

Field Dependence/Independence
Reading Attitudes, and Academic Achievement
in Fifth and Sixth Grade Gifted Children

THESIS

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Abstract

The purpose of this study was to reveal the significance of relationship among the cognitive style of field dependence/independence, reading attitudes, and academic achievement for a sample of fifth and sixth grade gifted children and to compare these relationships with those found for a sample of students of average ability.

The study was conducted with 72 students in a suburban Western New York school district. Field dependence/independence was determined using the Group Embedded Figures Test (GEFT). Reading attitudes were determined using the Third Experimental Edition of the Survey of Reading Attitudes (SRA) by Wallbrown, Brown, and Engin. IQ was determined using the Lorge-Thorndike Intelligence Test. Academic achievement was determined using the Iowa Tests of Basic Skills (ITBS).

Repeated one-way analyses of variance revealed significant differences between the gifted and average students in their performance on measures of field dependence/independence, reading attitudes, IQ, and academic achievement.

Additional one-way analyses of variance revealed that females read for enjoyment more than males do. There were no statistical differences between males and females in the scores obtained on the GEFT, SRA, IQ, and ITBS measures.

A correlational study revealed significant positive relationships between performance on a test of field dependence/independence and measures of IQ and academic achievement. A significant negative relationship was also revealed to exist between field dependence/independence and the Expressed Difficulty dimension of reading attitude.

Results of the analyses were discussed in terms of their application to the identification and education of the gifted.

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Chapter I

Statement of the Problem

Purpose

The purpose of this study was to investigate the relationships which exist among the cognitive style of field dependence/independence, eight dimensions of reading attitude, and performance on standardized measures of academic achievement and intelligence for a group of fifth and sixth grade gifted students.

Need for the Study

One of the most pervasive themes in the literature of gifted education is dissatisfaction with the standardized IQ test as a basic tool in the process of identifying gifted children. Central to this problem is the question of "What is meant by 'gifted'?" While there are many conflicting points of view concerning an acceptable definition of "giftedness," there is one point upon which most educators agree: the more that is known about gifted children and how they learn, the easier it will be to design better and more meaningful educational programs for them, and thereby make the realization of their full potential possible.

The basic issue in education of the gifted, just as it is in education of those with moderate and low intellectual

ability, is individualization in content, materials and method (Gold, 1965, p.5). The aim is the release of the individual's potential, and gifted children must receive differentiated educational opportunities if they are to realize their contributions to self and society.

Once it is accepted that the gifted need to be recognized in order to individualize their programs, the problem then becomes how to identify them. Gifted is a term of relative definition, and many educational conflicts result from this lack of clarity. Former U.S. Commissioner of Education Sidney Marland, Jr., tackled the problem of defining giftedness in his 1971 United States Office of Education (USOE) Report to the Congress:

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 program 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 combination:

1. general intellectual ability
2. specific academic aptitude
3. creative or productive thinking
4. leadership ability
5. visual and performing arts
6. psychomotor ability (p.ix)

This definition represents the first formal recognition at the federal level of the problems of education for gifted children. It should be noted that when Congress

passed the "Gifted and Talented Children's Act of 1978" (PL95-561), the category of "psychomotor ability" was deleted from the areas suggested by the Marland Report. Therefore, the current USOE definition contains only five categories for consideration.

The Marland Report emphasized the importance of a "differentiated educational program" by listing its three essential characteristics:

1. A differentiated curriculum which denotes higher cognitive concepts and processes.
2. Instructional strategies which accommodate the learning styles of the gifted and talented and curriculum content.
3. Special grouping arrangements which include a variety of administrative procedures appropriate to particular children, i.e., special classes, honor classes, seminars, resource rooms, and the like (p. x)

However, stating a definition is one thing, and making it educationally operational is another (Gallagher, 1979, p.30). While trying to effect some guidelines for educators, the USOE definition presents some major problems. Among them are its failure to consider nonintellective or motivational factors and the non-parallel nature of its components - a fault which contributes to its widespread misinterpretation and misuse (Renzulli, 1978, p.181). According to Gallagher, though, the inadequacies of the definition are merely symptoms pointing to the incompleteness of what is known about the relevant concepts. There

will not be a better definition of giftedness until more is known about the factors involved in what it really is.

Unfortunately, at the present time, "no matter how elaborate and all-encompassing the definition of giftedness, the specific identification tools that are actually used are often the real determiner and the real definer of giftedness in a school setting" (Gallagher, 1975, p.26). Coincidentally, the term gifted as it is used today is most specifically identified with high intellectual ability (Clark, 1979), and measuring intelligence has, up to now, been mostly dependent on paper and pencil tests - specifically, the standardized IQ tests. The reliance upon tests which compare people with a standard or norm has been disputed for many years (Clark, 1979; Gallagher, 1975; Gold, 1965; Hildreth, 1966; Whitmore, 1980; Witty, 1951), but "even now the intelligence test looms very large as a selection tool for the gifted individual" (Clark, 1979, p.117).

Gallagher (1975) confronts this paradox by explaining that although IQ tests clearly do not measure all of what is considered to be important in our discussions of intelligence, they are valuable for several reasons. First, they give some indication of the current mental level of the child in comparison with others of his own age. Second, they make predictions as to the rate of the child's mental growth in the future. Finally, they measure much of what is necessary to current academic success.

While Gallagher's defense of the IQ tests substantiates the reasons that they are still used, the criticisms of them should not be ignored. One assumption of most intelligence tests is that intelligence is a single, unvariable factor (Clark, 1979; Gallagher, 1965; Mindell, 1982; Whitmore, 1980). More current data indicate that intelligence is neither a single factor, nor is it a constant one (Clark, p.126).

Another problem with the IQ tests is the choice of content items. IQ tests tend to be good predictors of academic success because the items on them have been restricted to the concepts and skills found in school curricula - especially reading, language arts, and arithmetic (Clark, 1979; Gold, 1965).

