation to become less accurate when applied toward a different group, thus exhibiting poorer generalizability. Cross-validation is a procedure by which the researcher can estimate the amount of loss expected in generalizability due to the shrinkage factor. The jack-knife procedure randomly divides a sample into two subgroups and calculates the correlation between the predicted criterion and the observed criterion of the calibrated sample. The difference between the R^2 of the initial sample (screening) and the calibrated sample is the estimate of the shrinkage and therefore the future prediction quality of the regression equation (Pedhazur, 1982).

Cross-validation, utilizing the jack-knife procedure, was computed to ascertain the amount of shrinkage and thus the overall generalizability of the prediction equation. A calibration sample of 80 was extracted.

TABLE XIV

PREDICTION ACCURACY OF STANFORD-BINET IQS BY THE REGRESSION EQUATION DIFFERENTIATED BY IQ LEVELS

Stanford-Binet IQ Range	N of Cases	Actual Predicted Range	Predicted Accuracy
130 or Above	12/24	Above 130	50.0%
	12/24	Below 130	50.0%
120-129	14/39	Between -29	10.3%
	5/39	Above 130	12.8%
	20/39	Below 120	51.3%
110-119	40/60	Between -19	66.7%
	12/60	Above 119	20.0%
	8/60	Below 110	13.3%
100-109	14/34	Between -09	41.2%
	19/34	Above 109	55.9%
	1/34	Below 100	2.9%
< 99	2/5	Below 100	40.0%
	3/5	Above 100	60.0%

The resultant correlations between the predicted S-B and the original S-B with the three independent variables are tabulated in Table XV, while the statistics for the original calibration sample are reported in Table XVI.

The difference between the original R^2 derived from the total sample and the calibrated R^2 is an estimate of the amount of shrinkage (Pedhazur, 1982). In this instance, the estimated shrinkage was .1376. The calibrated R^2 (.4123) divided by the original R^2 (.5489) established the loss in generalizability to another population due to this shrinkage. Due to the uniqueness inherent in the present sample, a 25 percent loss can be expected in generalizing to another sample population. The inclusion of a subjective measurement variable in the regression equation was likely the causative agent in the high degree of loss in generalizability.

This contention was substantiated by eliminating the subjective measure (TSCALE) as a variable and replicating stepwise multiple regression analysis and cross-validation based upon the newly derived b weights. Again, three independent variables were extracted: CogAT (b = 0.46427), SFTAA-L (b = 0.29212), and SRA2R (b = 0.13983). The R^2 increased from .4489 to .4916 to .5069. The statistical data of the multiple regression formulas without TSCALE entry are contained in Appendix N, Tables XXXVI through XXXIX. A calibration sample of 85 was utilized for cross-validation. A calibrated R^2 of .5088 was calculated, exhibiting no shrinkage or loss in generalizability. Even with this stability, however, only 50 percent variance of the S-B IQ can be accounted for by the combination of the three variables.

TABLE XV

CORRELATIONS BETWEEN THE CALIBRATION SAMPLE AND INDEPENDENT VARIABLES

	CogAT	TSCALE	SFTAA-L	Sample
PREDSB*	0.90	0.43	0.75	Calibration
S-B	0.67	0.43	0.56	Screening

*Predicted Stanford-Binet Score.

TABLE XVI

STATISTICS OF THE ORIGINAL CALIBRATION SAMPLE

Statistics	Variable S-B	Variable Resid-ual Square
Mean	118.025	80.372
Variance	136.759	11193.912
Range	63.000	524.068
Sum	9442.000	6349.384
Standard Error	1.307	11.904
Kurtosis	1.601	5.628
Standard Deviation	11.694	105.801
Skewness	0.919	2.244
Number	80	79

Research Question Three

What are the effectiveness ratios of the four group IQ tests in estimating the Stanford-Binet IQ scores? Referring to Tables XVII through XIX, the effectiveness estimates of the group intelligence scales in comparison to the IQs derived from the Stanford-Binet are tabulated from several reference points: ±0.5 and ±1.0 standard deviations and within IQ categories. Effectiveness ratios are computed by dividing the number of correctly identified cases by the total number of confirmed cases within a specified range. Table XVII displays the numerical breakdown of the effectiveness of each group IQ test in estimating the Stanford-Binet IQ within the appropriate IQ range.

All group IQ scales demonstrated less than 44 percent effectiveness in predicting within specified IQ ranges. The only exception was the SPM; this was likely attributable to errors in homoscedasticity. The variance of errors at all values should be constant. However, when this variance fluctuates, a violation in the property of homoscedasticity exists. By examining the SPM scattergram (Appendix O) and sample distribution graph (Appendix M), a negatively skewed distribution is evident. This is interpreted to mean that given the characteristics within this sample, proportionately larger number of participants achieved scores within the +2 and +3 standard deviation range than would be expected in the population at large. This is due to either the restriction in range of the sample or error in measurement (reliability) of the variable (SPM). The scores derived from the SPM were proportionately clustered above standard scores of 120. With 60.7 percent of the SPM scores occurring at this level, test discrimination may be moderately impaired, as confirmed by the minimal effective ratio of the SPM in

TABLE XVII

EFFECTIVENESS OF GROUP IQ TESTS IN PREDICTING WITHIN STANFORD-BINET IQ RANGES

Test	S-B <99 (%)	S-B 100-109 (%)	S-B 110-119 (%)	S-B 120-129 (%)	S-B 130> (%)
OTIS	n/a*	n/a*	41.7	43.6	33.5
SFTAA	60.0	40.0	43.3	20.5	33.5
CogAT	80.0	40.0	25.0	20.5	20.8
SPM	20.0	14.3	21.7	64.1	58.3

*Given 115 sample cutoff.

TABLE XVIII

EFFECTIVENESS OF GROUP IQ TESTS IN PREDICTING STANFORD-BINET IQ SCORES WITHIN ±0.5 STANDARD DEVIATION (±7 POINTS)

Test	S-B <99 (%)	S-B 100-109 (%)	S-B 110-119 (%)	S-B 120-129 (%)	S-B 130> (%)
OTIS	n/a	n/a	63.3	56.4	16.7
SFTAA	40.0	60.0	50.0	43.6	16.7
CogAT	80.0	51.4	40.0	28.2	25.0
SPM	20.0	20.0	36.7	74.4	25.0*

*Percent may be misleading given that the highest derived standard score is 130.

TABLE XIX

EFFECTIVENESS OF GROUP IQ TESTS IN PREDICTING STANFORD-BINET IQ SCORES WITHIN ±1.0 STANDARD DEVIATION (±15 POINTS)

Test	S-B <99 (%)	S-B 100-109 (%)	S-B 110-119 (%)	S-B 120-129 (%)	S-B 130> (%)
OTIS	n/a	45.5*	83.3	94.9	87.5
SFTAA	100.0	100.0	88.3	74.4	54.2
CogAT	100.0	90.9	85.0	69.2	62.5
SPM	40.0	45.5	78.0	79.5	66.7

*Percent may be misleading given sample cutoff.

TABLE XX

EFFICIENCY OF GROUP IQ TESTS IN PREDICTING WITHIN STANFORD-BINET IQ RANGES

Test	S-B <99 (%)	S-B 100-109 (%)	S-B 110-119 (%)	S-B 120-129 (%)	S-B 130> (%)
OTIS	n/a	n/a	15.3	10.4	4.9
SFTAA	1.8	8.6	15.9	4.9	4.9
CogAT	2.6	8.6	9.2	4.9	3.1
SPM	0.6	3.1	8.0	15.3	8.6

identifying accurately within the lower IQ levels. Both the OTIS and the SFTAA differentiated 33.5 percent of the cases above 130 IQ.

Referring to Table XVIII, the effectiveness of the group IQ tests in predicting Stanford-Binet IQs within ±0.5 standard deviations (plus or minus seven points) yielded moderate accuracy within all IQ ranges, except for those above 130 IQ. The OTIS and SPM proved more accurate in estimating IQ scores between 120 to 129, while the SFTAA and CogAT were more precise between IQs of 100 to 109. Both the OTIS and the SFTAA were only able to predict IQ scores within plus or minus seven points of the 130 IQ category with 16.7 percent effectiveness, while the CogAT predicted 25 percent.

Given the allowance of plus or minus one standard deviation (±15 points), effectiveness of group IQ tests increased in like proportion. All group tests were able to predict IQs above 130 with at least 50 percent accuracy, with the OTIS achieving 87.5 percent effectiveness. However, given this large of an error band, effectiveness decreased as IQ increased, as illustrated in Table XIX.

Efficiency is the ratio of the correctly identified cases divided by the total sample. With a sample of 163, efficiency percentages were calculated for each specified IQ range and are reported in Table XX. Screening matrices using a cutoff of 115 on the OTIS would likely be quite inefficient in terms of cost and time in locating students with Stanford-Binet IQs of 130 and above. At best, an 8.6 percent efficiency was attained by using the SPM.

Table XXI is an interesting compilation showing the IQ cutoffs on the group tests which are necessary to include all identified students with Stanford-Binet IQs of 130 or above. An arbitrary cutoff of 125 would exclude half of these students if using the SFTAA or the CogAT as a screening instrument. A basal of 100 or 105 was designated essential in order to obtain 100 percent accuracy in using group IQ tests in screening matrices. For example, in the sample, a screening cutoff of 120 on the OTIS would exclude 21 percent of the identified students with Stanford-Binet IQs of 130 or above, 34 percent with the SFTAA, and 42 percent with the CogAT. However, only 12 percent would be eliminated with the SPM at a 120 cutoff.

TABLE XXI

CUTOFF POINT PERCENTAGES INCLUSIVE OF STUDENTS WITH STANFORD-BINET IQS 130 OR ABOVE (N = 24)

	100	105	110	115	120	125	130	135	140	145
OTIS				100.0*	79.2	58.3	33.3	16.7	16.7	16.7
SFTAA		100.0	95.8	83.3	66.7	50.0	33.3	12.5	8.3	4.2
CogAT		100.0	87.5	79.2	58.3	50.0	20.8	8.3	8.3	4.2
SPM	100%	95.8	91.7	87.5	87.5	75.0	58.3			

*Percent may be misleading given sample cutoff.

By inspecting Table XXII, the OTIS is revealed to overestimate Stanford-Binet IQs across all IQ levels 70 percent of the time; the SPM followed with a 51 percent tendency to overestimate. Within the critical IQ range of 120 to 129, all group IQ tests tended to underestimate Stanford-Binet IQs, with the OTIS being closer to the 50 percent level. Within the 110 to 119 IQ range, the OTIS and the SPM overestimated 89.8 percent

TABLE XXII

OVERESTIMATION AND UNDERESTIMATION OF GROUP IQ TESTS
BASED UPON STANFORD-BINET IQS

Test	Total Sample		S-B 130>		S-B 120-129		S-B 110-119	
	Overest.	Underest.	Overest.	Underest.	Overest.	Underest.	Overest.	Underest.
OTIS	70.4	29.6	4.2	95.8	47.2	52.8	89.8	10.2
SFTAA	31.3	68.7	4.2	95.8	17.9	82.1	35.0	65.0
CogAT	18.8	81.2	0.0	100.	12.8	87.2	17.2	82.8
SPM	51.3	48.7	0.0	100.	31.6	68.4	70.0	30.0

and 70 percent of the cases, respectively. The actual scattergrams exemplifying the distribution of each group IQ test with the Stanford-Binet IQs are included in Appendix O.

Research Questions Four and Five

What are the correlations between teacher and parent ratings using the subjective rating scale (Behavioral Checklist of Intellectual Functioning), and group and individual IQ indices and their effectiveness in identifying high intelligence? Before addressing the correlation studies, statistical analysis had to be applied to the Teacher and Parent Rating Scales themselves in order to ascertain their reliability and validity as variables. Both the rating scales' reliability coefficients for this sample are reported in Table IV, while Table XXVI tabulates their respective correlations with the IQ scales. The meaningfulness of these data was discussed in Chapter III.

Because of the interdependency of raters on the Teacher Rating Scale, cluster analysis (BMDP-1M, 1977) was utilized to either identify subclusters or to validate the scale as an unidimensional construct of intellectual functioning. Given that there were 37 teachers in this project, one participant was randomly selected for each teacher as subjects in the cluster analysis. These 37 scales were subjected to clustering by the minimal distance method, producing a correlation matrix, variable cluster tree, and absolute values of the correlations in sorted and shaded form for delineation of subclusters (Appendix P). The results of these procedures produced no discernible clusters, thus validating the scale--at least as perceived by the teacher sample in this project--as representing an unidimensional construct of intellectual functioning.

Given the independence of raters on the Parent Rating Scale, factor analysis (SPSS) (Nie et al., 1975) was applied to ascertain its dimensional characteristics. The 40-item scale was subjected to principal component factoring with iteration and varimax rotation, which resulted in five eigenvalues above 1.0 being extracted, as illustrated in Table XXIII.

TABLE XXIII

EIGENVALUES & PROPORTIONS OF VARIANCE AFTER VARIMAX ROTATION FOR THE PARENT RATING SCALE

	F1	F2	F3	F4	F5
Eigenvalues	16.09	1.95	1.33	1.12	1.04
Proportion of:					
Factor Variance	74.7	9.0	6.2	5.2	4.8
Total Variance	41.3	47.3	51.7	55.7	59.4

Table XXIV addresses the item loadings comprising each factor for the Parent Rating Scale. All items attaining loadings above 40 were utilized in eliciting factor labels. Based upon the original hypothesized clusters which were used to generate the rating scale (Behavioral Checklist of Intellectual Functioning), factor labeling was accomplished. The factors were labeled as follows:

TABLE XXIV

ITEMS AND THEIR RESPECTIVE LOADINGS (>.40) FOR FIVE-FACTOR SOLUTION FOR THE PARENT RATING SCALE

Factor 1		Factor 2		Factor 3		Factor 4		Factor 5	
Items	Loadings	Items	Loadings	Items	Loadings	Items	Loadings	Items	Loadings
08	.4239	01	.6352	10	.5049	02	.5280	05	.4744
21	.4235	03	.5629	23	.5424	11	.4354	13	.5996
22	.5413	04	.6561	24	.6123	14	.6338	15	.4007
29	.6492	05	.4553	26	.5096	15	.4059	20	.6354
30	.4713	07	.6640	28	.5283	17	.6113	21	.4063
33	.6607	08	.5001	31	.4806	18	.4182	32	.5939
34	.6529	09	.6647	35	.4037	26	.5188	--	--
35	.6421	16	.4902	40	.4427	27	.6024	--	--
36	.7377	28	.4611	--	--	--	--	--	--
37	.7163	--	--	--	--	--	--	--	--
39	.6037	--	--	--	--	--	--	--	--

Factor 1--Abstract Reasoning, Problem-Solving Ability

Factor 2--Perceptiveness and Memory

Factor 3--Persistence and Independence

Factor 4--Originality and Proficiency

Factor 5--Accelerated Learning Ability.

Therefore, for all subsequent statistical procedures, the sum total from the Teacher Rating Scale was used as a single variable, while the five factor scores derived from the Parent Rating Scale were used as five additional variables. The intercorrelation matrices for both scales are presented in Appendices P and Q, while the correlations between the proposed hypothetical clusters (Appendix G) and the actual clustering for the Parent and Teacher Rating Scales are reported in Appendices R and S, respectively.

By referring to Table XXV, it is apparent that essentially no intercorrelation existed between the rating scales as complated by the parents and teachers in this study. Therefore, it would not be surprising that if the Teacher Rating Scale exhibited low correlations with academic and/or IQ indices, then the Parent Rating Scale would demonstrate negligible correlations. As exemplified in Tables XXVI and XXVII, the Teacher Rating Scale fluctuated between .18 and .43 with IQ indices and between .16 and .50 with SRA scores, while the Parent Rating Scale was inconsequential.

Due to these weak correlations between the ratings by the teachers and parents, cross-validation procedures based solely on these two variables became statistically unsound and thus were not performed. However, it should be reiterated that the teachers' ratings correlated as well as the OTIS, SPM, and SFTAA-NL with the Stanford-Binet, thus affording its inclusion in the multiple regression formula.

TABLE XXV

INTERCORRELATIONS BETWEEN TEACHER AND PARENT RATING SCALES

Scales	Teacher	Parent F1	F2	F3	F4	F5
Teacher	1.00					
Parent						
Factor 1	.09	1.00				
Factor 2	.02	.04	1.00			
Factor 3	.17	.04	.06	1.00		
Factor 4	.07	.08	.04	.07	1.00	
Factor 5	.19	.04	.09	.07	.04	1.00

TABLE XXVI

CORRELATIONS BETWEEN TEACHER AND PARENT RATING SCALES AND IQ INDICES

Scales	S-B	OTIS	SFTAA	CogAT	SPM
Teacher	0.43*	0.33*	0.26*	0.33*	0.18**
Parent					
Factor 1	0.12	0.01	0.14	0.14	0.04
Factor 2	0.07	0.04	0.11	0.07	0.08
Factor 3	0.02	0.10	-0.11	0.08	0.08
Factor 4	0.14	0.12	0.15	0.23*	0.03
Factor 5	0.12	0.24*	0.07	0.23*	0.24*

*Statistically significant $\underline{p} = < .01$.
**Statistically significant $\underline{p} = < .05$.

TABLE XXVII

CORRELATIONS BETWEEN TEACHER AND PARENT RATING SCALES AND SRA ACHIEVEMENT SUBTESTS

Scales	SRA1: 1981-1982			SRA2: 1982-1983		
	Composite	Reading	Math	Composite	Reading	Math
Teacher Sum	0.31*	0.40*	0.16**	0.48*	0.50*	0.37*
Parent Sum	0.28*	0.19**	0.29*	0.28*	0.29*	0.23*
Factor 1	0.14	0.10	0.13	-0.02	0.04	-0.09
Factor 2	0.04	-0.06	0.13	0.09	0.05	0.11
Factor 3	0.22*	0.13	0.24*	0.26*	0.20*	0.25*
Factor 4	0.05	0.05	-0.02	0.11	0.15	0.15
Factor 5	0.30*	0.30*	0.29*	0.36*	0.35*	0.26*

*Statistically significant $\underline{p} = < .01$.
**Statistically significant $\underline{p} = < .05$.

Research Question Six

What are the correlations between SRA achievement subtest scores and IQ indices? The correlations among SRA Composite, Reading, and Math scores over a one-year period varied from .44 to .64, a moderate fluctuation given that the SRA series which were administered for grades one and two were identical. SRA Reading scores between 1982 and 1983 were correlated at .60, while Composite and Math correlated .64 and .57, respectively. The intercorrelation between subtests remained comparatively stable from one year to the next.

As referenced in Table XXVIII, the correlations between IQ tests and the SRA achievement subtests tended to decrease between 1982 and 1983, with the exception of a mild increase between SPM and SRA Math. Of all the IQ tests, the CogAT correlated the highest with all SRA scores, averaging .50. Both 1982 and 1983 SRA Composite scores correlated the lowest with the SPM and the OTIS, and the highest with the CogAT; SRA Reading scores correlated the lowest with the SPM and the highest with the CogAT. SRA Math scores correlated the lowest with the Stanford-Binet and the highest with the CogAT.

Research Question Seven

What are the mean standard score differences between SRA achievement subtests over a one-year period which would differentiate IQ levels and validate SRA reliability? Table XXIX, which itemizes the mean standard scores for each SRA subtest differentiated by IQ levels, substantiated logical increments in mean scores with each ascending level in IQ. In addition, most subtests' means, across all IQ levels, increased between 1982 and 1983, with the exception of Reading, whose mean decreased

TABLE XXVIII

CORRELATIONS BETWEEN SRA ACHIEVEMENT SUBTESTS AND IQ INDICES

Test	SRA1C*	SRA1R	SRA1M	SRA2C**	SRA2R	SRA2M	SB	Cog AT	SFTAA	SPM	OTIS
SRA1C	1.00						.42	.59	.46	.33	.40
SRA1R	.84	1.00					.44	.54	.37	.29	.37
SRA1M	.89	.57	1.00				.30	.50	.42	.30	.35
SRA2C	.64	.62	.56	1.00			.40	.50	.37	.37	.35
SRA2R	.57	.60	.44	.88	1.00		.42	.49	.32	.29	.31
SRA2M	.54	.51	.51	.84	.60	1.00	.33	.43	.39	.37	.35

*1981-1982 scores.

**1982-1983 scores.

four points within the 130 or above IQ range and two points within the 100 to 109 IQ range. Scattergrams of the 1982 and 1983 SRA subtests differentiated by IQ levels are included in Appendix T.

TABLE XXIX

MEAN STANDARD SCORES OF 1982 AND 1983 SRA ACHIEVEMENT SUBTESTS DIFFERENTIATED BY STANFORD-BINET IQ LEVELS

SRA Subtests		IQ Levels				
		100-109	110-119	120-129	130>	All
Composite	1*	110.62	113.16	118.09	124.82	114.95
	2**	111.49	119.11	120.66	124.54	118.10
Reading	1	110.18	113.81	117.19	125.50	115.09
		108.43	115.32	118.34	121.08	114.80
Math	1	110.21	112.48	116.53	120.64	113.61
	2	112.94	118.53	119.61	125.00	118.30

*1982 SRA.

**1983 SRA.

Although not a statistically reliable measure, the mean difference in standard scores between SRA subtests across all IQ levels was calculated for perusal. On the average, a difference of 8 to 11 standard score intervals was sustained as a normal disparity between one year and the next at all IQ levels, as illustrated in Table XXX. The corresponding percentile rankings to these standard scores, however, will vacillate markedly depending upon the IQ range. For example, a plus or minus nine point standard score discrepancy within the 130 or above IQ range would entail a maximum nine percentile point spread (91 to 99+%), while the same plus or minus nine point standard score disparity within the 100 to 109 IQ range would denote a maximum 46 percentile point margin (27 to 73%).

TABLE XXX

MEAN DIFFERENCE BETWEEN 1982 AND 1983 SRA ACHIEVEMENT SUBTESTS ACROSS STANFORD-BINET IQ LEVELS

SRA	100-109	110-119	129-129	130>	All
Composite	9.29	9.89	8.06	8.50	8.97
Reading	10.09	9.26	8.03	8.91	9.08
Math	11.82	11.07	10.41	9.23	10.97

In reference to Table XXXI, it becomes apparent that the correlations between kindergarten and first grade or first and second grade become more positive as IQ increases. The lowest correlation between 1982 and 1983 SRA subtests was observed within the 100 to 109 IQ range with SRA Math. The highest correlation was within the 130 or above IQ range with SRA Reading. However, all the 1982-1983 correlations were substantially lower than the test-retest reliability coefficients reported in the SRA manual (SRA, 1978a). Overall caution must be employed in utilizing percentile rankings as entry criteria in special programs, especially if the final criterion is a S-B IQ score.

TABLE XXXI

CORRELATIONS BETWEEN 1982 AND 1983 SRA ACHIEVEMENT SUBTESTS DIFFERENTIATED BY STANFORD-BINET IQ LEVELS*

SRA	100-109	110-119	120-129	130	All
Composite	0.50	0.56	0.66	0.67	0.64
Reading	0.46	0.49	0.59	0.68	0.60
Math	0.34	0.56	0.50	0.45	0.51

*All correlations are significant $p < .001$.

By surveying Tables XXXII and XXXIII, prudence in the utilization of SRA scores is exhibited. Taking the 1983 SRA sample only, 46 percent of the intellectually gifted--as assessed by the Stanford-Binet--did not achieve the 97th percentile in their Composite or Math scores and 67 percent did not in Reading. Of the sample taken as a whole, more participants achieved at the 97th percentile in the area of math than reading. In addition, 31 percent within the 120 to 129 IQ range obtained Composite scores at or above the 97th percentile, while 26 and 11 percent within the 110 to 119 and 100-109 IQ ranges, respectively, performed at the 97th percentile.

Of those students within the 130 IQ range who obtained a 97th percentile in Composite scores, only 31 percent matched that performance for two consecutive years. Given the allowance of achievement at the 97th percentile in any subtest combination for two consecutive years, still only 41 percent within the 130 IQ range procured these criteria.

TABLE XXXII

PERCENT ACHIEVING AT THE 97TH PERCENTILE ON SRA ACHIEVEMENT SUBTESTS DIFFERENTIATED BY STANFORD-BINET IQ LEVELS

	SRA Achievement Subtests					
S-B IQ	Comp 1*	Reading 1	Math 1	Comp 2**	Reading 2	Math 2
100-109	5.9	5.9	11.8	11.4	5.7	11.4
110-119	13.8	10.3	19.0	26.3	14.0	28.1
120-129	25.0	15.6	31.3	31.6	18.4	26.3
130>	37.5	50.0	27.3	54.2	33.3	54.2

*1982 SRA scores.

**1983 SRA scores.

TABLE XXXIII

PERCENT ACHIEVING AT THE 97TH PERCENTILE ON SRA ACHIEVEMENT SUBTESTS FOR TWO CONSECUTIVE YEARS

S-B	Composite	Reading	Math	Any Combination
100-109	2.9	2.9	5.9	11.8
110-119	9.1	1.8	9.1	18.2
120-129	18.8	6.3	12.5	28.1
130>	31.8	22.7	22.7	40.9

CHAPTER V

SUMMARY AND CONCLUSIONS

The conclusions drawn from the statistical results, the limitations of the study, and the recommendations and implications for public school screening models of gifted education are focused upon in this chapter.

Conclusions

Within the limits and findings of the present study, the following conclusions are drawn for each hypothesis.

Hypothesis One: There is no statistically significant relationship between IQ indices on the CogAT, SFTAA, OTIS, SPM, and the IQ derived from the Stanford-Binet.

Each group IQ measure demonstrated a statistically significant positive correlation ($p < .01$) with the Stanford-Binet but to varying degrees. It was determined that the CogAT exhibited the highest correlation with the S-B; 45 percent of the variance in the S-B IQ performance could be accounted for by the CogAT. It can be inferred that the similarity in assessed performance between the CogAT and S-B have a .67 correlation for this sample population. The CogAT simulated the S-B more effectively than did the other group IQ tests for the total sample, however, it also consistently underestimated the S-B across all IQ ranges.

While the SPM for this sample only demonstrated a .28 correlation with the S-B, it did maintain the closest overall mean standard score of

118 with the S-B. The resultant correlation between the SPM & S-B was likely a depressed estimate of its potential relationship for several reasons:

1) the restricted ceiling imposed upon the SPM by its limited conversion data;

2) the study's restriction placed upon the range of the sample;

3) the high intercorrelations which existed between the independent variables.

The SPM exhibited the highest efficiency and effectiveness ratios in predicting S-B IQs above 120.

The SFTAA correlated .54 with the S-B, which infers that 29% variance in the S-B IQ scores can be accounted for by the SFTAA, while the OTIS shared 19% variance with the S-B IQ scores. The mean standard scores for the SFTAA and the OTIS were 113 & 124, respectively. This would infer that the OTIS tended to overestimate S-B IQs, while the SFTAA would more likely to underestimate S-B IQs across all ranges.

The CogAT showed the highest intercorrelation with the SFTAA (.63), and a .53 correlation with the OTIS, while the SPM correlated .43 with the SFTAA. Given that one of the primary objectives for the study was to extract a linear predictive regression formula estimating S-B IQs, by using highly intercorrelated independent variables, the resultant multiple correlation was inadvertently depressed.

Hypothesis Two and Three: (2) There is no statistically significant relationship between IQ scores yielded by the Stanford-Binet and a linear combination of IQ scores on the CogAT, SFTAA, OTIS, and SPM. (3) There is no statistically significant relationship between IQ scores yielded by the Stanford-Binet and a linear combination of IQ scores from the group measures and the parent and teacher ratings on the Behavioral Checklist of Intellectual Functioning.

The research ascertained that a statistically significant ($p < .001$) linear combination predictive of S-B IQ indices did exist with CogAT, SFTAA-L, and TSCALE variables. This combination of variables accounted for 55 percent of the variance in the S-B. However, with the inclusion of a subjective measurement variable (TSCALE), both its predictive validity and generalizability were substantially depressed; whereas the contrived linear combination (forced deletion of the TSCALE variable) which extracted the variables of CogAT, SFTAA-L, and SRA2R, accounted for 51 percent of the variance in the S-B and demonstrated a substantial degree of generalizability.

The original linear equation tended to underestimate actual S-B IQs above 120 and to overestimate IQs within the 100 to 109 IQ range. The highest degree of preciseness was attained within the 110 to 119 IQ range, yielding 60 percent predictive accuracy.

When evaluating the group IQ tests' effectiveness in estimating the S-B IQ within a specified range, the SPM surpassed the others in predicting IQs above 120. However, this conclusion must be dampened by the fact that the SPM violated the assumption of homoscedasticity at these higher IQ levels possibly due to its restricted ceiling of 130. Conversely, the SPM would be the most efficient group IQ test for screening purposes.

All group IQ tests were less effective (<25%) in estimating S-B IQ scores within the plus or minus seven points allowance at the above 130 IQ level; however, as the IQ levels descended, the predictability accuracy of group IQ tests increased. The OTIS and the SPM proved to be the most precise group IQ measures in estimating IQs within the 120 to 129

IQ range, given the plus or minus seven points allowance. All group IQ tests were able to predict IQs above 130 with at least 50 percent accuracy, given a plus or minus 15 points allowance.

To include all identified participants in this study with achieved S-B IQs of 130 and above, it would be necessary to utilize a screening cutoff of 100 on the SPM and a 105 on the CogAT and the SFTAA. To include at least 75 percent of these identified participants, a cutoff of 115 on all group IQ tests would be necessary. A screening matrix enforcing a cutoff point of 120 on group IQ measures would be excluding at most 42 percent of the identified intellectually gifted students in the study by using the CogAT but only 12 percent by using the SPM as a screening instrument.

Before selecting the group IQ test with the greatest utility, one additional set of statistical data needs to be appraised. For the total sample, the OTIS and the SPM overestimated 70 to 51 percent of the S-B IQs, respectively, while the CogAT underestimated 81 percent of the S-B IQs. Within the 120-129 IQ level, a critical range when attempting to discern IQs by group measurement, the OTIS incurred a 50-50 chance of overestimating S-B IQs, while the other group tests were more likely to underestimate.

Given that an ideal screening matrix for the intellectually gifted would logically incorporate a group IQ test which was reliable, valid, economical and expedient in use, synthesis of all statistical data would infer that the SPM is the most effective and efficient group screening instrument available for at least the first and second grade public school population.

Hypothesis Four: There is no statistically significant relationship between parent ratings on the Behavioral Checklist of Intellectual Functioning and group and/or individual IQ indices.

No significant relationships or consequential correlations were found between the Parent Rating Scale and group or individual IQ indices. However, factors three and five of the Parent Rating Scale did register correlations above .25 with the SRA achievement subtests. Factor three (persistence/independence) and factor five (accelerated learning ability), at least as perceived by the parents, contained items which were more sensitive to or analogous with academic aptitude and performance than cognitive functioning as assessed by group or individual IQ measures. It can be surmised that parents tend to perceive behaviors characteristics of high academic performance, motivation, tenacity, and independence as concomitants of high cognitive ability. However, a germane factor contributing to this premise was that the parents were not afford inservice training on the utilization of the rating scale as were the teachers.

Hypothesis Five: There is no statistically significant relationship between teacher ratings on the Behavioral Checklist of Intellectual Functioning and group and/or individual IQ indices.

All correlations between the Teacher Rating Scale and group individual IQ tests were statistically significant ($p < .01$). Correlations varied .18 to .43. The Teacher Rating Scale, as ascertained by cluster analysis, was verified as an unidimensional scale of the construct of intellectual functioning and had a higher correlation with the Stanford-Binet. It can be concluded that items in the scale, as perceived by the teachers in this study, were more analogous to the Stanford-Binet than any group IQ tests. However, the Teacher Rating Scale correlated higher with the SRA achievement subtests than it did with the group IQ measures. This finding would infer that a proportion of the rating scale items were also perceived by the teachers as being more representative of academic aptitude and performance than cognitive functioning.

Hypothesis Six: There is no statistically significant difference between teacher's and parent's ability in identifying high intellectual functioning as assessed by ratings on the Behavioral Checklist of Intellectual Functioning against the set criteria on the Stanford-Binet Intelligence Scale.

The Teacher Rating Scale demonstrated statistically significant correlations ($p < .01$) with the S-B, OTIS, SFTAA and the CogAT. Its' correlation with the SPM was significant at $p < .05$. Only Factors Four and Five on the Parent Rating Scale showed significant correlations ($p < .01$) with some of the group IQ tests: Factor Five with the OTIS, CogAT and SPM; Factor Four with the CogAT.

Given the substantially higher correlations which existed between the Teacher Rating Scale and IQ indices and academic scores, it can be inferred that teachers were more effective in discerning the relative levels of cognitive functioning between the participants than were the parents. Of course, it must be reiterated that the parents of the participants were not afforded inservice training on the utilization of the rating scale as were the teachers. This must be considered a germane factor when contemplating the source for this disparity.

Parents tended to associate successful academic performance with high cognitive functioning. Given the negligible correlations which evolved between the Parent Rating Scale and IQ indices, it can be surmised that the parents in this study were inadequate assessors of the construct of intellectual functioning as depicted by their responses to the items on the subjective rating scale.