The norming of the most commonly used IQ tests was conducted within the major culture; this has given rise to the criticism of "culture-bias." Therefore, many believe that such bias makes the tests inappropriate as measures of ability for children outside the Anglo culture (Clark, 1979; Gallagher, 1975; Gold, 1965; Marland, 1971; Whitmore, 1980; Witty, 1951).

Most school districts which provide special programs for the gifted do use several types of screening devices, but will continue to use what is available until more productive measures are developed (Whitmore, 1980). Gallagher

(1975) challenges those who criticize the IQ tests to devise others that are more appropriate to be used as identification tools. Clark feels that to do so it must be first discovered which activities and skills include both cognition and motivational development and in what sequence these activities usually occur. That information, she notes, would be useful in the development of criterion measures which would not only reveal a child's present level of development, but which also would suggest experiences that would best challenge further growth (1979, p.12). Given those guidelines, perhaps an acceptable alternative already exists in the area of cognitive styles.

Simply put, cognitive styles are the methods by which people prefer to select and process information. In recent years there has been a significant increase in the amount of research conducted in this field - particularly concerning its relationship to education. With the increased focus of attention on individualization in the classroom, particularly in establishing the USOE recommended differentiated programs for the gifted, preferential modes of learning must be considered.

So far, at least nine dimensions of cognitive style have been identified and studied, with field dependence/independence being the most widely known and thoroughly researched. Approximately thirty years of work by Herman Witkin and his colleagues has yielded considerable data

concerning the instruments used to assess field dependence/independence and its relationship to a host of cognitive, personality and social-behavioral characteristics (Kogan, 1971).

Field independent people tend to be more internally motivated and to process information sequentially or analytically. They tend to be self-reliant and prefer solitary occupations which are abstract rather than social in content. On the other hand, field dependent people tend to be more externally motivated and to process information simultaneously or in a global fashion. They prefer social situations and enjoy the company of others (Cohen, 1969; McClelland, 1977; Witkin & Goodenough, 1976). Related research also suggests that students who are more field independent learn better from an inductive approach, while field dependent students tend to benefit from a more teacher directed approach (Daku, 1978; Kogan, 1971; Smith, 1973). Because research has shown that cognitive styles influence "how students learn, how teachers teach, how teachers and students interact, and how students make their educational and vocational choices and perform in the areas of their choice" (Witkin, Moore, Goodenough, & Cox, 1977, p.2), they should certainly be considered when screening potential candidates for differentiated courses of study. The resultant educational programs would be significantly more meaningful if they were based upon the specific cog-

nitive variations present in each student.

Similarly, because the educational planning for the affective development of gifted students, like the planning for the cognitive development, must stem from the special characteristics - hence, the special needs, of the students to be served, the design of such programs should reflect the interests and attitudes of the individuals as well as the particular subjects in which they may excell (Barbe & Renzulli, 1975). Since it has been established that the ability to read well constitutes "much of what is necessary to current academic success," the importance of a positive attitude toward reading is widely recognized.

Recent research has demonstrated that reading attitude is a multi-factored phenomenon (Brown, Engin, & Wallbrown, 1979a, 1979b; Engin, Wallbrown, & Brown, 1976; Wallbrown, Brown, & Engin, 1978). Wallbrown and his colleagues have developed an instrument which breaks down the concept of reading attitude into eight dimensions, namely: Expressed Reading Difficulty, Reading as Direct Reinforcement, Reading as Enjoyment, Alternative Learning Modes, Reading Group, Reading Anxiety, Silent vs. Oral Reading, and Comics. A Survey of Reading Attitudes has been used with various groups of children in grades four, five, and six; but there have been no published reports of its having been used with gifted children as yet.

Questions

For the purpose of this study, the following questions were posed:

1. Is there a significant difference in the cognitive style of field dependence/independence between gifted and average students in the fifth and sixth grades?
2. Are there significant differences in performance on standardized measures of intelligence between gifted and average students in the fifth and sixth grades?
3. Are there significant differences in performance on standardized measures of achievement between gifted and average students in fifth and sixth grades?
4. Are there significant differences in reading attitudes between gifted and average students in the fifth and sixth grades?
5. Are there significant differences in the cognitive style of field dependence/independence between males and females in the fifth and sixth grades?
6. Are there significant differences in performance on standardized measures of intelligence between males and females in the fifth and sixth grades?
7. Are there significant differences in performance on standardized measures of achievement between males and females in the fifth and sixth grades?

8. Are there significant differences in reading attitudes between males and females in the fifth and sixth grades?
9. Are there significant relationships between the cognitive style of field dependence/independence and eight dimensions of reading attitude for fifth and sixth grade students?
10. Are there significant relationships between the cognitive style of field dependence/independence and performance on standardized measures of achievement for fifth and sixth grade students?
11. Are there significant relationships between the cognitive style of field dependence/independence and performance on standardized measures of intelligence for fifth and sixth grade students?

Definition of Terms

1. GIFTED STUDENTS: For the purposes of this study, the gifted students were those who were previously identified by their school personnel according to the following criteria:

- a. Teacher recommendation - based upon outstanding classroom performance over the two year period of grades 3 and 4.
- b. Total percentile scores of 188 or above for both Reading Comprehension and Total Math subscores on the Iowa Test of Basic Skills (ITBS) taken in May, 1981.
- c. Score of 130 or above on any one of the 3 scores on the Wechsler Intelligence Scale for Children - Revised (WISC-R).

2. AVERAGE STUDENTS: Those who scored between stanines 5 and 7 on the Reading Comprehension and Total Math subtests of the ITBS taken in May 1981, and whose classroom performance was considered satisfactory by their teachers.

3. COGNITIVE STYLES: Information processing strategies which reflect underlying personality trends. They are stable preferences in modes of perceiving, remembering, and thinking - or - distinctive ways of apprehending, storing, transforming, and using information. Each style embodies a contrast between two modes of functioning, neither of which is uniformly more adaptive. Each pole of the contrast represents a different complex of interacting characteristics.

4. FIELD DEPENDENCE/INDEPENDENCE: A dimension of cognitive style which indicates the extent to which an individual perceives part of a field as discrete from the surrounding field as a whole. It contrasts an analytic, self-referent, impersonal orientation with a global, socially sensitive, interpersonal orientation.

5. FIELD DEPENDENCE: The end of the performance continuum at which the individual is highly dependent on the structure of the visual field. Field dependent individuals tend to be more outgoing and more socially inclined.

6. FIELD INDEPENDENCE: The other end of the performance continuum at which the individual has great ability to deal with the presented field analytically or to separate an item from the configuration in which it occurs. Field independent individuals tend to be more analytical and internally oriented.

7. ACADEMIC ACHIEVEMENT: For the purposes of this study, the measures of academic achievement were the raw scores obtained on the ITBS subtests of Reading Comprehension, Math Concepts, Math Computation, Math Problem Solving, and Total Math taken in May 1981. For the fifth grade students, this represents Form 7, Level 10; for the sixth grade students, Form 7, Level 11.

8. INTELLIGENCE: For the purposes of this study, the measures of intelligence were the raw scores obtained on the Verbal and Nonverbal subtests of the Lorge-Thorndike Intelligence Test. For the fifth grade students, this represents Form 1, Level A; for the sixth grade students, Form 1, Level B.

9. READING INTERESTS: "The content, style, and structure of reading materials preferred by students" (Brown, Engin, and Wallbrown, 1979a, p.259).

10. READING ATTITUDE: "The feelings expressed and/or shown by students toward reading and its component processes" (Brown, Engin, and Wallbrown, 1979a, p.259).

11. EIGHT DIMENSIONS OF READING ATTITUDE:

1. Expressed Reading Difficulty:
The extent to which students perceive of themselves as having difficulty with reading and are willing to acknowledge the existence of a problem.
2. Reading as Direct Reinforcement:
The extent to which students perceive of themselves as receiving direct extrinsic reinforcement from their friends, classmates, parents, and teachers for reading-type activities.
3. Reading as Enjoyment:
The extent to which students perceive of themselves as valuing reading-type activities for their intrinsic value as a source of information, learning, and emotional satisfaction which is independent of outside influences.
4. Alternative Learning Modes:
The extent to which students prefer to use alternatives other than reading when they are faced with a learning task.
5. Reading Anxiety:
The extent to which students become emotionally upset and/or experience unpleasant physical sensations or feelings when engaging in or thinking about reading-type activities.
6. Reading Group:
Students' attitudes toward their reading group and the instructional materials used in that group.
7. Silent vs. Oral Reading:
The relative preference of students for silent reading activities as opposed to activities which require oral reading.
8. Comics:
The extent to which students enjoy reading comics and devote their time and energy to this activity (Brown, Engin, & Wallbrown, 1979a, p.260).

Limitations of the Study

The limitations of this study are related to the small number of subjects and to the method of their selection. Since there were only 36 gifted students involved in this study, any conclusions drawn should not be generally applied without further research. Also, the subjects were chosen on the basis of specific criteria; therefore, the sample is not random nor does it include students from the low end of the IQ/achievement scale.

Summary

Because of the relative definition of giftedness and the long-standing dissatisfaction with standardized IQ and achievement tests as tools for identifying the gifted, this study examined the relationships which exist among those two measures and an indicator of the cognitive style of field dependence/independence for a sample of 36 gifted students in the fifth and sixth grades. A similar task was undertaken for a sample of 36 average students, and a comparison of the two sets of results was made.

Out of concern for the affective as well as the cognitive aspects of gifted education, this study also surveyed eight dimensions of the reading attitudes of the gifted students and compared them to those of the average students.

Chapter II

Review of the Literature

Purpose

The purpose of this study was to examine cognitive and affective similarities and differences between gifted and average-achieving students in the fifth and sixth grades. Specific areas of investigation included the cognitive style of field dependence/independence, the academic achievement areas of mathematic and reading, the intellectual measures of verbal and nonverbal IQ, and the affective dimensions of reading attitude.

For the purpose of review, the theories and research upon which this study was based will be considered in three parts: the first, identification of the gifted; the second, the construct of cognitive styles; the third, the affective dimensions of reading attitude.

Identification of the Gifted

Central to any discussion of "giftedness" is the question: Who are the gifted? The answer to this key question, however, is culturally related, that is, dependent on place and time.

Public interest in gifted children has long been associated with a society's need to develop political or scientific leaders. Thus, concerted efforts to identify

and educate gifted children has occurred most frequently within emerging nations or those seeking to acquire or maintain a role of world leadership or domination (Whitmore, 1980). Once the national goals have been met, interest usually has waned, and general support for special programs for the gifted has lessened or disappeared (Gowan & Demos, 1964; Hildreth, 1966; Whitmore, 1980).

Historically, there is evidence that man has always attempted to recognize those with superior intellect and ability according to the needs of the times (Gallagher, 1975; Gowan & Demos, 1964; Hildreth, 1966; McDermott, 1982; McGreevy, 1978). "Intelligence as the most striking aspect of personality was doubtless one of the first characteristics to emerge, along with social leadership, in the dim pre-historic past when...the individual became distinguished from the...tribe" (Gowan & Demos, 1964, p.8). However, even in a primitive tribe, the definition of talent was relative. If the tribe was dependent on hunting wild game, the hunter was valued; if the tribe was aggressive, the warrior was most prized (Gallagher, 1975).

Wisdom and intelligence were extolled by the eminent writers of Greece and Rome, and the most able children in those cultures were selected for special tutoring in science, philosophy, metaphysics, and public speaking (Hildreth, 1966; McGreevy, 1978; Parker, 1979). Yet, according to Gallagher, "even nations which produced men

whose brilliant insights are still recognized today had a limited view of man's talents" (1975, p.10). In honoring the orator and the artist, the Greeks failed to appreciate the inventor; and the Romans neglected the many talents of the citizenry in favor of the soldier and the administrator.