Conversely, teachers were able to subjectively apprehend cognitive functioning, as discerned by the performance on the Stanford-Binet, as well as the OTIS and SPM. However, the Teacher Rating Scale correlated higher with the SRA subtests than it did with the group IQ tests. This would infer that the items on the rating scale, although statistically deemed unidimensional, may represent those behaviors typifying successful academic achievement rather than purely cognitive functioning.

Hypothesis Seven: There is no statistically significant relationship between academic achievement as assessed by the SRA achievement series and group and/or individual IQ indices.

All correlations between SRA subtests and group or individual IQ tests were statistically significant at $p < .01$. However, these positive correlations between SRA subtests and group IQ tests decreased from 1982 and 1982. This decline in relationships may, in part, be due to reliability factors of the instruments or it may represent the prevailing dichotomy between academic and cognitive assessments. At best, 25 percent of the variance in group IQ tests can be accounted for by academic achievement.

The CogAT correlated the highest with the SRA subtests, as it did with the Stanford-Binet. SRA Reading scores correlated higher with the Stanford-Binet and the CogAT, while SRA Math scores correlated higher with the SFTAA, SPM, and OTIS. Therefore, it was not surprising when SRA Reading (1983) became the third variable in the contrived multiple regression formula (deletion of the subjective variable, TSCALE).

Furthermore, the SRA subtests tended to correlate better than the SPM with the Stanford-Binet. It can be surmised that if a screening matrix utilized either the CogAT or the SFTAA and the SRA in selecting candidates that (1) redundancy would then exist in the nomination process, and (2) congruency in the type of potential candidates eliminated by the screening process would escalate.

Hypothesis Eight: There are no statistically significant mean standard score differences between 1982 and 1983 SRA achievement subtest scores among average (IQ 90 to 109), high average (IQ 110 to 119), superior (IQ 120 to 129), and gifted (IQ 130>) first and second grade students.

The mean standard score difference between IQ ranges on the SRA subtests were only statistically significant ($p < .05$) for these pairs: between IQ levels 100-109 and 110-119 for Composite (1982) and Reading (1983), and IQ levels 120-129 and > 130 for Reading (1982). The mean standard score difference for each IQ category between all SRA subtests were not statistically significant.

The mean standard score of each SRA subtest increased with each ascending IQ level and for each testing, from 1982 to 1983. It can be concluded that the mean performance for all participants improved the second year of testing across all IQ levels, and that a differential increment in standard scores existed among different IQ levels.

A standard score mean of 121 or above was indicative of S-B IQ scores above 129. However, it was also confirmed across all IQ levels in this study, that an individual's standard score, on the average, was susceptible to an 8 to 11 point fluctuation from one year to the next. This variability would have significant repercussions for screening matrices employing an entry criterion of 97 percentile on a SRA subtest. Statistics verified that less than 41 percent of those participants with S-B IQs 130 or above obtained a 97 percentile on any two SRA subtests for two consecutive years. In addition, a substantial percentage of participants in the remaining IQ categories also achieved a 97 percentile ranking in one or more SRA subtests. This finding would diminish the SRA's specificity in delineating high intellectual functioning as defined by IQ tests.

An interesting statistic to be cognizant of when utilizing SRA scores in screening matrices was that the SRA Math subtest yielded a greater percentage of candidates with a 97 percentile ranking across all the IQ ranges than did the SRA Reading subtest. SRA Math scores at or above the 97 percentile also appeared more stable over time than comparable SRA Reading scores.

As the IQ levels ascended so did the test-retest reliability correlations per subtest from 1982 to 1983. This would infer that at the higher IQ ranges, academic achievement as assessed by the SRA became more stable over time. Still the test-retest reliability correlations obtained with this sample were below the acceptable test-retest reliability coefficient of .85 as stipulated by most authorities (Cronbach, 1970). Overall caution should be employed when utilizing percentile rankings on the SRA as an entry criterion into gifted education programs.

Limitations

As referenced in Chapter One, the salient limitation of this study was the assumption that the IQs derived from the Stanford-Binet Intelligence Scale were accurate. All statistical inferences and conclusions stipulated in this research project pivoted on this singular assumption.

The second limitation regarded the reliability of the teacher and parent rankings on the Behavioral Checklist of the Intellectual Functioning. Given that the checklist was a subjective measure and that the scale's reliability could not be statistically controlled, it naturally became susceptible to interrater variability. Several factors account for this type of fluctuation:

1. perceptual variability on the part of the raters over time;
2. propensity for rating differences among raters; and
3. susceptibility of item misinterpretation.

These threats to the rating scale's reliability cannot be effectively controlled and therefore must be appraised as a limitation when referencing the subjective checklist's applicability and generalizability to other samples.

Another limitation relating to the subjective rating scale was that the parents were not afforded the same opportunity for inservice training on the utilization and interpretation of the checklist as were the teachers. This factor, in part, may have accounted for the disparity between the teacher and parent ratings.

The fourth limitation concerned the arbitrary cutoff of 115 on the OTIS in selecting the initial sample. By employing this cutoff on a group IQ test, a proportion of first and second grade students from which the sample was drawn may indeed have had Stanford-Binet IQs of 130 or above, thus unduly restricting the scope of the statistical conclusions and research inferences offered by this study.

Additional limitations were inherent due to the restriction of range within the research sample. Because the participants were drawn from a first and second grade population who had achieved an IQ score of 115 or above on the Otis-Lennon Mental Ability Test, all conclusions and results from this study are therefore limited in their applicability and generalizability to similarly defined populations. Furthermore, a depressed multiple correlation can be expected when (1) there is a restriction of range, (2) there is low reliability in a measurement instrument of an independent variable, (3) there is an error of measurement violation in the independent variables, and (4) there is high intercorrelation among independent variables (Pedhazur, 1982). All these conditions were present to varying degrees in this study and therefore likely contributed to the lower than anticipated multiple correlation among the group IQ measure and the Stanford-Binet.

Recommendations

Given that the primary purpose of the research study was to ascertain the most effective and efficient assessment model for identifying high intellectual functioning in first and second grade students, recommendations based on the conclusions drawn from this study are presented. The initial screening matrix should employ group measures which (1) have the least tendency to overestimate Stanford-Binet IQs, (2) have reasonably high correlations (> .50) with the Stanford-Binet, and (3) have high reliability coefficients and construct validities of intellectual functioning. The research concluded that by utilizing a combination of three variables (CogAT, SFTAA-L, and TSCALE), it was possible to account for 54 percent of the variance in Stanford-Binet IQ scores. This prediction formula was more precise than any variable used singly. However, employing this derived formula would necessitate the administration of two group IQ tests and the completion of a subjective teacher rating scale. Unfortunately, this formula was also substantiated as having poor generalizability to other samples. It should be reiterated that the inclusion of a subjective measure was the probable cause for this weakness and not the uniqueness inherent in the research sample. However, it is hypothesized that the prediction formula with the subjective measure could be applicable to other public school populations if teacher inservice explicating the behavioral constructs of high intellectual functioning was implemented.

Taken individually, each group IQ test reviewed in this study had positive features which would warrant its inclusion into a screening matrix for the intellectually gifted. The CogAT had the highest correlation with the S-B, but underestimated S-B IQ scores more than the other group measures. The SPM was stipulated the most effective and efficient group test in estimating S-B IQ scores, but like the OTIS, it tended to overestimate IQs between the range of 110-119. This would infer that if matrices employed an 115 cutoff on either the OTIS or SPM, an excessive number of candidates would be selected for processing in the final selection phase.

The purpose of utilizing the most appropriate group IQ test at the primary screening level is to extract the largest percent of promising candidates with the highest probability of satisfying the program's multi-criteria for admittance. For programs of the intellectually gifted, it has been substantiated that of those group IQ tests investigated in this study, none could be utilized as substitutes for an individual intelligence scale at the final multi-criteria level. It would be statistically unsound to utilize another group IQ test at the final selection phase, given the reportedly low to moderate intercorrelations among group IQ tests and their disparities in scope and content. Based on these contentions, group IQ scores are generally considered incomparable.

Given the tendency for SRA achievement scores--at least as represented by this sample--to decrease between first and second grade, it would seem logical to utilize an entry criterion of 97 percentile in an academic area for two consecutive years for academically gifted programs. Statistical findings did not support the practice of interchanging group IQ and group achievement test scores in fulfilling entrance requirements for programs of the intellectually gifted. It is believed that the multicriteria selection matrices for public education programs of the academically gifted should not contaminate their construct by including group and/or individual IQ criterion. Likewise, the inverse would apply for programs of the intellectually gifted. It would be statistically unsound to interchange academic achievement scores of 97 percentile and IQ scores of 130 or above as representing the same construct.

If public school systems elect to service both the academically and intellectually gifted simultaneously, then entrance criteria should comprise either the attainment of IQs of 130 or above on individual intelligence scale or 95 percentile in an academic area on an above-grade level academic battery. The prediction formula combining scores from the CogAT, SFTAA-L and SRA Reading, at best could only estimate S-B IQs with 50 percent accuracy. This reinforces the assumption that no group test, singly or in combination, can emulate an individual intelligence scale. As IQ levels increased above the average range, the predictive accuracy of group IQ tests and the multiple regression formula decreased in their ability to delineate S-B IQs.

At the primary elementary education level, high scores of the SPM correlated the best with SRA Math scores, and were more stable over time than were the SRA Reading scores among the higher levels of intelligence. It can be conjectured that for systems servicing both the academically and intellectually gifted, the SPM with a cutoff of 120 may be the most appropriate group screening instrument.

The principal purpose for developing the subjective checklist for this study was to ascertain if it was possible to define and isolate the single construct of intellectual functioning, while eliminating from its scope all other defined domains of giftedness, i.e., leadership ability, talent in the visual or performing arts, creativity and academic proficiency. Only by identifying and defining a construct in behavioral terms, does it then become possible to isolate, assess and evaluate that construct. By implementing this process, program direction and objectivity is subsequently enhanced. In addition, it then becomes practical and feasible to instruct teachers and significant others so that they become proficient in subjectively assessing a given construct.

The prime rationale for utilizing teachers and parent nominations in screening models is that they are expedient and inexpensive. However, their value as an alternative screening source depends upon their reliability and effectiveness in discerning candidates. In this study, the Teacher Rating Scale was as effective in this role as was the OTIS, SPM, and SRA.

The Parent Rating Scale overestimated intellectual functioning across all IQ levels and was thus ascertained noneffective in delineating between IQ ranges. It would be impractical to inservice all the parents in the same format as the teachers. If parents are to become a viable source in the subjective assessment of the construct of intellectual functioning, then an instructional format which could supply a realistic comparative basis to improve item interpretation and scoring would be required. A practical inservice approach for parents would be to mail an information packet, similar to the one presented to the teachers, along with an invitation to attend a follow-up discussion at the next P.T.A. meeting. It is hypothesized that parents may be more effective in the subjective assessment of other domains of giftedness rather than intellectual functioning, if these areas can be unidimensionally represented in behavioral terms.

Whatever area of giftedness a school system elects to serve, caution must be maintained in unidimensionally defining that particular domain of giftedness to insure that:

1. reliable and valid instrumentation is available for both initial and final screening procedures;

2. reliable and valid instrumentation congruent with the defined construct is employed;

3. redundancy in the use of instrumentation is avoided; and

4. reciprocity in the use of achievement and intelligence tests is abstained, unless the gifted program is designed to service both gifted areas.

Finally, analyses of the statistic findings in this study collaborate with previous research in proposing that student selection models for programs of the academically or intellectually gifted should employ these guidelines:

1. redefine the program's philosophy into measurable constructs so that it becomesfeasible to effectively evaluate both the program's goals and objectives and the participant's progress;

2. utilize standardized tests which are congruent with the program's philosophy and curriculum;

3. utilize measurement instruments which validate the constructs espoused by the program's philosophy; and

4. utilize valid and reliable tests which have been substantiated as adequate predictors of the constructs.

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APPENDIX A

CONFIDENCE INTERVALS FOR THE STANFORD-BINET INTELLIGENCE SCALE

	Age Level				
	5-9-0 Through 13-5-29				
	Confidence Level				
IQ	68%	85%	90%	95%	99%
140-149	±5	±7	±8	±10	±13
130-139	±5	±8	±9	±10	±14
120-129	±5	±8	±9	±10	±14
110-119	±5	±7	±8	±9	±12
100-109	±4	±6	±7	±9	±12
90-99	±4	±6	±7	±9	±11
80-89	±4	±6	±7	±8	±10
70-79	±3	±5	±6	±7	±9
60-69	±3	±4	±5	±5	±7

Source: Sattler, 1982.

APPENDIX B

DATA COLLECTION FORM

DATA COLLECTION FORM

School ____________________

Teacher ____________________

							SRA 81-82					SRA 82-83					Otis
Name	DOB	GRADE	M/F	Teacher Cklist Score	Parent Cklist Score		COMP	RDG	MATH	LANG	EAS	COMP	RDG	MATH	LANG	EAS	
						CA											
Parents						SS											
						%											
					Mailed	SN											
Sand Springs, OK 74063					/ /82	GL											

			SFTAA				CogAT		
Stanford-Binet	Raven's SPM		LANG	NON LANG	TOTAL		VERBAL	QUANT	NONVERBAL
CA	CA	CA				CA			
IQ	SS	IQ				SS			
%	%	%				%			
MA	MA	MA				SN			
		GL %				GL %			

APPENDIX C

PARENT CONSENT FORM

SAND SPRINGS PUBLIC SCHOOLS
Special Education Services
P.O. Box 970
Sand Springs, OK 74063

PARENT CONSENT FORM

Student: ______________________ Date of Birth: ______________________

Parents: ______________________ Home Phone: ______________________

Address: ______________________ Work Phone: ______________________

______________________ School: ______________________

I hereby give permission for my child ______________________ to participate in this research study and to be administered the following assessments:

Short-Form Test of Academic Aptitude
Cognitive Abilities Test
Raven's Standard Progressive Matrices
Stanford-Binet Intelligence Scale

As the parent, I agree to complete the Parent Checklist and return it with this consent form in the enclosed envelope.

______________________ ______________________
Date Signature

You, as a parent, have the following rights:

1. to refuse permission for testing;
2. to receive a copy of all testing results;
3. to have these results explained;
4. to know that all results are kept strictly confidential; and
5. to have these results destroyed upon parent request.

If my child's test performance should meet the eligibility criteria for nomination into the Sand Springs Schools' Enrichment Study Program (gifted education), I give my permission for those results to be forwarded to the ESP selection committee.

____
Signature

☐ Check if a second checklist is requested.

☐ I do not give my permission for my child to participate in this study.

APPENDIX D

PARENT COVER LETTER

SAND SPRINGS PUBLIC SCHOOLS — OFFICE OF THE SUPERINTENDENT
SAND SPRINGS, OKLAHOMA 74063
Dr. Wendell Sharpton
SUPERINTENDENT

December 27, 1982

Dear Parents:

Your child has been selected as a possible participant in a research project to be conducted this spring through the Sand Springs Public Schools. The goal of this study is twofold: (1) to find a reliable group measurement which correlates with intelligence and academic achievement at the first and second grade levels; and (2) to identify behavioral characteristics, as perceived by the parents and teachers, which correlate with high intelligence and academic aptitude.

The Otis-Lennon Mental Ability Test, a group administered intelligence scale, was given to the elementary students in November. All first and second grade students who achieved 115 or above on the Otis-Lennon have been selected as prospective participants in the research project.

Given parental consent, each participant will be administered individually the Stanford-Binet Intelligence Scale by a certified school psychologist. Your child will then be administered three group intelligence tests: the Cognitive Abilities Test, the Short-Form Test of Academic Aptitude, and the Raven's Standard Progressive Matrices. All assessments will be given during the school time over a month's span and will require approximately three hours of testing time.

In addition, the parent(s) and teacher of each participant will be requested to complete a behavioral checklist as to how they perceive the child on different aspects of intellectual functioning. The checklist should be completed by the parent or guardian who maintains primary care of the child. If the other parent should wish input, a second checklist can be requested.

If you have any questions, I'll be happy to discuss your concerns. To give permission for your child to participate in this research study, please complete these steps:

1. Sign the parent consent form;
2. Complete the parent checklist; and
3. Return both in the enclosed envelope within two weeks.

If you do not wish your child to participate in this study, please check the appropriate place on the consent form and return the form in the enclosed envelope.