Selective attention to certain types of giftedness to the exclusion of others was not limited to the Classical era, however. During the Renaissance, versatility - particularly in the fine arts - was encouraged; during the Reformation, critical thinking was admired; during the Enlightenment, the great scientific thinkers were honored (Gowan & Demos, 1964; Hildreth, 1966).

According to McDermott (1982), the reason for this historical diversity has been that in selecting and educating the talented, each society has been more concerned with defending its current "privileges" than in undertaking a "neutral, objective detached endeavor to give each person his proper due in life" (p.3). He states that:

Human knowledge is always incomplete, relative to its significance, subjective in many of its applications, prejudicial in its cultural manifestations. What we admire and cultivate in our society today is a very narrow spectrum of human potential. We test, compare, and select the young with our inherited categories of acceptable talent and then argue that the maintenance of this state is crucial for the national welfare. (p.3)

This philosophy, he argues, is only acceptable as long as the conditions for success in the future are equivalent to those in the past.

Given these diverse antecedents, it is obvious that what constituted "giftedness" in the past was, indeed, culture-bound. Acknowledging that fact does not make defining and identifying giftedness in turbulent twentieth century America a simple matter.

This sociopolitical pattern of interest in the gifted can be seen in America's 200 year old love-hate relationship with them. Hofstadter (1962) traces the development of this ambivalence toward the gifted in America through the original necessity for pragmatic skills in a frontier country, a distrust of European thought and influence, the tension between faith and reason in American evangelical religion, and Jacksonian populism with its belief in the wisdom of the common man. He sees it as inherent in McCarthy's attack on intellectuals during the 1950's and in the anti-rationalism of the back-to-nature movements and suggests that it has affected the American educational system by causing academic talent to be undervalued and neglected.

In addition to anti-intellectualism, Solano (1980) cites another major reason for the serious past neglect of the gifted in the American educational system. This opinion is also shared by Clark (1979), Feldman (1979), Gallagher (1975), Gowan and Demos (1964), Flowman (1980), Torrance (1980) and Toynbee (1968), and that is: the concept of democracy and its actualization in the American school system. Solano interprets Thomas Jefferson's

statement "We must dream of an aristocracy of achievement arising out of a democracy of opportunity" to mean that there is "an obligation to help the handicapped overcome their disadvantages, but not to help those who already have an advantage. The emphasis is upon fostering equality and avoiding the creation of favored elites rather than on developing excellence" (p.39).

Gowan and Demos (1964) discuss this dichotomy of the elite and the democratic in terms of the construct of "equality of opportunity" for talent wherever it may be found. They feel that harmonizing the opposing principles of developing each individual to his maximum while simultaneously providing for the greatest general good through common education is a peculiarly American educational problem.

The Rockefeller Report (1958), Excellence in a Democracy, argues powerfully for a reappraisal of our understanding of the meaning of equality in a democracy. It points out the necessity for democracies to maintain an insistence on quality:

Every democracy must encourage high individual performance. If it does not, it closes itself off from the mainsprings of its dynamism and talent and imagination, and the traditional democratic invitation to the individual to realize his fullest potentialities becomes meaningless. (p.16)

While noting that men are equal, but different, before the law, the Rockefeller Report urges that the fairest

and most useful way of providing for these differences is by acknowledging the concept of equality of opportunity.

Gold (1965) refers to this equality of opportunity as "a traditionally American commitment to individualization." Compared to individualization, he feels all other issues (class size, special opportunities, homogeneous grouping, acceleration) are secondary and must be considered in the light of their contribution to the treatment of the student as an individual:

To the extent that school programs are truly adapted to individual differences, they contribute to the self-realization of each student. And only as they contribute to the release of each learner's potential are they truly individualized. (p.2)

It is through this concept of individualization, then, that McDermott writes:

we arrive at the fundamental case for the gifted. On the one hand, the individual will surely benefit as he develops his potential. On the other hand, the larger society is presumed to also benefit from the eventual application of better ideas. (1982, p.3)

The earliest documented attempt to adapt an American educational institution to accommodate the special needs of the gifted for accelerated academic growth occurred in 1868 when William T. Harris instituted flexible promotion as a way of providing for the pupils whom he termed "able" in the St. Louis schools. Other districts then instituted similar programs for so-called "brilliant" students who exhibited high "intelligence" or scholastic "achievement."

Credit was later given to Guy Whipple for establishing the "term 'gifted' as the standard designation of children of supernormal ability having used it in Monroe's Cyclopedia of Education" (Henry, 1920, p.9 in Passow, 1981, p.5).

The reviews of programs and provisions for the gifted which appeared in the National Society for the Study of Education 19th and 20th yearbooks (Henry, 1920; Whipple, 1924), clearly indicate that it was the highly intelligent and high academic achievers who were considered gifted, and it was the traits and characteristics of such individuals that determined the nature of giftedness in the 1920's.

This preoccupation with the scholastic attributes of giftedness was a logical result of the enormously influential work of Lewis Terman, "the father of the gifted movement" (Clark, 1979; Feldman, 1979; Gallagher, 1965, 1975; Gowan & Demos, 1964; Hildreth, 1966; Whitmore, 1980; Witty, 1951). Terman's early work at Stanford University in 1916 resulted in the revision of the Binet-Simon scale into the Stanford-Binet Test of Intelligence - a test which has been used consistently ever since in the identification of the gifted (Clark, 1979; Feldman, 1979; Whitmore, 1980).

In 1921, Terman began what evolved into a fifty-year project involving the systematic study of 1,500 gifted children. It was the first large-scale study of the gifted

ever undertaken, and it "remains unmatched today in its scope, thoroughness, and longitudinal span" (Whitmore, 1980, p.13).

Terman's aim in conducting the Genetic Studies of Genius was "to discover what physical, mental, and personality traits are characteristic of gifted children as a class and what sort of adult the gifted child becomes" (Terman & Oden, 1951, p.21). This monumental work, which has become a classic model for researchers, is being continued today by the late Dr. Terman's colleagues at Stanford who are still collecting and analyzing data on the original subjects, now in retirement (Passow, 1981; Whitmore, 1980).

When conducting the original search for participants, Terman sought "subjects with a degree of brightness that would rate them well within the top one percent of the school population" (Terman, 1925 & 1926, p.19). For children under 14, a 140 IQ on the Stanford-Binet Test and, for high school subjects, 135 IQ on the Terman Group Intelligence Test was, as Terman states, "the arbitrary standard set for inclusion in the study" (Passow, 1981, p.6).

Terman was well aware that there was more to giftedness than a high IQ, since critics such as Witty were vocal even then about the faults inherent in the IQ tests. In his writings Terman was careful to mention that it was only one of the criteria considered (Seagoe, 1975), yet his

name was to become almost synonymous with the term "IQ." According to Whitmore (1980), "he was totally unaware of the popular use of the 'Stanford-Binet' that would follow and the unquestionable faith the public, including educators would eventually place in the scores representing a child's performance on the measure" (p.12).

Although it is impossible to calculate the full impact of Terman's view of giftedness on educational policy and practice, it seems that giftedness and genius came to be defined in IQ terms not just among educational researchers but in the public's mind as well (Clark, 1979; Feldman, 1979; Gallagher, 1975; Gold, 1965; Gowan & Demos, 1964; Hildreth, 1966; Tuttle, 1978; Whitmore, 1980; Witty, 1851). This idea that giftedness is primarily represented by a score of 140 on a standardized IQ test is still widespread today, despite much argument by other leaders in the field (Clark, 1979; Feldman, 1979; Whitmore, 1980).

Several of the major findings of the Marland report (1971) concerned the inadequacies of the screening devices currently used in identifying the gifted:

Types of screening processes commonly employed in identifying the gifted have included teacher nomination and group tests. Both means have about the same level of accuracy, and both fail to identify large numbers of gifted children.

A number of studies have shown that individual tests identify gifted children much more accurately than do group measures. Half of an identified gifted

population remains unidentified with group tests alone. One study pointed out that group test ratings tend to be higher for the below average individual, while, for the above average, group test scores are lower than those obtained on the individually administered Binet test scale.

Data provided by a test publisher showed that the discrepancy between group scores and individual scores increased as the intelligence level increased. The most highly gifted children were penalized most by group test scores; that is, the higher the ability, the greater the probability the group test would overlook such ability.

Teachers also are able to nominate about half of the gifted. (Similar levels of accuracy occur when they attempt to nominate the creative.) It is unsafe to assume that teachers will identify even the highly gifted, according to one study in which 25 per cent of the most gifted were missed. (II-7)

The critics of the IQ tests share these common views:

1. "IQ and intelligence are by no means one and the same: IQ is an observed empirical score; intelligence is an abstract concept. Whether or not an IQ test validly measures intelligence is an utterly unsettled issue" (Taylor, 1980, p.12).
2. The IQ obtained from an intelligence test pertains only to mental functioning and conceptual thinking and sets up too narrow a definition of the gifted.
3. Rather than measuring potential or native capacity, what the IQ test really measures is aptitude for future academic work.
4. Much of what the IQ test measures is extraneous and obscures the subject's actual intellectual potential.

5. The very fact that most intelligence tests result in a single score reflects a belief on the part of the test makers that there is some general factor of intelligence.

6. Intelligence tests normed on the majority population contain cultural bias which adversely affects the scores of minority subjects.

7. The intelligence tests do not measure creativity, leadership, or motivation.

8. The ceilings on the intelligence tests are often too low to discriminate between the bright and the gifted because the questions usually are aimed at the lower level cognitive skills such as recall and comprehension.

9. Since the tests are objective in nature, students' answers are limited to specific choices of "correct" answers chosen from various alternatives. The gifted individual who has greater insight sometimes views the "correct" answer as wrong and the wrong answer as correct simply because he can evaluate the question more deeply.

10. Since the IQ tests rely heavily upon the printed word, they penalize students with reading problems (Clark, 1979; Feldman, 1979; Gallagher, 1975; Galyean, 1981; Gold, 1965; Gowan & Demos, 1964; Hildreth, 1966; Tuttle, 1978; Whitmore, 1980).

In spite of all the criticism, these group tests still survive as major identification tools for the gifted.

Gallagher (1975) and others feel that the major reason for this is that they measure much of what is necessary for academic success. Until more appropriate measures are devised, their use will undoubtedly continue.

In trying to arrive at a more appropriate definition of giftedness, Gold suggests that the educator "adopt a definition with greater relevance to his own sphere of operation" (1965, p.7). Gold feels that the school has an obligation to stimulate and recognize the fulfillment of promise of every individual enrolled, but that there is a need to distinguish between primary and secondary tasks.

Since a major concern of schools is academic growth, intellectual achievement must be considered an educational priority. Since the schools are concerned with citizenship, social leadership must be considered an educational priority. Gold notes that while some schools encourage young people to develop superior competence in music, the arts, and a number of skill trades, "they are usually working toward the establishment of certain minimum levels of performance rather than virtuosity" (p.7). This is a natural result of the schools' consideration of these areas as secondary priorities.

In looking for giftedness, then, Gold feels that intellectual achievement and social leadership are educational standards by which the schools should evaluate students:

To the extent that the school recognizes intellectual ability only, the school neglects its responsibility. However, to the extent that schools fail to put primary focus on intellectual growth, they reject or weaken the function which society has assigned them. (p.7)

Approaching the question of definition from another standpoint, Gallagher (1975) claims "the ability to manipulate internally learned symbol systems is perhaps the sine qua non of giftedness" (pp. 10-11). He notes that the prime symbol system for our culture is language, and the linguistic facility of the student is primarily what is tested when one tests for IQ. Yet he does allow that there are other symbol systems such as mathematics, music, chemistry, and art and that children who come from culturally different homes often express themselves in the symbol system of that culture (p.11).