Sincerely,

Bonnie Johnson, School Psychologist
Coordinator of Elementary Special Services
245-1874

APPENDIX E

PARENT RATING SCALE: BEHAVIORAL CHECKLIST

OF INTELLECTUAL FUNCTIONING

PARENT RATING SCALE: BEHAVIORAL CHECKLIST OF INTELLECTUAL FUNCTIONING

____
Child

____
Parent

____
Date

DIRECTIONS: Please rate this child by circling the most appropriate response to each item:

5--almost always demonstrates this trait
4--often demonstrates this trait
3--occasionally demonstrates this trait
2--seldom demonstrates this trait
1--does not demonstrate this trait

1.	Has an accurate memory	5	4	3	2	1
2.	Puts ideas together in different ways	5	4	3	2	1
3.	Conveys ideas effectively	5	4	3	2	1
4.	Displays good observational skills	5	4	3	2	1
5.	Develops basic learning skills quickly	5	4	3	2	1
6.	Knows many things of which other children are unaware	5	4	3	2	1
7.	Responds accurately to questions	5	4	3	2	1
8.	Recognizes significance of situations	5	4	3	2	1
9.	Is inquisitive	5	4	3	2	1
10.	Demonstrates good concentration	5	4	3	2	1
11.	Uses a wide variety of resources in learning	5	4	3	2	1
12.	Finds alternative solutions to problems	5	4	3	2	1
13.	Understands things which other children need to have spelled out	5	4	3	2	1
14.	Creates work of unusual quality	5	4	3	2	1
15.	Transfers learning to new situations	5	4	3	2	1
16.	Can accurately paraphrase verbal communications	5	4	3	2	1
17.	Produces a large number of original ideas	5	4	3	2	1
18.	Uses extensive vocabulary	5	4	3	2	1
19.	Is challenged by new ideas	5	4	3	2	1
20.	Learns rapidly	5	4	3	2	1

21.	Quickly analyzes problems	5	4	3	2	1
22.	Can predict valid consequences	5	4	3	2	1
23.	Is self-directing	5	4	3	2	1
24.	Is persistent in completing projects	5	4	3	2	1
25.	Prefers own organization rather than the structuring of others	5	4	3	2	1
26.	Shows concern for details	5	4	3	2	1
27.	Generates original ideas	5	4	3	2	1
28.	Shows a desire to learn	5	4	3	2	1
29.	Breaks down relationships into parts to clafify their hierarchy	5	4	3	2	1
30.	Seeks logical answers	5	4	3	2	1
31.	Organizes tasks effectively	5	4	3	2	1
32.	Reads at an advanced level	5	4	3	2	1
33.	Perceives similarities between concepts	5	4	3	2	1
34.	Sees parts in relation to the whole	5	4	3	2	1
35.	Clearly defines problems	5	4	3	2	1
36.	Uses abstract concepts	5	4	3	2	1
37.	Perceives differences between concepts	5	4	3	2	1
38.	Questions existing solutions	5	4	3	2	1
39.	Sees relationships among unrelated facts	5	4	3	2	1
40.	Judges own products realistically	5	4	3	2	1

APPENDIX F

RESOURCES UTILIZED IN THE FORMATION OF THE 27 CLUSTERS OF HIGH INTELLECTUAL FUNCTIONING

Resources utilized in the formation of the 27 clusters of high intellectual function:

1. M. Bonsall, "Intellectual Processing Rating Scale" (Clark, 1979)

2. J. Briet, "Traits Common to Intellectually Gifted Children" (Martinson, 1974)

3. K. Bull, "Possible Components of a Construct for Intellectual Ability" (Bull, 1981)

4. C. Clark and E. Dyer, "Kindergarten Checklist" (Martinson, 1974)

5. M. Goldberg, "Characteristics of the Gifted" (Goldberg, 1975)

6. P. Hogan and B. Clark, "Differential Cognitive Characteristics of the Gifted" (Clark, 1979)

7. Los Angeles Unified School District, "Criteria Checklist for Gifted Program" (Martinson, 1974)

8. L. Lucito, "Gifted Characteristics" (Martinson, 1974)

9. J. Miley, "Teacher Checklists, Grades Kindergarten-Sixth" (Miley, 1972)

10. J. Renzulli, "Parent Nomination Form at the Early Childhood Level" (Martinson, 1974).

11. J. Renzulli and R. Hartman, "Scale for Rating Behavioral Characteristics of Superior Students" (Martinson, 1974)

12. J. Robeck, "Checklist of Intellectual Functioning" (Clark, 1979)

13. M. Seagoe, "Some Learning Characteristics of Gifted Children" (Martinson, 1974)

14. P. Stallings, "Characteristics of the Disadvantaged Gifted" (Martinson, 1974).

APPENDIX G

CONSTRUCTS OF INTELLECTUAL FUNCTIONING

CONSTRUCTS OF INTELLECTUAL FUNCTIONING

Retentiveness--Memory

Has a good memory, retains and uses information which has been heard or read; knows many things of which other children are unaware; quick mastery and recall of information

Knowledge and Skills

Grasps and retains knowledge; uses a wide variety of resources; develops basic learning skills at an earlier age

Comprehension

Comprehends implications which other children need to have spelled out; can paraphrase, summarize, evaluate verbal and written communication easily and adequately

Intellectual Curiosity

Likes intellectual activity; is challenged by new ideas; asks questions of a provocative nature; is inquisitive of "why's"

Language Development

Has an extensive vocabulary; thinks and uses higher level abstract words and concepts

Verbal Fluency

Communicates with clarity; elaborates and embellishes easily; uses complex sentence structure; conveys ideas effectively

Fluency of Ideas

Thinks clearly and performs difficult mental tasks; produces a large number of ideas, often quickly; transfers learning to new situations easily; demonstrates a more complex processing of information than same-aged peers

Acceleration

Responds quickly and accurately to questions; learns rapidly, easily, and efficiently with less repetition; learns easily through experience

Flexibility

Quickly analyzes problems and puzzles; is able to approach ideas, problems from a number of perspectives; is adaptable; is able to find alternative ways to solve problems

Perceptiveness

Has a keen power of observation and receptivity; sense of significance; demonstrates richness of imagery; highly attentive to environment

Originality

Combines ideas and materials in number of ways or creates products of unusual character or quality; puts unrelated ideas together in new and different ways; has ability to generate original ideas and solutions

Persistence

Has capacity for self-direction; appears more mature than same-aged peers; wants to learn.

Concentration

Has ability to concentrate; is not easily distracted from interests

Abstraction

Is capable of abstract visual and/or verbal reasoning; can easily categorize into higher abstraction; perceives similarities and differences between objects, events, and concepts

Generalizations--Cause and Effect Relationships

Has ability to see relationships among unrelated facts and concepts; sees implications and consequences; makes valid generalizations

Conceptualization

Readily grasps underlying principles; understands and applies rules; expands concepts into broader relationships

Deductive Reasoning--Analysis

Is capable of breaking down concepts, events, and relationships into parts to clarify their hierarchy

Synthesis

Is capable of synthesizing information easily; has an interest in inductive learning; sees parts in relation to the whole

Elaboration

Is concerned with detail and complexity; is often involved with a variety of implications and consequences

<u>Verbal Reasoning</u>

Reasons out problems easily; seeks logical answers

<u>Quantitative Reasoning</u>

Can easily manipulate arithmetic concepts; can analyze word problems and deduce correct operation effectively

<u>Critical Thinking</u>

Can define the problems, formulate hypotheses, test ideas, and arrive at valid conclusions

<u>Sensitivity to Problems</u>

Perceives and is aware of problems that others may not see; is ready to question or change existing solutions

<u>Independence in Thought</u>

Is inclined to follow his own organization and ideas rather than the structuring of others

<u>Independence in Action</u>

Shows ability to plan, organize, execute, and judge

<u>Independence in Work Habits</u>

Possesses research skills to facilitate independent work

<u>Reading Proficiency</u>

Learns to read at an earlier age than peers; reads and comprehends at an advanced level; reads widely, quickly, and intensely in one or more areas

APPENDIX H

TEACHER INSERVICE HANDOUTS

Characteristics of Creative-Gifted Children[1]

They:

1. Are curious
2. Have a large vocabulary
3. Have long memories
4. Sometimes learn to read alone
5. Have a keen sense of time, keep track of the date
6. Are persistent
7. Like to collect things
8. Are independent
9. Are healthy and well coordinated, but some may be delicate
10. May be bigger and stronger than average
11. Sustain interest in one or more fields over the years
12. Initiate their own activities
13. Develop earlier, sitting up, walking, talking
14. Learn easily
15. Have a keen sense of humor
16. Enjoy complicated games
17. Are creative and imaginative
18. Are interested and concerned about world problems
19. Analyze themselves, are often self-critical
20. Like older children when very young
21. Are original
22. Set high goals and ideals
23. Are leaders
24. Have talent(s) in art, music, writing, drama, dance
25. Use scientific methods of research
26. See relationships and draw sound generalizations
27. Produce work which is fresh, vital, and unique
28. Create new ideas, substances, and processes
29. Invent and build new mechanical devices
30. Often run counter to tradition
31. Continually question the status quo
32. Do the unexpected
33. Apply learning from one situation to different ones
34. Problem solve on a superior level, divergently, innovatively
35. May appear different
36. Enjoy reading, especially biography and autobiography

---

[1]Ann Fabe Isaacs, National Association for Creative Children and Adults, 1976 (Tuttle & Becker, 1980).

Some General Characteristics of Gifted Children[2]

The gifted child is likely to possess the following abilities:

1. To read earlier and with greater comprehension of nuances in the language.
2. To learn basic skills better. The gifted child usually learns them faster and needs less practice. Overlearning can lead to boredom, cessation of motivation, and the commission of careless errors.
3. To make abstractions when other children at the same age level cannot.
4. To delve into some interests beyond the usual limitations of childhood.
5. To comprehend, with almost nonverbal cues, implications which other children need to have "spelled out" for them.
6. To take direction independently at an earlier stage in life and to assume responsibility more naturally.
7. To maintain much longer concentration periods.
8. To express thoughts readily and to communicate with clarity in one or more areas of talent, whether verbal, numerical, aptitudinal, or affective.
9. To read widely, quickly, and intensely in one subject or in many areas.
10. To expend seemingly limitless energy.
11. To manifest creative and original verbal or motor responses.
12. To demonstrate a more complex processing of information than the average child of the same age.
13. To respond and relate well to peers, parents, teachers, and adults who likewise function easily in the higher-level thinking processes.
14. To have many projects going, particularly at home, so that the talented child is either busily occupied or looking for something to do.
15. To assume leadership roles because the innate sense of justice that is often noticeable in gifted children and youth gives them strength to which other young people respond.

Behaviors in Six Talent Areas[3]

Convergent Thinking and Behavior

1. Usually responds more quickly and appropriately to questions than others his/her age.

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[2]Paul Plowman, California State Department of Education, 1971 (Tuttle & Becker, 1980).

[3]Robert A. Male, "Talent Category Explanation Sheet," University of Wisconsin-Madison, 1979 (Tuttle & Becker, 1980).

2. Usually responds more quickly and appropriately than peers in new situations.
3. Asks questions relative to the topic or subject under discussion.
4. Usually selects the best course of action, the preferred outcome, or the most accurate response given several alternatives.
5. Sometimes re-defines a problem, a situation, or a statement made by someone else.
6. Sometimes determines what should be done having previously learned the appropriate procedure for achievement of a goal or task.
7. After considering a problem sometimes organizes activities to solve the problem.
8. Has on occasion given directions to others and has also written or told the procedures for performing a task.
9. Demonstrates through discussion, or in writing, an understanding of limitations or constraints that relate to a given problem or situation.
10. Has on occasion appropriately explained the reasons for making a given choice or acting a certain way.

Divergent/Creative Thinking and Behavior

1. Generates many ideas.
2. Plays with ideas and is willing to go beyond the usual or known.
3. Often establishes new relationships between previously unrelated objects or ideas.
4. Is not easily discouraged by setbacks, but will adapt and continue working on a task.
5. Demonstrates the ability to express ideas through many forms of communication (e.g., speaking, writing, drawing, and acting).
6. Understands and appreciates the humor of others and displays a sense of humor.
7. Often initiates learning activities (a self-starter).
8. Often supports an opinion or solution contrary to that selected by others (parents, teachers, peers) and ably defends his/her position.
9. Often values the processes of discovery and creation as much as the end product.
10. Relies on self-evaluation and self-support as well as evaluation and support from others.

Goal-Related Thinking and Behavior

1. Plans ahead by having on hand materials needed to undertake specific activities.
2. Has demonstrated that he/she can state what needs to be done first, second, and so on when undertaking an activity or project.

3. Has demonstrated the ability to define the final goal or outcome of an activity or project.
4. Has stated a planned course of action and acted according to the plan.
5. Demonstrates his/her consideration of one's abilities, time, and personal limitations when making plans.
6. Has identified and stated personal qualities and talents which represent strengths and limitations relative to a specific activity.
7. Has, when acting according to a plan, adapted it and his/her behaviors to meet changing conditions.
8. Has on occasion identified and stated possible contributions of others in a proposed group activity.
9. Has demonstrated the ability to state and define his/her own goals and priorities and to understand the goals and priorities of others even when not the same as his/her own.
10. Has shown that he/she can evaluate the results of following a plan by the contributions of others as well as his/her own, and the value of the plan itself.

Social Skills and Behavior

1. Often relates well with older children and adults.
2. Acknowledges the rights of others.
3. Values the ideas of teachers or parents.
4. Values the ideas of peers.
5. Likes to share experiences with peers.
6. Understands peers' humor and displays his/her own sense of humor.
7. Humor is understood by peers.
8. Ideas are respected by peers.
9. Demonstrates independent action which is accepted and understood by peers.
10. Is looked to by others for leadership.

Physical Skills and Behavior

1. Learns a physical skill more quickly and correctly than peers.
2. Is able to integrate newly learned physical skills into his/her repertoire more easily and quickly than peers.
3. Accurately identifies his/her physical abilities and limitations.
4. Physically adapts more easily than his/her peers to unanticipated circumstances or events.
5. Often experiments with previously learned physical skills in order to expand upon them.
6. Is not easily discouraged by setbacks but will adapt and continue working on physical tasks.
7. Accurately describes and assesses his/her own physical accomplishments and the accomplishments of others.

8. Has successfully taught others how to perform physical activities.
9. Evaluates his/her performance against an internal standard of excellence as well as established external criteria.
10. Demonstrates justifiable confidence in his/her physical abilities and is recognized by others as possessing superior physical abilities.

Affective Thinking and Behavior

1. Has shown more interest than peers in understanding self.
2. Has shown more of an interest than peers in understanding the attitudes and feelings of others.
3. Has shown more interest than peers in understanding social issues.
4. Communicates thoughts and feelings more easily than peers.
5. Recognizes and discusses more effectively than peers the similarities and differences between his/her perceptions and those of others.
6. Has identified certain social and interpersonal issues as important to himself/herself.
7. Sometimes discusses social issues with informed others.
8. Understands the values underlying the social issues which interest him/her.
9. Demonstrates a consistency in social behaviors and attitude which reflects an internalized value system.
10. Has modified his/her value system or philosophy based on learning.

Concomitant Difficulties Potentially Associated With Positive Traits of the Highly Gifted

Traits	Difficulties
Supersensitivity of the nervous system and accompanying acute perceptiveness	Physical tension, "hyperactivity," distractibility; Emotional strain--awareness of social responses to him; Feelings of isolation and rejection
Perfectionism	Feelings of inadequacy, unrealistic expectations, and "perceived failure" derived from the high expectations of self and adults
Independence	A seemingly rebellious or disruptive nature, tends to challenge and question indiscreetly; Develops feelings of resenting the constraining structure of the classroom which leads to unhappiness at school
Initiative	Wants to have a choice, to be able to pursue interests, to function in an environment with minimal limitations and structure; this leads to difficulty when the child cannot accept the limitations of time, space, or resources for activities
Intense drive to explore, to discover, to master, to know, and to be creative	Behavior that appears to be stubbornness, disruptiveness, and "off task" (pursuit not appropriate for the assignment); these behaviors can produce resentment or irritation in adults and peers which further results in social criticism
Advanced problem solving skills	May tend to dominate discussion or activities, or to respond with passive boredom to shallow curriculum (convergent and memory exercises, repetition, practice); Often moves ahead of the class and may perceive resentment of his skills and achievement
The distinct learning style of the highly gifted and creative	Causes the child to be unresponsive to many traditional teaching methods and curricula--e.g., math pages, drill exercises, grammar and traditional reading groups; frequently the child appears "lazy" or "unmotivated" to the teacher

Source: J. R. Whitmore, Giftedness, Conflict, and Underachievement, Boston, 1980.