Another factor that has been recently considered in the attempt to better define and identify giftedness is cerebral hemispheric lateralization. According to Lundy (1981), the fact that certain of our cognitive functions are asymmetrically represented in the two hemispheres of the brain has been noted and described by neuropsychologists for over 100 years, but it has been only since the 1950's that scientists have made great strides in isolating the differential functions within the two hemispheres.

The research so far accumulated in this field has determined that the left cerebral hemisphere is responsible

for the logical, sequential processing of information and deals primarily with verbal, analytical, abstract, temporal, and digital materials (Bogen, 1969; Gazzaniga, 1970; Ornstein, 1972). The right cerebral hemisphere processes information nonlinearly, holistically, simultaneously dealing with a variety of information. It specializes in non-verbal, spatial, analogic, emotional and aesthetic material (Torrance & Mourad, 1979, p.44).

It has been established that while the left side of the brain controls the motor functions of the right side of the body, it also contains the elements of conscious, analytical, rational processing. The right side of the brain is responsible for the left side of the body as well as unconscious, creative, intuitive thought.

A specialized area of the brain that has been investigated in great detail is the area involved in producing and understanding language. It is called "Broca's area," named after a 19th century French investigator who was particularly interested in aphasia (Lundy, 1981). More recent studies of this area by Geschwind (cited in Lundy, 1981, p.14) have suggested that it is profoundly asymmetrical (a characteristic of the more specialized functions of the cortex). He also found that linguistic ability is primarily dependent upon the left hemisphere, while the right hemisphere is more important for the perception of music and the perception and analysis of nonverbal patterns.

Geschwind later cautioned against "over-emphasizing the significance of the isolated hemispheric specialization because, in the intact human organism, the two hemispheres usually act in concert" (cited in Lundy, 1981, p.14).

Galyean (1982) and Gowan (1979a) view this cooperation between the hemispheres as a division of labor. They have concluded that knowledge emerges within the right hemisphere but it is encoded, understood, and communicated within the left hemisphere.

Leong (1980) discusses the application of cerebral laterality to reading proficiency. He cites research which concludes that word recognition is a multistage process involving feature analysis by the right hemisphere and decoding and naming by the left hemisphere. Thus:

the laterality-reading relationship is carried one step further by suggesting that the right hemisphere specializes in holistic and featural analysis while the left specializes in analytic and naming tasks. Successful word perception, as well as early reading, involves reciprocal contributions from the right and left hemispheres. This occurs in varying degrees, for different individuals and at varying stages of reading. (p.197)

Rubenzer reviewed the literature concerning the special functions of the right hemisphere, and he also notes:

For left-handed adults and children approximately five years of age or under, language processing is more equally divided between the right and left hemispheres. The right hemisphere is more involved than the left hemisphere with the interpretation and retention of facial features or recall of melodic

patterns. The right hemisphere is predominant in processing the "artistic subjects" (music, art, dance, and physical education), and is theorized to be most adroit at processing tasks that require simultaneous and divergent cognitive styles. The right hemisphere appears to be relatively more involved with affective responses than the left hemisphere. Emotional responses which result from aesthetic evaluation or perceptions are hypothesized to be products of the right hemisphere. (1979, 89-90)

This research into hemispheric lateralization has also explored the aspect of sex differentiation. There is some evidence to suggest that left hemisphere specialization proceeds faster in females than in males (Cromie, 1978; Lundy, 1981). This would account for the female superiority in verbal ability. Buffery and Gray (in Lundy, 1981, p.16) account for the corresponding superiority of males in spatial ability by theorizing that "a consequence of the less well lateralized cerebral representation of linguistic skill in the male might be a more bilateral cerebral representation of spatial skill than can be achieved in the female brain." This is only speculation, however.

These discoveries of the right hemispheric functions have had a profound influence on the study of creative problem solving among the gifted. One of the classic paradigms in the literature is Wallas's process of "gifted thought" (Beckman, 1981; Gowan, 1979a; Lundy, 1981). Wallas broke task of creative problem solving down into four stages:

1. Preparation - investigation of the problem in all directions and narrowing it until all the obstacles are visible.
2. Incubation - setting the problem aside and avoiding any voluntary consideration of it.
3. Illumination - spontaneous recognition of or insight into the solution.
4. Verification - consciously attempting to determine the validity of the solution according to some criteria.

Blakeslee points out (in Lundy, 1981, p.16) that "the first and last stages of this process are well defined left brain tasks that we learn in school. The middle two stages are not so easy because they really involve 'unconscious' processes. If one can just learn to let the left brain do the work, or just stand aside, the right brain will often fill the gap." The term for that which fills the gap is "imagery."

Gowan (1979b) argues that a great deal of the brain activity that is characteristic of the gifted has to do with imagery. He also suggests that since it is assumed that the right hemisphere imagery is "divergent" in production and is, therefore, the most creative, it is seen as the vehicle through which incubation takes place. Under most circumstances it is overlain by the more cognitive processes of the generally dominant left hemisphere. If one removes the left hemisphere's function through relaxation, mediation, hypnosis, fantasy, daydreaming, sensory deprivation, or some similar state, and the imagery of the

right hemisphere is brought into focus, the first steps toward creative imagery have been taken.

On this point, Dellas and Gaier (1975, p.205) support Gowan. They write:

In the realm of personality, a clearly differentiating factor that characterizes the 'creative' is the relative absence of impulse and imagery control by repression. This relative lack of self defensiveness seems to accord to the 'creative' fuller access to his (or her) conscious and unconscious experiences, and therefore, a greater opportunity to combine dissociated items.