Some Learning Characteristics of Gifted Children[4]

Characteristics	Concomitant Problems
1. Keen power of observation; naive receptivity; sense of the significant; willingness to examine the unusual	1. Possible gullibility
2. Power of abstraction, conceptualization, synthesis; interest in inductive learning and problem solving; pleasure in intellectual activity	2. Occasional resistance to direction; rejection or remission of detail
3. Interest in cause-effect relations, ability to see relationships; interest in applying concepts; love of truth	3. Difficulty in accepting the illogical
4. Liking for structure and order; liking for consistency, as in value systems, number systems, clocks, calendars	4. Invention of own systems, sometimes conflicting
5. Retentiveness	5. Dislike for routine and drill; need for early mastery of foundation skills
6. Verbal proficiency; large vocabulary; facility in expression; interest in reading; breadth of information in advanced areas	6. Need for specialized reading vocabulary early; parent resistance to reading; escape into verbalism
7. Questioning attitude, intellectual curiosity, inquisitive mind; intrinsic motivation	7. Lack of early home or school stimulation
8. Power of critical thinking; skepticism, evaluative testing; self-criticism and self-checking	8. Critical attitude toward others; discouragement from self-criticism

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[4]May V. Seagoe, Professor of Education, University of California at Los Angeles (Martinson, 1974).

Characteristics	Concomitant Problems
9. Creativeness and inventiveness; liking for new ways of doing things; interest in creating, brainstorming, free-wheeling	9. Rejection of the known; need to invent for oneself
10. Power of concentration; intense attention that excludes all else; long attention span	10. Resistance to interruption
11. Persistent, goal-directed behavior	11. Stubbornness
12. Sensitivity, intuitiveness, empathy for others; need for emotional support and a sympathetic attitude	12. Need for success and recognition; sensitivity to criticism; vulnerability to peer group rejection
13. High energy, alertness, eagerness; periods of intense voluntary effort preceding invention	13. Frustration with inactivity and absence of progress
14. Independence in work and study; preference for individualized work; self-reliance; need for freedom of movement and action	14. Parent and peer group pressures and nonconformity; problems of rejection and rebellion
15. Versatility and virtuosity; diversity of interests and abilities; many hobbies; proficiency in art forms such as music and drawing	15. Lack of homogeneity in group work; need for flexibility and individualization; need for help in exploring and developing interests; need to build basic competencies in major interests
16. Friendliness and outgoingness	16. Need for peer group relations in many types of groups; problems in developing social leadership

Identification of Highly Gifted Underachievers[5] at the Primary Level

The characteristics most frequently associated with the children identified as highly gifted underachievers, ages 5 to 9, are listed below. The asterisked characteristics were found in more than 80 percent of the subjects. All of the characteristics listed occurred with unusual frequency in this group of children.

*IQ of 140+ on the Binet

*School work had been rather consistently incomplete

*Vast gap between qualitative level or oral and written work

*Test phobic, poor test results

Lack of academic initiative (as defined by school)

A rigidity in interests

*Profound interest in a single area in which he is "expert"

*School phobia--or at least disinterest

*Very low self-esteem, unhealthy self-concept producing:
- difficulty coping emotionally
- lack of self-confidence--inferiority feelings
- sincere belief that no one likes him (projection of self hate)

Distractibility--inability to focus, concentrate efforts constructively; lack of selective perception of stimuli

General hyperactivity, hypertensive behavior

*A very autonomous spirit, quite focused in self and resistant to influence

General immaturity in all areas--physical, social, emotional

Very often young (Fall babies)

Chronic inattentiveness--just cannot listen and absorb

*Inability to function constructively in a group of any size

Psychomotor inefficiency, most often visual-perception handicap

*Wide interest range

*Tendency to consistently set goals and standards too high; e.g., unrealistic standards of complexity or realism in art

*No apparent satisfaction from repeated demonstration of acquired skill--e.g., math facts, cursive, points

*<u>Not</u> motivated by usual devices--teacher enthusiasm, group interests, stimulating environment; and often not to praise or points awarded

Tendency to attribute success and failure to external control

Malingering, hypochondria, frequent illness

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[5] Joanne Rand Whitmore, Ph.D., Kent State University (Tuttle & Becker, 1980).

APPENDIX I

TEACHER RATING SCALE: BEHAVIORAL CHECKLIST

OF INTELLECTUAL FUNCTIONING

TEACHER RATING SCALE: BEHAVIORAL CHECKLIST OF INTELLECTUAL FUNCTIONING

____
Student

____
Teacher

____
Date

DIRECTIONS: Please rate this student by circling the most appropriate response to each item:

5--almost always demonstrates this trait
4--often demonstrates this trait
3--occasionally demonstrates this trait
2--seldom demonstrates this trait
1--does not demonstrate this trait

1.	Has an accurate memory	5	4	3	2	1
2.	Puts ideas together in different ways	5	4	3	2	1
3.	Conveys ideas effectively	5	4	3	2	1
4.	Displays good observational skills	5	4	3	2	1
5.	Develops basic learning skills quickly	5	4	3	2	1
6.	Knows many things of which other children are unaware	5	4	3	2	1
7.	Responds accurately to questions	5	4	3	2	1
8.	Recognizes significance of situations	5	4	3	2	1
9.	Is inquisitive	5	4	3	2	1
10.	Demonstrates good concentration	5	4	3	2	1
11.	Uses a wide variety of resources in learning	5	4	3	2	1
12.	Finds alternative solutions to problems	5	4	3	2	1
13.	Understands things which other children need to have spelled out	5	4	3	2	1
14.	Creates work of unusual quality	5	4	3	2	1
15.	Transfers learning to new situations	5	4	3	2	1
16.	Can accurately paraphrase verbal communications	5	4	3	2	1
17.	Produces a large number of original ideas	5	4	3	2	1
18.	Uses extensive vocabulary	5	4	3	2	1
19.	Is challenged by new ideas	5	4	3	2	1
20.	Learns rapidly	5	4	3	2	1

21.	Quickly analyzes problems	5	4	3	2	1
22.	Can predict valid consequences	5	4	3	2	1
23.	Is self-directing	5	4	3	2	1
24.	Is persistent in completing projects	5	4	3	2	1
25.	Prefers own organization rather than the structuring of others	5	4	3	2	1
26.	Shows concern for details	5	4	3	2	1
27.	Generates original ideas	5	4	3	2	1
28.	Shows a desire to learn	5	4	3	2	1
29.	Breaks down relationships into parts to clafify their hierarchy	5	4	3	2	1
30.	Seeks logical answers	5	4	3	2	1
31.	Organizes tasks effectively	5	4	3	2	1
32.	Reads at an advanced level	5	4	3	2	1
33.	Perceives similarities between concepts	5	4	3	2	1
34.	Sees parts in relation to the whole	5	4	3	2	1
35.	Clearly defines problems	5	4	3	2	1
36.	Uses abstract concepts	5	4	3	2	1
37.	Perceives differences between concepts	5	4	3	2	1
38.	Questions existing solutions	5	4	3	2	1
39.	Sees relationships among unrelated facts	5	4	3	2	1
40.	Judges own products realistically	5	4	3	2	1

APPENDIX J

ITEM ANALYSIS OF THE TEACHER RATING SCALE:

MEANS, STANDARD DEVIATIONS, CORRELA-

TIONS, AND DISTRIBUTIONS

TABLE XXXIV

ITEM ANALYSIS OF THE TEACHER RATING SCALE: MEANS, STANDARD DEVIATIONS, CORRELATIONS, AND CHOICE DISTRIBUTIONS

	Item Analysis			Choice Distributions (%)				
Item	Mean	Standard Deviation	Corr. (Total)	1	2	3	4	5
1	4.14	0.948	0.734	1	4	18	32	45
2	3.76	1.094	0.785	3	10	26	30	31
3	3.94	1.002	0.777	1	6	29	27	38
4	4.12	0.960	0.739	1	5	22	27	46
5	4.20	0.956	0.723	2	4	15	31	48
6	3.66	1.000	0.649	1	10	39	24	27
7	4.14	0.905	0.730	0	5	20	32	43
8	3.85	1.085	0.804	3	7	26	28	35
9	3.83	0.965	0.583	1	7	30	32	30
10	3.83	1.181	0.724	4	11	20	27	38
11	3.19	1.022	0.753	6	16	45	22	12
12	3.50	1.124	0.843	6	11	30	32	20
13	3.52	1.055	0.722	2	17	29	32	20
14	3.43	1.263	0.678	11	11	27	27	24
15	3.66	1.043	0.811	3	9	30	33	24
16	3.89	1.101	0.767	2	9	25	24	39
17	3.31	1.136	0.738	7	19	25	35	14
18	3.35	1.069	0.761	4	17	37	25	17
19	3.82	1.101	0.808	3	10	22	31	34
20	4.13	1.038	0.778	2	7	14	29	48
21	3.74	1.143	0.813	3	11	29	22	35
22	3.78	1.101	0.845	2	11	27	26	34
23	3.68	1.180	0.720	5	14	17	34	29
24	3.81	1.236	0.679	5	14	14	27	39
25	3.26	1.222	0.631	11	16	29	28	17
26	3.57	1.187	0.752	5	17	19	33	25
27	3.36	1.121	0.722	5	19	27	32	17
28	4.25	1.000	0.720	1	6	14	23	55
29	2.58	1.233	0.514	26	19	32	15	7
30	3.83	1.116	0.787	5	7	22	34	33
31	3.76	1.166	0.736	3	15	19	29	34
32	3.66	1.172	0.609	5	11	29	24	32
33	3.57	1.144	0.776	6	9	33	27	25
34	3.38	1.265	0.708	12	9	33	23	24
35	3.55	1.172	0.777	5	15	27	27	26
36	2.82	1.106	0.609	13	25	37	18	7
37	3.40	1.153	0.716	7	13	34	25	20
38	3.06	1.179	0.683	10	24	30	23	13
39	2.75	1.120	0.613	16	24	38	15	7
40	3.59	0.952	0.785	2	11	27	45	15

APPENDIX K

ITEM ANALYSIS OF THE PARENT RATING SCALE:
MEANS, STANDARD DEVIATIONS, CORRELATIONS, AND DISTRIBUTIONS

TABLE XXXV

ITEM ANALYSIS OF THE PARENT RATING SCALE: MEANS, STANDARD DEVIATIONS, CORRELATIONS, AND CHOICE DISTRIBUTIONS

	Item Analysis			Choice Distributions (%)				
Item	Mean	Standard Deviation	Corr. (Total)	1	2	3	4	5
1	4.63	0.658	0.568	1	1	1	29	69
2	4.04	0.715	0.588	0	2	16	57	25
3	4.22	0.819	0.652	1	1	14	42	42
4	4.48	0.751	0.654	1	1	4	34	59
5	4.60	0.683	0.621	1	1	2	29	67
6	4.02	0.898	0.651	1	2	24	37	35
7	4.27	0.740	0.617	1	1	8	50	40
8	3.94	0.868	0.731	1	2	25	42	29
9	4.68	0.676	0.515	1	1	2	20	75
10	4.10	0.860	0.656	1	3	16	45	35
11	3.84	0.898	0.658	1	6	23	46	24
12	3.79	0.869	0.560	1	4	34	39	23
13	4.00	0.935	0.685	1	6	17	42	34
14	3.55	0.987	0.629	2	10	40	28	20
15	3.98	0.862	0.746	0	6	21	43	30
16	4.03	0.938	0.669	1	4	24	34	38
17	3.89	0.885	0.649	1	6	24	43	27
18	3.93	0.936	0.615	1	4	29	34	33
19	4.27	0.812	0.635	0	2	16	35	47
20	4.60	0.702	0.623	1	2	3	26	68
21	3.93	0.852	0.754	1	2	25	45	27
22	3.86	0.886	0.713	1	5	29	40	26
23	3.93	1.003	0.664	1	9	20	35	34
24	3.84	0.968	0.578	1	8	28	34	30
25	4.14	0.932	0.361	1	4	20	30	45
26	4.06	0.920	0.596	1	3	22	35	39
27	3.97	0.869	0.662	1	5	20	45	29
28	4.68	0.693	0.586	1	1	4	17	77
29	3.50	1.073	0.655	3	16	28	34	19
30	4.22	0.880	0.622	1	3	13	37	45
31	3.53	0.929	0.604	1	12	35	37	15
32	3.92	1.183	0.563	4	11	16	27	42
33	3.89	1.028	0.711	1	9	25	30	35
34	3.88	0.938	0.752	0	9	24	37	30
35	3.77	0.903	0.743	1	6	32	37	24
36	3.42	1.070	0.665	4	16	30	34	16
37	3.71	0.984	0.692	2	9	27	39	23
38	3.91	0.954	0.597	0	9	24	35	32
39	3.40	0.964	0.638	2	16	36	34	13
40	3.88	0.864	0.660	1	6	22	48	24

APPENDIX L

PARENT DISSEMINATION LETTER

SAND SPRINGS PUBLIC SCHOOLS OFFICE OF THE SUPERINTENDENT

SAND SPRINGS, OKLAHOMA 74063
Dr. Wendell Sharpton
SUPERINTENDENT

Dear Parent:

The testing portion of the research project conducted by the Sand Springs School has been completed. To assist you in interpreting your child's IQ score, the following information is offered:

1. IQ's are typically categorized as follows:

90-109	Average
110-119	Above average
120-129	Superior
+130	Gifted

2. 68% of the total population have assessed IQ's between 85-115, 14% have assessed IQ's between 115-130, and 2% have assessed IQ's above 130.

Based on your child's performance on the day of testing, an IQ of ______ was obtained on the Stanford-Binet Individual Intelligence Scale. The chances that the range of scores between _____ to _____ include your child's true IQ are 90 out of 100.

If you have any concerns regarding the accuracy of this score or would wish further interpretation, please feel free to contact me for a conference.

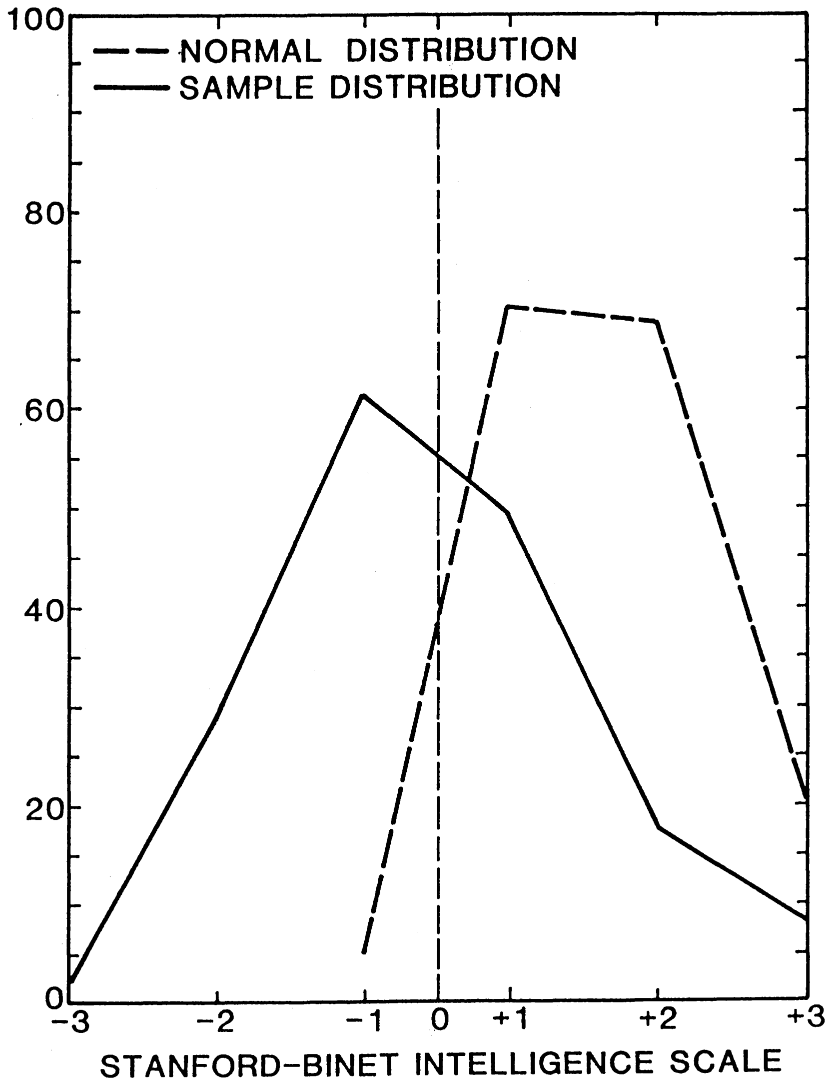
Sincerely,

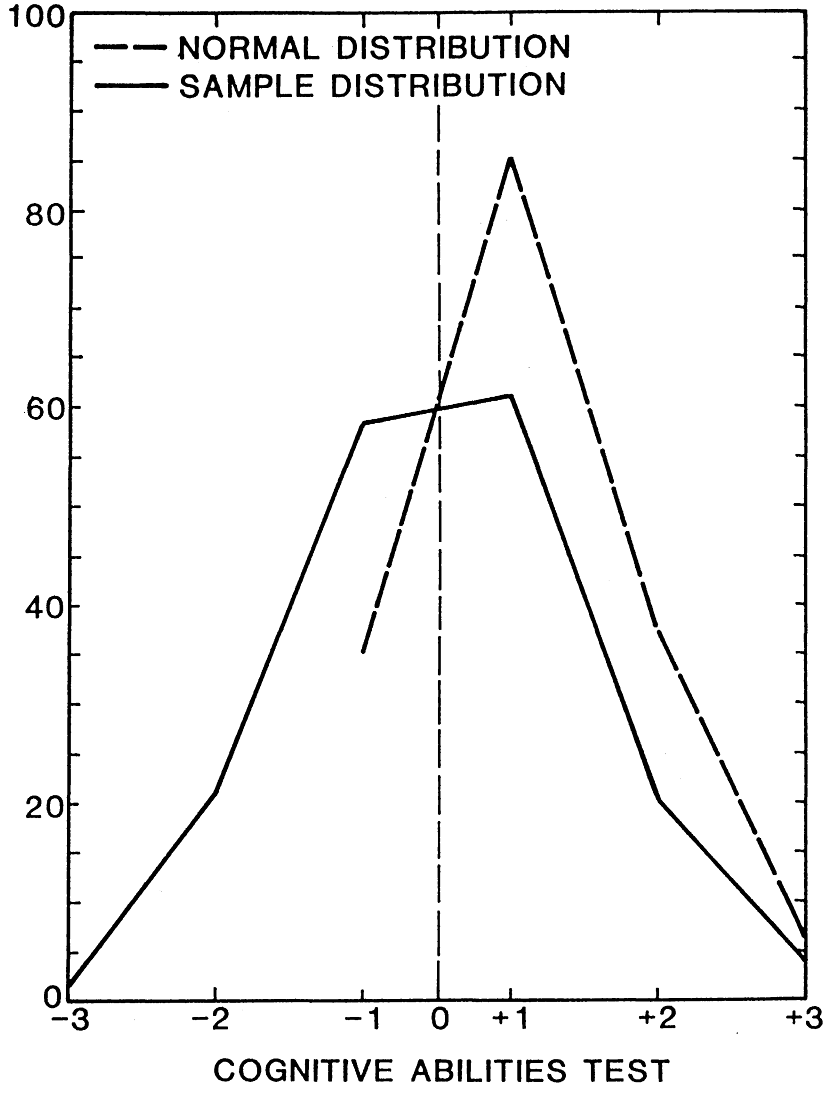
Bonnie Johnson
School Psychologist
245-1874 or 241-3640

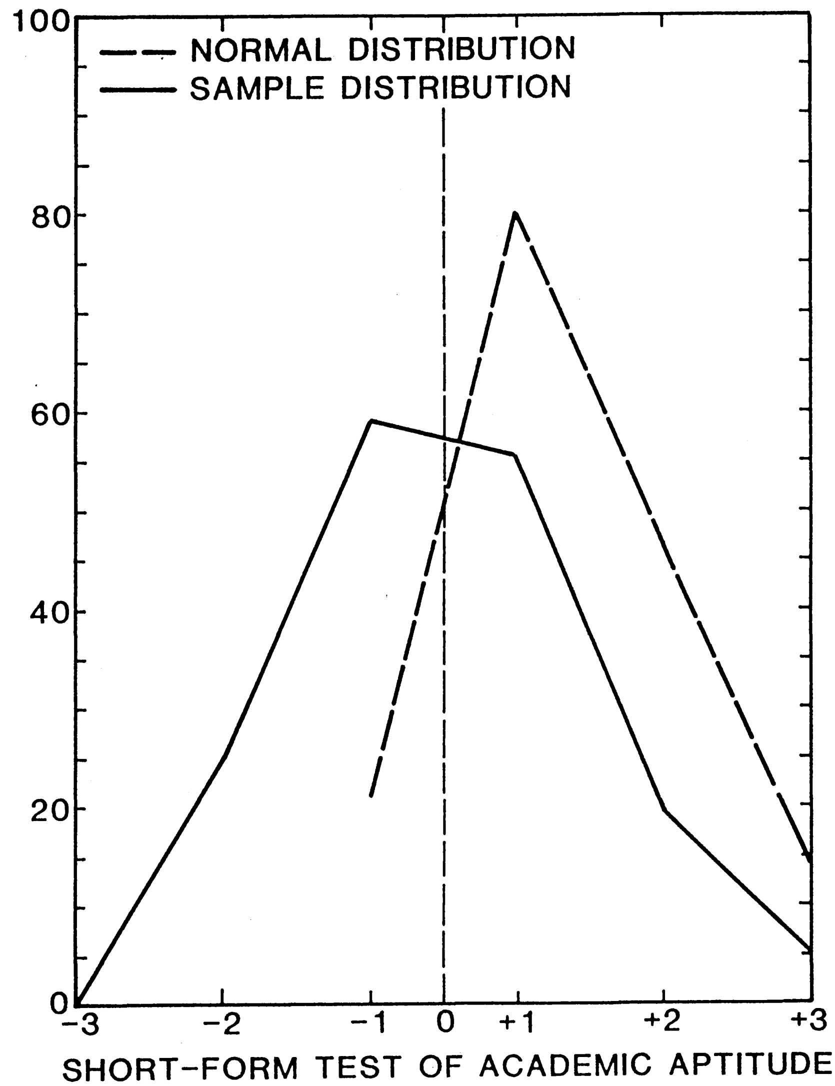
BJ/mm

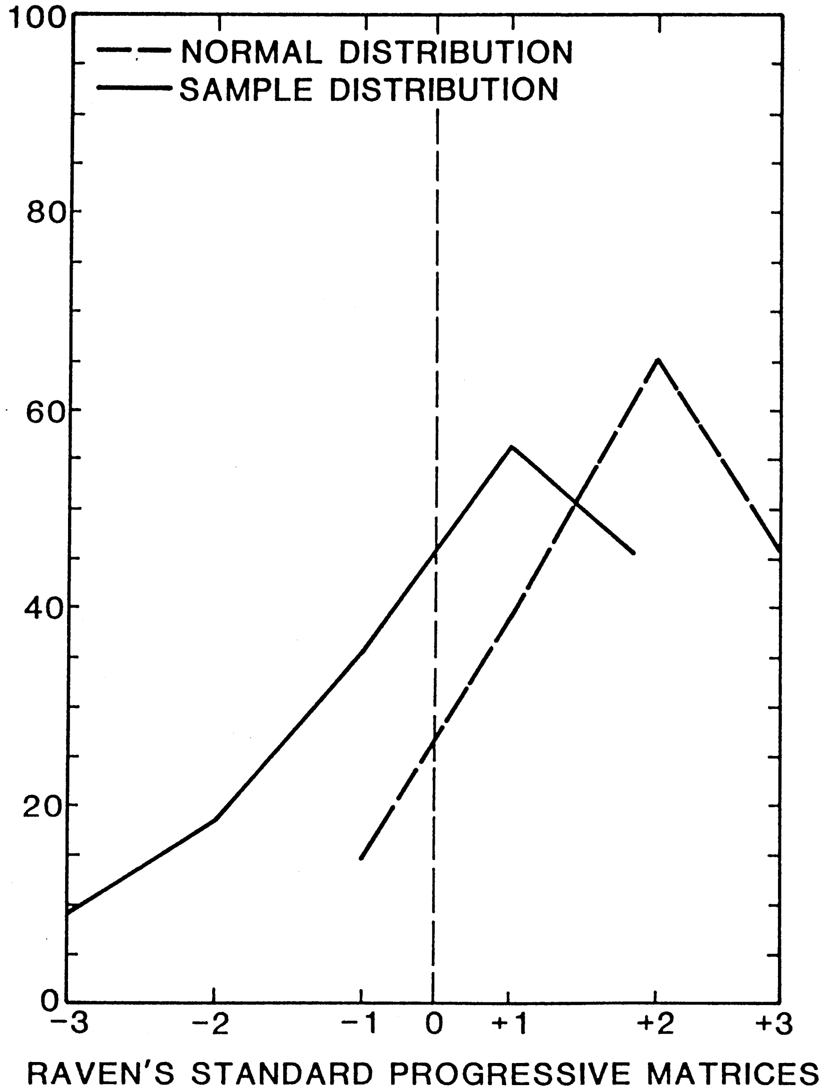
APPENDIX M

GRAPHIC REPRESENTATIONS OF THE DIFFERENCES BETWEEN SAMPLE AND NORMAL MEANS AND STANDARD DEVIATIONS

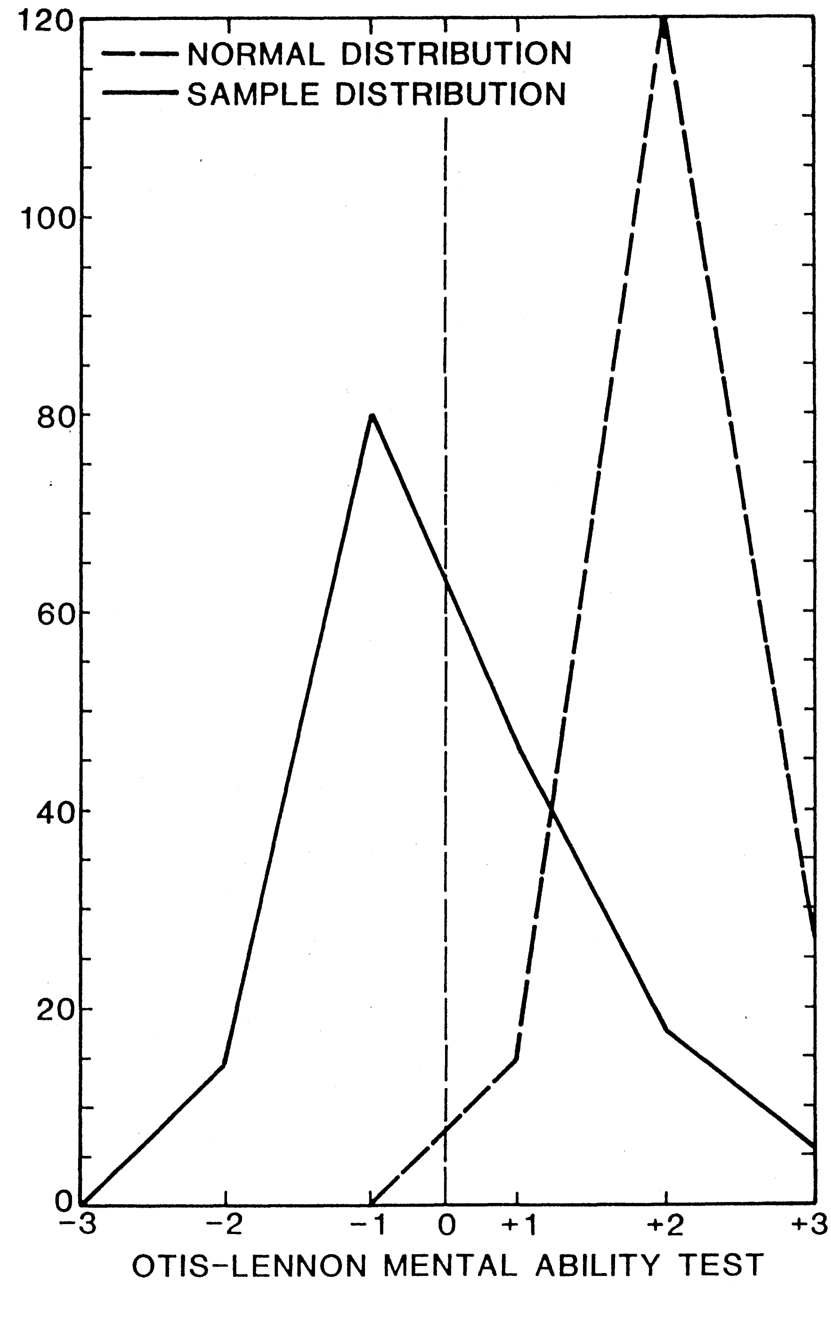

NORMAL DISTRIBUTION
SAMPLE DISTRIBUTION
100
80
60
40
20
0
-3
-2
-1
0
+1
+2
+3
STANFORD-BINET INTELLIGENCE SCALE


100
80
60
40
20
0
NORMAL DISTRIBUTION
SAMPLE DISTRIBUTION
−3
−2
−1
0
+1
+2
+3
COGNITIVE ABILITIES TEST


100
80
60
40
20
0
NORMAL DISTRIBUTION
SAMPLE DISTRIBUTION
-3
-2
-1
0
+1
+2
+3
SHORT-FORM TEST OF ACADEMIC APTITUDE



100
80
60
40
20
0
NORMAL DISTRIBUTION
SAMPLE DISTRIBUTION
−3
−2
−1
0
+1
+2
+3
RAVEN'S STANDARD PROGRESSIVE MATRICES


NORMAL DISTRIBUTION
SAMPLE DISTRIBUTION
120
100
80
60
40
20
0
-3
-2
-1
0
+1
+2
+3
OTIS-LENNON MENTAL ABILITY TEST

APPENDIX N

MULTIPLE REGRESSION SUMMARY TABLE AND CROSS-VALIDATION STATISTICS ON THE VARIABLES WITHOUT TSCALE ENTRY

TABLE XXXVI

MULTIPLE REGRESSION SUMMARY TABLE WITHOUT TSCALE ENTRY
FOR PREDICTING STANFORD-BINET IQS

Step	MR	R^2	Adj. R^2	F	Signif. Level	R^2 Change	Variable In	Beta In	Corr.
1	0.6700	0.4489	0.4451	118.922	0.000	0.4489	CogAT	0.6700	0.6702
2	0.7011	0.4916	0.4846	70.097	0.000	0.0427	SFTAA-L	0.2553	0.5609
3	0.7120	0.5069	0.4966	49.347	0.000	0.0153	SRA2R	0.1425	0.4205

TABLE XXXVII

STATISTICS ON THE VARIABLES IN THE MULTIPLE REGRESSION
EQUATION WITHOUT TSCALE ENTRY

Variable	b	SE b	Beta	SE B	Corr.	Partial Corr.	Partial Corr.	T
CogAT	0.4643	0.0849	0.4428	0.0810	0.6700	0.3199	0.4145	5.466
SFTAA-L	0.2921	0.0791	0.2681	0.0726	0.5609	0.2161	0.2942	3.694
SRA2R	0.1398	0.0661	0.1425	0.0673	0.4205	0.1239	0.1737	2.117
CONSTANT	18.8234	8.7791	---	---	---	---	---	2.144

TABLE XXXVIII

ANALYSIS OF VARIANCE OF REGRESSION EQUATION
WITHOUT TSCALE ENTRY

	DF	SS	MS	F	Signif. Level
Regression	3	11546.5828	3848.8609	49.347	0.000
Residual	144	11231.3361	77.9954	---	---

TABLE XXXIX

STATISTICS OF CALIBRATION SAMPLE
WITHOUT TSCALE ENTRY

Statistic	Variable S-B	Variable Resid-ual Square
Mean	117.966	64.006
Variance	131.848	6454.143
Range	50.000	483.040
Sum	10263.000	5440.535
Standard Error	1.231	8.714
Kurtosis	-0.202	8.324
Standard Deviation	11.482	80.338
Skewness	0.410	2.356
Number	85.000	85.000

APPENDIX O

SCATTERGRAMS OF GROUP IQ TESTS

SCATTERGRAM

Short-Form Test of Academic Aptitude (SFTAA)

																	%
>155																	
150-54						1											
145-49											1						4.2
140-44									1					1			4.2
135-39									2							1	4.2
130-34				1	1				1		3	1		1			20.8
125-29						2	1		2	1	2		1				16.7
120-24					2	4	1	4	2	2	1	1					16.7
115-19				1	1	4	5	8	2	3	1						16.7
110-14			2	2	5	6	10	5	2	2		1					12.5
105-09				3	2	2	7	3	4				1				4.2
100-04				6	3	4	5		1								
95-99	1		1	5	1	3	4	2									
90-94			1	2													
<90				1													
	<90	90-94	95-99	100-04	105-09	110-14	115-19	120-24	125-29	130-34	135-39	140-44	145-49	150-54	155-59	>160	