Thus, Lundy (1981) summarizes, "creative imagery appears to involve, at least to some extent, the gifted individual having the capacity to be open to cognitive materials that, in other persons, would be repressed, ignored, or perceived as irrelevant" (p.16).

Gowan (1979b) applies this theory to the educational question of the common drop in creativity which occurs in most children at about the fourth grade:

We suggest that this drop is caused by the extinction of right hemisphere imagery as a result of the overteaching of the left hemisphere functions of reading, writing, and arithmetic which occurs at the time, and the lack of stimulation of right hemisphere functions caused by the lessening or absence of music and art from the curriculum and the lack of other right hemisphere stimulation procedures. (p.65)

Much of the research on creative problem solving has been conducted by Torrance. In 1979, he and Ball reported a study which had been based upon the disappointing fact that:

many very gifted and talented students have considerable difficulty in seeing implications of new knowledge and skills. This difficulty seemed to be most severe with students who reported preference for a logical, sequential style of learning and thinking, the specialized manner of processing information of the left hemisphere of the brain. Students with the right hemisphere way of processing information - simultaneously, non-linearly, intuitively - seemed to have no such difficulty. (p.8)

Torrance and Ball (1979) tested 200 participants in the Georgia Governor's Honors Program with the Torrance, Reynolds, and Riegel's Your Style of Learning and Thinking questionnaire which classified respondents according to right, left, and integrated styles of learning and thinking. They found that those reporting a right cerebral hemisphere or integrated style of learning and thinking make significantly more applications of their newly acquired knowledge than their counterparts reporting a left cerebral hemisphere style of learning and thinking.

The direct implications of the brain research for the identification and education of the gifted has been well summarized by Galyean (1981):

The traditional education system has often emphasized left hemisphere functioning to the diminution and even denial of right hemispheric functioning. Tests are designed to measure analytical processing skills as a major determinant of IQ. The highly creative individual who may perceive holistically and be more comfortable with artistic expression is left little room to achieve well on most IQ tests. Only recently has the literature related to learning begun to attach equal importance to affective learning modes, creative learning styles, and introspective/affective/student centered

learning strategies. Research on learning styles has shown that individuals vary greatly as to dominant modes of learning. Traditional education programs based on the tabula rasa concept of sequential acquisition of information work well for those with left hemispheric dominance, but for those who operate from a holistic and intuitive manner for processing information, prolonged exposure to predominantly left hemispheric learning strategies can severely hamper their intellectual development. Many researchers even believe that if certain right hemispheric functions are not activated and used frequently, they will never fully develop. The goal is to train everyone to function well in both modes. (p.8)

Mindell (1982) cites these faults in the present system for failing to accommodate even the most basic needs of the gifted dyslexic and holds out hope that the emerging research on hemispheric lateralization will support the notion that "many types of giftedness co-exist and that talent is asymmetrically divided within and among some individuals" (p.23).

In comparing our educational system to that of the Japanese, Torrance cites the widespread feeling that the amount of attention the Japanese pay to right hemispheric functions (physical skills, musical performance, art products, dramatic enactments, teamwork) is responsible for a lack of reading problems and an almost total lack of illiteracy in Japan. As a result of this, Torrance advises:

Perhaps the single most important lesson United States educators might learn from Japan is the importance of a national commitment to the development of the full potential of each person, and to

the importance of the creativity of each individual. (1980, p.4)

In retrospect of the issues raised thus far, it appears that for historical, political, and educational reasons, the concept of giftedness is not acceptably or permanently definable except in the most general of terms. This lack of specificity has caused numerous problems to arise concerning adequate screening and identification procedures in selecting children for special programs. While the methods currently employed have been successful in identifying some gifted students, they have also failed to identify many others who are truly gifted and who need differentiated educational programs. The research suggests that one reason for this failure may be that the tests now used as screening devices are constructed so as to favor those whose thinking style tends to be logical and sequential. To explore this question more fully, an investigation into cognitive styles was undertaken.

Cognitive Styles

"There is nothing so unequal as the equal treatment of unequals." This adage is seen frequently in the literature on gifted children (Arent, 1979, p.70; Brandwein, 1980, p.2; Clark, 1979, p.108; Hammill, 1979, p.18), but its message is applicable throughout the entire field of education. Kogan (1971) cites the recently renewed interest in individual differences in American schools,

but he notes its emergence from a new and different perspective: "From an almost exclusive concern with individual differences in a straightforward framework, emphases have shifted to the interaction of personal cognitive and non-cognitive characteristics with task and instructional variables" (p.244).

Research in the area of cognitive styles has been found to have direct classroom applications in the identification of individual differences among students. Witkin, Moore, Goodenough, and Cox (1977) have done considerable work in this field, and they have found that cognitive styles complement educational goals in the areas of ability and intelligence assessment, instructional variables, and learning strategies.

According to Davey (1976), the definition of cognitive styles offered by Santostefano, Rutledge, and Randall (1965) is shared by most theorists:

Essentially, the concept of cognitive styles proposes that when perceiving, an individual's cognition is active (not passive), selecting, sorting and organizing information according to particular system-principles which are influenced by motivational and personality factors. The extent to which these principles operate in and govern the cognitive functioning of individuals varies, creating meaningful individual differences and revealing the unique strategy an individual has developed to process and handle information. (Santostefano, Rutledge, & Randall, 1965, p.58)

Elaborating on this basic concept, Witkin et al.

(1977) submit:

First, cognitive styles are concerned with the form rather than the content of cognitive activity. They refer to individual differences in how we perceive, think, solve problems, learn, relate to others, etc. The definition of cognitive styles is thus cast in process terms.

Second, cognitive styles are pervasive dimensions. They cut across the boundaries traditionally - and, we believe, inappropriately - used in compartmentalizing the human psyche and so help restore the psyche to its proper status as a holistic entity.

A third characteristic of cognitive styles is that they are stable over time.