Stanford-Binet Intelligence Scale

SCATTERGRAM

Raven's Standard Progressive Matrices (SPM)	<90	90-94	95-99	100-04	105-09	110-14	115-19	120-24	125-29	130-34	135-39	140-44	145-49	150-54	155-59	>160	%
+127			1	3	3	6	5	8	6	3	6	1	1	2		1	58.3
125-27				1		6	4	1	1	2		2					16.7
120-24			1	7	2	7	7	3	6	1	2						12.5
115-19			1	1	2		6	2									0.0
110-14				3	2	4	3	3	1	1							4.2
105-09			1		1	3	1	1	1				1				4.2
100-04				2	2		3	3	1	1							4.2
95-99																	
90-94				1	2		2	1									
<90	1			3		1	2		1								

Stanford-Binet Intelligence Scale

SCATTERGRAM

Cognitive Abilities Test (CogAT)	<90	90-94	95-99	100-04	105-09	110-14	115-19	120-24	125-29	130-34	135-39	140-44	145-49	150-54	155-59	>160	%
>155																	
150-54																	
145-49														1			4.2
140-44													1				4.2
135-39																	0.0
130-34									2		1	1				1	12.5
125-29								2	1	2	3	1	1				29.2
120-24						2	1	1	4	1	1						8.3
115-19				1	1	2	5	1	2	3	1			1			20.8
110-14				1	4	4	5	10	3	1		1					8.3
105-09				4	1	4	11	2	4	1	2						12.5
100-04			1	6	3	9	4	3									
95-99				2	3	4	5	2									
90-94	1		2	2		1	2	1	2								
<90			1	6		1											

Stanford-Binet Intelligence Scale

SCATTERGRAM

Otis-Lennon Mental Ability (OTIS)

	<90	90-94	95-99	100-04	105-09	110-14	115-19	120-24	125-29	130-34	135-39	140-44	145-49	150-54	155-59	>160	%
>145								1					1	2		1	16.7
140-44							1										0.0
135-39					1	2	2	3	2								0.0
130-34				1	2	2	1	5	3	2	1	1					16.7
125-29				1	3	6	1	2	2	1	3	1	1				25.0
120-24			2	5	3	6	14	7	6	2	3						20.1
115-19	1		2	14	5	10	15	4	4	3	1	1					20.1

Stanford-Binet Intelligence Scale

APPENDIX P

INTERCORRELATION MATRIX OF THE

TEACHER RATING SCALE

TABLE XL

INTERCORRELATION MATRIX OF ITEMS ON THE TEACHER RATING SCALE*

Items	1	2	3	4	5	6	7	8	9	10
1	1.00									
2	0.54	1.00								
3	0.58	0.79	1.00							
4	0.80	0.40	0.61	1.00						
5	0.68	0.64	0.56	0.62	1.00					
6	0.57	0.57	0.69	0.50	0.54	1.00				
7	0.76	0.65	0.76	0.64	0.67	0.68	1.00			
8	0.59	0.73	0.77	0.57	0.67	0.51	0.72	1.00		
9	0.35	0.37	0.54	0.33	0.21	0.61	0.43	0.38	1.00	
10	0.70	0.52	0.45	0.66	0.83	0.47	0.58	0.67	0.16	1.00
11	0.47	0.51	0.52	0.46	0.52	0.59	0.46	0.45	0.29	0.55
12	0.45	0.81	0.75	0.39	0.55	0.58	0.61	0.78	0.47	0.46
13	0.45	0.49	0.48	0.39	0.62	0.67	0.56	0.62	0.36	0.71
14	0.39	0.46	0.52	0.53	0.33	0.36	0.38	0.52	0.16	0.29
15	0.50	0.57	0.54	0.36	0.59	0.43	0.54	0.61	0.26	0.41
16	0.45	0.68	0.75	0.26	0.60	0.57	0.68	0.73	0.48	0.33
17	0.36	0.49	0.53	0.49	0.33	0.65	0.43	0.43	0.52	0.24
18	0.55	0.59	0.76	0.65	0.48	0.73	0.65	0.62	0.55	0.38
19	0.68	0.61	0.63	0.74	0.60	0.50	0.59	0.57	0.42	0.48
20	0.83	0.68	0.66	0.59	0.84	0.64	0.79	0.68	0.40	0.71

*Based on a random sample of 37.

TABLE XL (Continued)

Items	11	12	13	14	15	16	17	18	19	20
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11	1.00									
12	0.60	1.00								
13	0.59	0.51	1.00							
14	0.41	0.50	0.13	1.00						
15	0.51	0.63	0.36	0.73	1.00					
16	0.38	0.73	0.45	0.44	0.67	1.00				
17	0.63	0.61	0.48	0.57	0.63	0.56	1.00			
18	0.65	0.68	0.46	0.56	0.62	0.68	0.74	1.00		
19	0.59	0.57	0.29	0.63	0.77	0.55	0.55	0.60	1.00	
20	0.46	0.57	0.47	0.51	0.67	0.64	0.40	0.59	0.75	1.00

TABLE XL (Continued)

Items	1	2	3	4	5	6	7	8	9	10
21	0.62	0.58	0.55	0.59	0.77	0.43	0.68	0.69	0.14	0.77
22	0.55	0.66	0.65	0.54	0.73	0.57	0.69	0.70	0.35	0.58
23	0.66	0.38	0.36	0.73	0.67	0.36	0.49	0.54	0.07	0.82
24	0.66	0.29	0.25	0.72	0.52	0.22	0.39	0.40	0.05	0.61
25	0.40	0.41	0.46	0.28	0.26	0.29	0.38	0.35	0.18	0.17
26	0.54	0.38	0.45	0.60	0.42	0.35	0.39	0.45	0.26	0.39
27	0.44	0.46	0.50	0.46	0.23	0.54	0.47	0.37	0.55	0.19
28	0.64	0.51	0.51	0.69	0.65	0.38	0.63	0.60	0.13	0.63
29	0.09	0.27	0.28	0.07	0.18	0.51	0.16	0.10	0.39	0.22
30	0.53	0.49	0.46	0.39	0.51	0.42	0.56	0.41	0.16	0.35
31	0.51	0.31	0.35	0.59	0.60	0.17	0.39	0.51	0.05	0.67
32	0.59	0.36	0.39	0.59	0.70	0.46	0.54	0.51	0.16	0.81
33	0.26	0.61	0.54	0.31	0.50	0.36	0.44	0.58	0.07	0.40
34	0.22	0.57	0.52	0.26	0.49	0.30	0.34	0.57	0.12	0.38
35	0.25	0.48	0.44	0.38	0.50	0.29	0.32	0.55	-0.01	0.50
36	0.21	0.32	0.20	0.16	0.41	0.38	0.23	0.27	0.16	0.49
37	0.18	0.53	0.54	0.31	0.49	0.29	0.43	0.50	0.10	0.33
38	0.15	0.37	0.36	0.18	0.31	0.26	0.25	0.33	0.23	0.28
39	0.21	0.42	0.33	0.27	0.32	0.53	0.27	0.27	0.39	0.32
40	0.59	0.67	0.57	0.52	0.78	0.56	0.67	0.69	0.22	0.66

TABLE XL (Continued)

Items	11	12	13	14	15	16	17	18	19	20
21	0.42	0.63	0.54	0.33	0.53	0.49	0.34	0.43	0.45	0.67
22	0.55	0.81	0.56	0.39	0.61	0.70	0.49	0.46	0.62	0.71
23	0.54	0.36	0.47	0.61	0.55	0.20	0.28	0.39	0.64	0.68
24	0.29	0.18	0.21	0.61	0.49	0.17	0.16	0.22	0.65	0.65
25	0.39	0.58	0.25	0.35	0.40	0.45	0.51	0.60	0.34	0.32
26	0.41	0.43	0.15	0.77	0.60	0.32	0.39	0.54	0.70	0.58
27	0.50	0.46	0.35	0.53	0.54	0.40	0.68	0.60	0.66	0.45
28	0.35	0.44	0.28	0.63	0.53	0.41	0.17	0.46	0.63	0.78
29	0.36	0.37	0.46	0.16	0.10	0.20	0.52	0.40	0.11	0.13
30	0.28	0.65	0.29	0.38	0.48	0.50	0.39	0.40	0.39	0.56
31	0.23	0.21	0.31	0.57	0.44	0.23	0.17	0.22	0.52	0.56
32	0.41	0.24	0.60	0.29	0.43	0.27	0.17	0.37	0.45	0.65
33	0.41	0.69	0.47	0.45	0.54	0.61	0.44	0.40	0.32	0.42
34	0.48	0.70	0.43	0.49	0.58	0.55	0.50	0.43	0.43	0.37
35	0.44	0.62	0.45	0.49	0.49	0.41	0.39	0.40	0.26	0.35
36	0.39	0.42	0.66	0.06	0.17	0.18	0.43	0.26	0.01	0.19
37	0.31	0.65	0.36	0.41	0.43	0.50	0.38	0.30	0.27	0.38
38	0.47	0.54	0.34	0.13	0.20	0.24	0.47	0.47	0.22	0.18
39	0.51	0.54	0.54	0.18	0.26	0.23	0.50	0.46	0.24	0.22
40	0.52	0.67	0.49	0.49	0.54	0.57	0.35	0.61	0.55	0.76

TABLE XL (Continued)

Items	21	22	23	24	25	26	27	28	29	30
21	1.00									
22	0.74	1.00								
23	0.60	0.50	1.00							
24	0.39	0.35	0.85	1.00						
25	0.40	0.58	0.16	0.11	1.00					
26	0.28	0.38	0.68	0.75	0.38	1.00				
27	0.15	0.48	0.39	0.40	0.37	0.50	1.00			
28	0.56	0.60	0.80	0.79	0.26	0.71	0.37	1.00		
29	0.14	0.35	0.13	-0.03	0.36	0.11	0.40	0.05	1.00	
30	0.65	0.73	0.31	0.26	0.67	0.38	0.27	0.40	0.40	1.00
31	0.55	0.39	0.83	0.74	0.05	0.58	0.24	0.70	0.01	0.27
32	0.62	0.39	0.75	0.51	0.06	0.37	0.19	0.57	0.08	0.19
33	0.62	0.65	0.27	0.16	0.57	0.24	0.27	0.26	0.40	0.71
34	0.55	0.64	0.33	0.15	0.58	0.36	0.28	0.22	0.41	0.66
35	0.65	0.60	0.42	0.22	0.57	0.30	0.23	0.29	0.40	0.64
36	0.47	0.47	0.27	0.04	0.35	-0.01	0.22	0.06	0.75	0.49
37	0.62	0.67	0.24	0.10	0.45	0.15	0.24	0.27	0.44	0.69
38	0.46	0.55	0.14	-0.05	0.66	0.11	0.33	0.14	0.57	0.46
39	0.30	0.50	0.19	0.03	0.47	0.24	0.52	0.10	0.74	0.43
40	0.62	0.72	0.60	0.43	0.39	0.48	0.30	0.67	0.32	0.59

TABLE XL (Continued)

Items	31	32	33	34	35	36	37	38	39	40
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31	1.00									
32	0.69	1.00								
33	0.25	0.25	1.00							
34	0.33	0.23	0.91	1.00						
35	0.35	0.35	0.89	0.87	1.00					
36	0.15	0.23	0.52	0.47	0.57	1.00				
37	0.30	0.17	0.85	0.77	0.75	0.56	1.00			
38	0.01	0.06	0.51	0.55	0.61	0.59	0.55	1.00		
39	0.00	0.20	0.51	0.52	0.54	0.70	0.49	0.67	1.00	
40	0.48	0.48	0.52	0.55	0.55	0.37	0.53	0.37	0.45	1.00

APPENDIX Q

INTERCORRELATION MATRIX OF THE

PARENT RATING SCALE

TABLE XLI

INTERCORRELATION MATRIX OF ITEMS ON THE PARENT RATING SCALE*

Items	1	2	3	4	5	6	7	8	9	10
1	1.00									
2	0.35	1.00								
3	0.47	0.46	1.00							
4	0.50	0.43	0.55	1.00						
5	0.51	0.31	0.43	0.46	1.00					
6	0.31	0.37	0.34	0.37	0.39	1.00				
7	0.51	0.32	0.53	0.59	0.52	0.36	1.00			
8	0.43	0.43	0.53	0.57	0.46	0.54	0.52	1.00		
9	0.56	0.32	0.44	0.49	0.37	0.31	0.46	0.44	1.00	
10	0.46	0.36	0.42	0.55	0.49	0.38	0.48	0.48	0.36	1.00
11	0.33	0.42	0.36	0.47	0.39	0.47	0.40	0.49	0.30	0.47
12	0.38	0.35	0.35	0.45	0.28	0.43	0.36	0.41	0.37	0.35
13	0.29	0.28	0.43	0.46	0.45	0.59	0.47	0.52	0.35	0.40
14	0.20	0.44	0.33	0.29	0.35	0.43	0.28	0.40	0.18	0.40
15	0.34	0.41	0.46	0.49	0.46	0.50	0.49	0.55	0.31	0.42
16	0.39	0.46	0.56	0.53	0.44	0.44	0.44	0.59	0.40	0.39
17	0.32	0.52	0.44	0.42	0.34	0.41	0.32	0.49	0.38	0.34
18	0.35	0.38	0.44	0.37	0.33	0.48	0.35	0.46	0.34	0.29
19	0.32	0.31	0.46	0.37	0.48	0.30	0.32	0.38	0.33	0.43
20	0.42	0.28	0.39	0.42	0.63	0.32	0.52	0.48	0.41	0.45

*Based on N of 161.

TABLE XLI (Continued)

Items	11	12	13	14	15	16	17	18	19	20
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11	1.00									
12	0.49	1.00								
13	0.51	0.41	1.00							
14	0.46	0.42	0.49	1.00						
15	0.59	0.50	0.57	0.54	1.00					
16	0.45	0.41	0.51	0.33	0.52	1.00				
17	0.43	0.33	0.47	0.51	0.46	0.43	1.00			
18	0.48	0.31	0.49	0.42	0.46	0.52	0.48	1.00		
19	0.37	0.44	0.44	0.51	0.54	0.42	0.41	0.39	1.00	
20	0.39	0.34	0.59	0.41	0.52	0.43	0.33	0.36	0.50	1.00

TABLE XLI (Continued)

Items	1	2	3	4	5	6	7	8	9	10
21	0.43	0.36	0.46	0.42	0.56	0.52	0.50	0.56	0.31	0.50
22	0.34	0.34	0.51	0.52	0.40	0.43	0.50	0.59	0.33	0.43
23	0.34	0.29	0.41	0.35	0.48	0.45	0.46	0.40	0.23	0.50
24	0.33	0.26	0.31	0.30	0.39	0.26	0.32	0.29	0.29	0.54
25	0.27	0.18	0.15	0.23	0.19	0.26	0.24	0.17	0.25	0.18
26	0.32	0.43	0.33	0.34	0.31	0.33	0.26	0.34	0.30	0.50
27	0.25	0.58	0.44	0.35	0.35	0.39	0.32	0.42	0.26	0.33
28	0.48	0.38	0.38	0.45	0.60	0.24	0.47	0.39	0.50	0.47
29	0.25	0.35	0.42	0.38	0.28	0.40	0.27	0.51	0.24	0.39
30	0.46	0.31	0.42	0.39	0.35	0.27	0.37	0.45	0.41	0.41
31	0.22	0.34	0.40	0.35	0.35	0.33	0.35	0.47	0.13	0.48
32	0.28	0.19	0.23	0.24	0.46	0.38	0.25	0.34	0.17	0.42
33	0.42	0.36	0.42	0.41	0.37	0.50	0.43	0.55	0.35	0.40
34	0.37	0.42	0.42	0.47	0.34	0.42	0.39	0.55	0.33	0.40
35	0.32	0.36	0.42	0.40	0.38	0.46	0.42	0.53	0.32	0.40
36	0.28	0.35	0.37	0.34	0.24	0.49	0.26	0.42	0.24	0.24
37	0.36	0.33	0.49	0.48	0.33	0.46	0.43	0.54	0.27	0.32
38	0.31	0.43	0.28	0.26	0.22	0.35	0.24	0.35	0.32	0.28
39	0.29	0.36	0.24	0.25	0.26	0.44	0.27	0.31	0.16	0.31
40	0.23	0.42	0.38	0.36	0.33	0.41	0.31	0.47	0.22	0.51

TABLE XLI (Continued)

Items	11	12	13	14	15	16	17	18	19	20
21	0.51	0.38	0.56	0.44	0.53	0.46	0.38	0.40	0.47	0.52
22	0.35	0.37	0.43	0.36	0.52	0.52	0.39	0.39	0.44	0.33
23	0.37	0.33	0.40	0.38	0.48	0.38	0.30	0.28	0.41	0.39
24	0.37	0.36	0.40	0.40	0.43	0.32	0.30	0.19	0.47	0.40
25	0.13	0.21	0.16	0.16	0.25	0.09	0.15	0.11	0.31	0.16
26	0.45	0.31	0.29	0.50	0.43	0.28	0.45	0.38	0.36	0.27
27	0.44	0.29	0.37	0.57	0.47	0.36	0.67	0.39	0.45	0.27
28	0.27	0.26	0.29	0.29	0.45	0.34	0.28	0.25	0.45	0.60
29	0.33	0.29	0.34	0.37	0.43	0.43	0.41	0.33	0.32	0.19
30	0.35	0.27	0.33	0.24	0.38	0.35	0.42	0.36	0.32	0.33
31	0.35	0.25	0.37	0.33	0.42	0.28	0.40	0.33	0.37	0.29
32	0.41	0.15	0.50	0.32	0.37	0.33	0.21	0.39	0.33	0.55
33	0.44	0.36	0.46	0.34	0.50	0.54	0.39	0.42	0.33	0.40
34	0.42	0.34	0.51	0.41	0.52	0.45	0.53	0.42	0.42	0.40
35	0.47	0.39	0.38	0.45	0.56	0.43	0.42	0.36	0.42	0.36
36	0.41	0.24	0.42	0.36	0.47	0.39	0.49	0.49	0.35	0.28
37	0.40	0.28	0.46	0.36	0.47	0.51	0.38	0.45	0.36	0.34
38	0.29	0.46	0.32	0.35	0.39	0.28	0.39	0.36	0.35	0.29
39	0.40	0.33	0.39	0.45	0.41	0.34	0.44	0.38	0.32	0.28
40	0.39	0.21	0.39	0.48	0.51	0.41	0.36	0.28	0.40	0.43

TABLE XLI (Continued)

Items	21	22	23	24	25	26	27	28	29	30
21	1.00									
22	0.58	1.00								
23	0.56	0.51	1.00							
24	0.44	0.31	0.52	1.00						
25	0.30	0.20	0.33	0.29	1.00					
26	0.36	0.42	0.38	0.48	0.30	1.00				
27	0.51	0.48	0.38	0.30	0.18	0.53	1.00			
28	0.42	0.41	0.51	0.44	0.30	0.37	0.36	1.00		
29	0.53	0.62	0.45	0.23	0.16	0.40	0.44	0.25	1.00	
30	0.48	0.42	0.37	0.37	0.21	0.28	0.34	0.32	0.46	1.00
31	0.49	0.44	0.49	0.49	0.22	0.49	0.35	0.32	0.46	0.48
32	0.49	0.35	0.42	0.30	0.08	0.23	0.28	0.41	0.33	0.30
33	0.48	0.50	0.39	0.36	0.15	0.23	0.42	0.31	0.48	0.52
34	0.50	0.57	0.47	0.37	0.23	0.39	0.56	0.38	0.62	0.55
35	0.60	0.58	0.56	0.44	0.47	0.41	0.47	0.34	0.59	0.50
36	0.43	0.52	0.37	0.22	0.22	0.34	0.52	0.22	0.52	0.39
37	0.48	0.54	0.43	0.25	0.18	0.25	0.43	0.25	0.54	0.45
38	0.36	0.41	0.38	0.35	0.34	0.41	0.40	0.34	0.47	0.43
39	0.51	0.44	0.37	0.28	0.20	0.32	0.46	0.23	0.46	0.44
40	0.47	0.45	0.40	0.45	0.25	0.46	0.46	0.39	0.47	0.40

TABLE XLI (Continued)

Items	31	32	33	34	35	36	37	38	39	40
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31	1.00									
32	0.29	1.00								
33	0.38	0.46	1.00							
34	0.42	0.39	0.64	1.00						
35	0.47	0.36	0.55	0.67	1.00					
36	0.29	0.40	0.63	0.67	0.59	1.00				
37	0.35	0.36	0.70	0.60	0.59	0.68	1.00			
38	0.30	0.30	0.40	0.42	0.50	0.45	0.37	1.00		
39	0.35	0.45	0.55	0.51	0.58	0.60	0.52	0.54	1.00	
40	0.44	0.38	0.41	0.53	0.58	0.41	0.43	0.40	0.47	1.00

APPENDIX R

CORRELATIONS OF THE HYPOTHESIZED CLUSTERS

ON THE PARENT RATING SCALE

TABLE XLII

CORRELATIONS OF HYPOTHESIZED CLUSTERS
ON THE PARENT RATING SCALE

Factor	Label	Items	Correlation
01	Retentiveness-Memory	01, 06	0.31
02	Knowledge and Skills	11, 05	0.39
03	Comprehension	13, 16	0.51
04	Intellectual Curiosity	19, 09	0.33
05	Language Development/Fluency	18, 03	0.44
		18, 36	0.49
		03, 36	0.37
06	Fluency of Ideas	15, 17	0.46
07	Acceleration	17, 20	0.52
08	Flexibility	12, 21	0.38
09	Perceptiveness	04, 08	0.57
10	Concentration	10, 04	0.55
11	Originality	02, 14	0.44
		14, 27	0.57
		02, 27	0.58
12	Persistence	23, 24	0.52
		23, 28	0.51
		24, 28	0.44
13	Abstraction	33, 37	0.70
14	Generalization	22, 39	0.44
15	Synthesis-Induction	34, 36	0.67
16	Analysis-Deductive	29, 34	0.61
17	Elaboration	26, 04	0.34
18	Verbal Reasoning	30, 35	0.50
19	Independence in Thought	25, 38	0.37
20	Independence in Action	31, 40	0.44
21	Reading Proficiency	32, 15	0.46

APPENDIX S

CORRELATIONS OF THE HYPOTHESIZED CLUSTERS

ON THE TEACHER RATING SCALE

TABLE XLIII

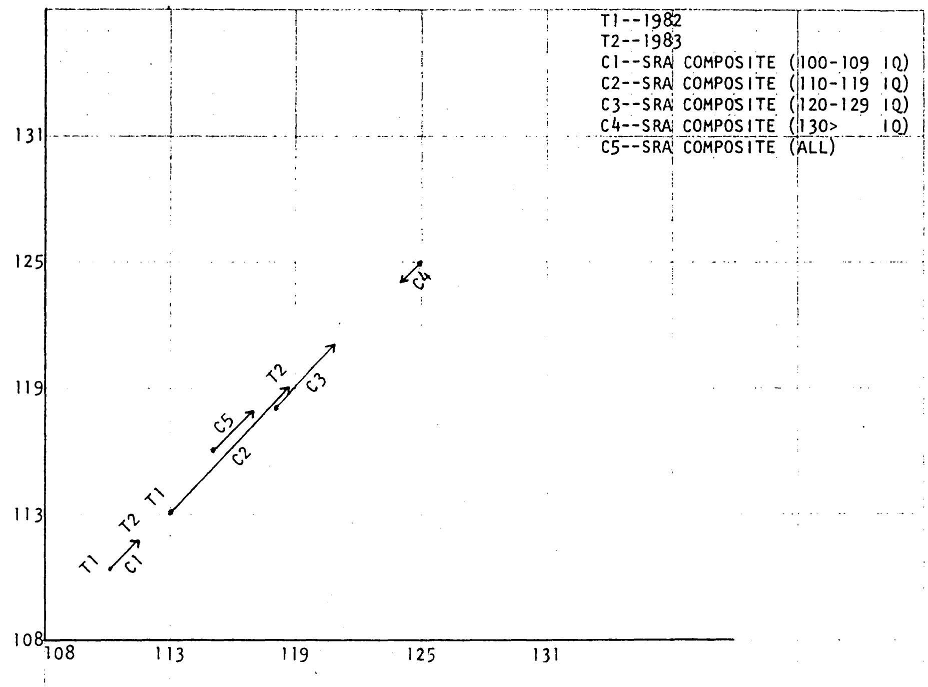
CORRELATIONS OF HYPOTHESIZED CLUSTERS
ON THE TEACHER RATING SCALE

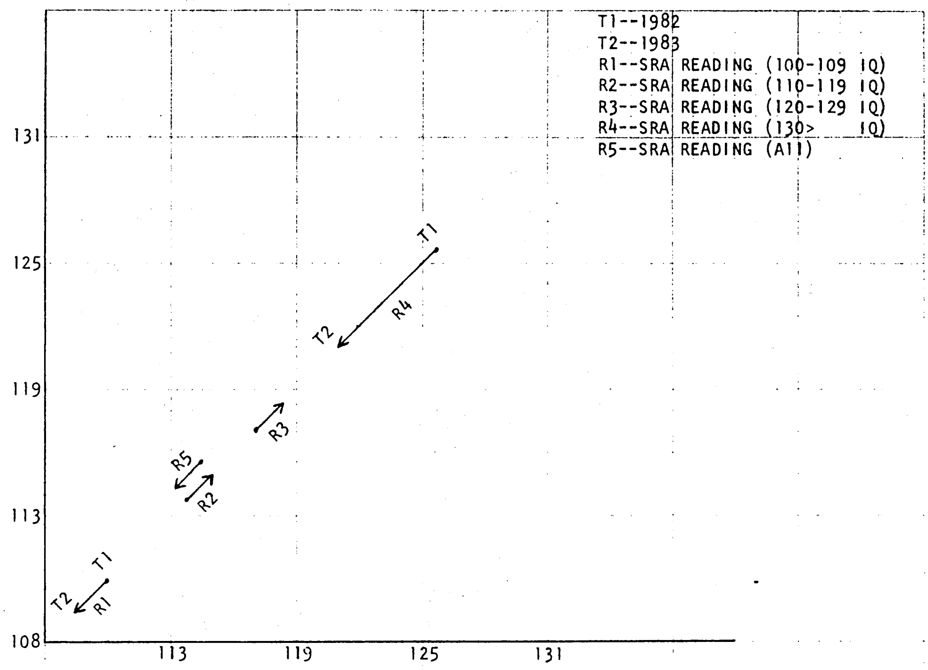
Factor	Label	Items	Correlation
01	Retentiveness-Memory	01, 06	0.55
02	Knowledge and Skills	11, 05	0.48
03	Comprehension	13, 06	0.52
04	Intellectual Curiosity	19, 09	0.51
05	Language Development/Fluency	18, 03	0.62
		18, 36	0.46
		03, 36	0.31
06	Fluency of Ideas	15, 17	0.51
07	Acceleration	07, 20	0.71
08	Flexibility	12, 21	0.69
09	Perceptiveness	04, 08	0.62
10	Concentration	10, 04	0.64
11	Originality	02, 14	0.56
		14, 27	0.51
		27, 02	0.69
12	Persistence	23, 24	0.79
		23, 28	0.74
		28, 24	0.80
13	Abstraction	33, 37	0.80
14	Generalization	22, 39	0.42
15	Synthesis-Inductive	34, 36	0.41
16	Analysis-Deductive	29, 34	0.43
17	Elaboration	26, 04	0.57
18	Verbal Reasoning	30, 35	0.71
19	Independence in Thought	25, 38	0.70
20	Independence in Action	31, 40	0.65
21	Reading Proficiency	32, 05	0.65

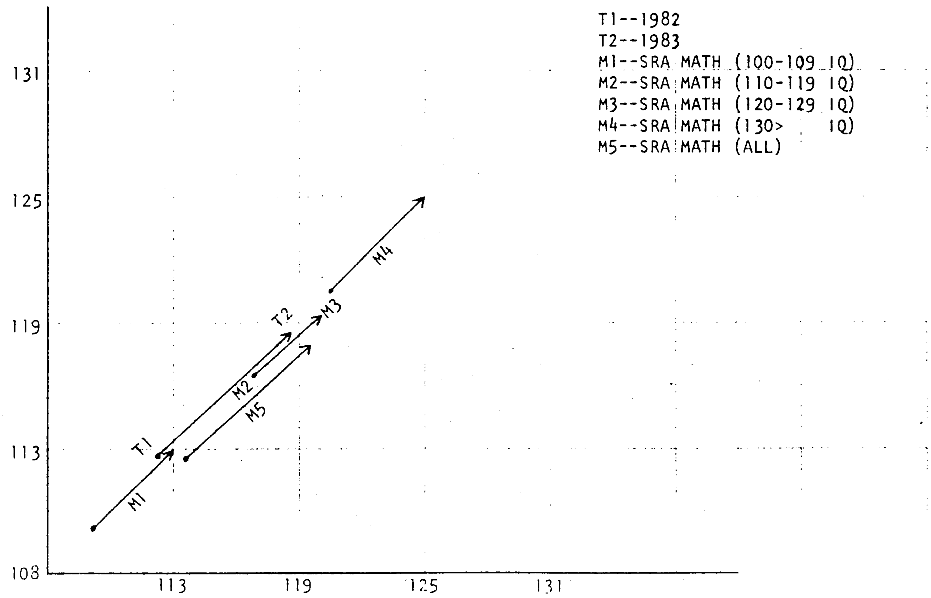
APPENDIX T

SCATTERGRAMS OF 1982 AND 1983 SRA SUBTESTS

DIFFERENTIATED BY IQ LEVELS


T1--1982
T2--1983
C1--SRA COMPOSITE (100-109 IQ)
C2--SRA COMPOSITE (110-119 IQ)
C3--SRA COMPOSITE (120-129 IQ)
C4--SRA COMPOSITE (130> IQ)
C5--SRA COMPOSITE (ALL)
131
125
119
113
108
108
113
119
125
131
T1
T2
C1
T1
C5
C2
T2
C3
C4


T1--1982
T2--1983
R1--SRA READING (100-109 IQ)
R2--SRA READING (110-119 IQ)
R3--SRA READING (120-129 IQ)
R4--SRA READING (130> IQ)
R5--SRA READING (All)
131
125
119
113
108
113
119
125
131
T1
T2
R4
R3
R5
R2
R1


T1--1982
T2--1983
M1--SRA MATH (100-109 IQ)
M2--SRA MATH (110-119 IQ)
M3--SRA MATH (120-129 IQ)
M4--SRA MATH (130> IQ)
M5--SRA MATH (ALL)
131
125
119
113
108
113
119
125
131
M4
T2
M3
M2
M5
T1
M1

APPENDIX U

LETTER OF APPROVAL FROM SAND SPRINGS PUBLIC SCHOOLS

SAND SPRINGS PUBLIC SCHOOLS OFFICE OF THE SUPERINTENDENT

SAND SPRINGS, OKLAHOMA 74063
Dr. Wendell Sharpton
SUPERINTENDENT

August 19, 1982

Mrs. Bonnie Johnson
School Psychologist
P.O. Box 513
Sand Springs, OK 74063

Dear Mrs. Johnson:

I have received with interest your dissertation proposal, and I believe it to be a viable study. The need to develop reliable measures for selecting and placing students in gifted and talented educational programs is clear. In Sand Springs, the dilemma of how we are to determine who should be classified as gifted has presented us with confusion and indecision. Selection processes for special education programs appear much more advanced over procedures now in place for selecting participants for gifted or enrichment studies programs.

I support your research and shall request that the staff connected with the gifted and talented program and the cooperating teachers involved assist you in these efforts.

Very truly yours,

Wendell A. Sharpton
Superintendent

WAS/bm

cc: Susan Cox

VITA

Bonnie Bea Johnson

Candidate for the Degree of

Doctor of Philosophy

Thesis: PREDICTORS OF STANFORD-BINET INTELLIGENCE SCORES AMONG POTENTIALLY GIFTED FIRST AND SECOND GRADE STUDENTS

Major Field: Applied Behavioral Studies

Biographical:

Personal Data: Born in Lynwood, California, March 14, 1947, the daughter of Arthur and Mary Jo Schultz, the wife of James R. Johnson, and mother of Tonya and Kyra Tromblee.

Education: Graduated from Sidney Lanier High School, Montgomery, Alabama, in May, 1965; attended the University of Alabama from 1965 to 1968; received Bachelor of Arts degree in Secondary Education from the University of Michigan in 1969; received Master of Arts degree in Special Education from Western Michigan University in 1975; enrolled in the School Psychology certification program in 1977 at the Oklahoma State University; completed requirements for the Doctor of Philosophy degree at Oklahoma State University in May, 1984.

Professional Experience: Ninth grade Biology teacher, Huntsville, Alabama, 1969-1970; graduate teaching assistant, Department of Special Education, Western Michigan University, 1974-1975; adjunct instructor, Department of Special Education, University of Tulsa, 1976-1977; special education teacher of the educable and trainable mentally handicapped, Hissom Memorial Center, Sand Springs, Oklahoma, 1977-1979; school psychologist, Sand Springs Public Schools, Oklahoma, 1979 to present; member of the National Association of School Psychology, Oklahoma Association of School Psychology, Oklahoma Association of Guidance Personnel, Council of Exceptional Children, American Personnel and Guidance Association.