Fourth, with regard to value judgments, cognitive styles are bipolar. This characteristic is of particular importance in distinguishing cognitive styles from intelligence and other ability dimensions.
(pp. 15-16)

The role of cognitive styles in the field of education can be more readily seen if one considers the possibility that "individual variation in knowledge acquisition is not simply a matter of more or less, but rather that more or less may be learned dependent upon the match between the individual characteristics of the pupil and the kinds of instructional procedures to which he is exposed" (Kogan, 1971, p.244). Knowing how a student perceives a problem can contribute a great deal toward teaching him how to solve it.

Another aspect of cognitive styles which has direct application to the educational setting is their pervasiveness throughout the dimensions of personality. Since

a child's degree of attentiveness and sociability are functions of personality as well as cognition, his classroom behavior can be better understood by the teacher who is aware of the child's cognitive style.

Additionally, because they are also perceptual dimensions, the styles can be assessed by nonverbal methods. "The use of nonverbal perceptual techniques to assess an individual's cognitive makeup helps avoid the penalty which students out of the mainstream culture commonly suffer on our heavily verbal assessment procedures" (Witkin et al., 1977, p.15).

Finally, concerning their bipolar nature, cognitive styles have the potential to reveal something more about what the child's skills are, not just what they aren't. According to Witkin et al. (1977), "to have more of an ability is better than to have less of it. With cognitive styles, on the other hand, each pole has adaptive value under specified circumstances, and so may be judged positively in relation to those circumstances" (p.16). In Kogan's terms (1971), "abilities concern level of skill - the more and less of performance - whereas cognitive styles give greater weight to the manner and form of cognition (p.244, italics in original). It is this emphasis on manner and form which serves to distinguish cognitive styles from the "intelligence" and even the "creativity" dimen-

sions within which level of performance is used to differentiate individuals (Vasgird, 1980).

Kogan (1971) enumerates nine of the cognitive styles which have been the object of systematic, theoretical and empirical examination during the past 30 years:

1. Field independence vs. field dependence
2. Scanning
3. Breadth of categorizing
4. Conceptualizing styles
5. Cognitive complexity vs. simplicity
6. Reflectiveness vs. impulsivity
7. Leveling vs. sharpening
8. Constricted vs. flexible control
9. Tolerance for incongruous or unrealistic experiences (p.246)

Each of these styles has its own body of research; however, for the purposes of this study, only the dimension of field dependence vs. field independence was considered.

Field Dependence and Field Independence (FD/FI)

Of all the cognitive styles, the field dependence/independence dimension is unquestionably the most widely known and thoroughly researched, and the largest body of work in this area has been contributed by Herman Witkin and his associates. They have devised instruments for assessing the construct of field dependence/independence and have sought to understand the congruence between these styles and the individual's psychological personality.

Witkin, Dyk, Faterson, Goodenough, and Karp (1962) state:

The person with a more field-independent way of perceiving tends to experience his surroundings analytically, with objects experienced as discrete from their background. The person with a more field-dependent way of perceiving tends to experience his surroundings in a relatively global fashion, passively conforming to the influences of the prevailing field or context. (p.35)

In terms of personality correlates, field independent people are more internally oriented and have more of a sense of separate identity. Because of this factor, they tend to learn more effectively than field dependent people under conditions of intrinsic motivation (Paclisanu, 1970). Field dependent people, on the other hand, tend to rely on external forms of motivation and tend to be generally more attentive to human faces and to recall them better than do those who are field independent. Field dependent people are more comfortable working in groups, helping each other and sharing; field independent people enjoy competing with others and tend to prefer individual achievements to group efforts. As children, field dependents spend more of their time in group play and team sports, while field independents prefer solitary play (Davey, 1976; Goodenough, Oltman, Friedman, Moore, Witkin, Owen, & Raskin, 1977; Goodenough & Witkin, 1977; Rapaczynski & Ehrlichman, 1978).

According to Goodenough and Witkin (1977), the characteristic sequence in individual development is an evolution from a field-dependent to a field-independent mode of functioning, particularly between the ages of 8 and 15

years. Also during the growth years, an individual's standing on the field-dependence dimension shows marked stability. In other words, children tend to hold the same position relative to their age peers on the field-dependence dimension as they grow up, while as a group they all show movement toward greater field independence (Witkin, Goodenough, & Karp, 1967).

The task on a test of field dependence/independence is to break up an organized visual field in order to keep a part of it separate from that field. Research has shown that an individual remains consistent in his ability to perform this disembedding task, not only from item to item on any test, but over extended periods of time as well. Because the scores from these tests form a continuous distribution, the labels "field dependent" and "field independent" reflect a tendency in varying degrees of strength toward one mode of perception or the other. "There is no implication that there exist two distinct types of human beings" (Witkin et al., 1977, p.7).

There is much evidence to support the theory that the environment (both the immediate environment of the family and the broader environment of the community) is one of the primary influences upon cognitive style. Goodenough and Witkin (1977) and Vasgird (1980) cite research which has shown that members of cultures and subcultures which stress social conformity (tight societies) are more field

dependent than members of cultures and subcultures which place a higher value on autonomy (loose societies). The cross cultural studies have also shed light on the sources of sex differences in field dependence/independence. They have shown that sex differences are more commonplace in tight societies than in loose societies. The greater role diversity in tight than in loose societies, including more pronounced differences between male and female roles, the greater emphasis on autonomy in the socialization of boys than of girls, and the stricter enforcement of sex-role expectations, appear to be contributing factors to the more frequently found sex-grouped cognitive style differences in tight societies (Goodenough & Witkin, 1977).

The cross cultural studies also lend support to the conclusion that childrearing procedures which stimulate early self-nonsel self segregation are likely to lead to a field independent cognitive style. Laosa's study of maternal teaching strategies and cognitive styles in Chicano families (1980) revealed that relatively field independent mothers used inquiry and praise as teaching strategies and field dependent mothers used modeling. The result of their methods produced in their children cognitive styles similar to their own.

Maccoby and Jacklin (1974) write that visual-spatial ability appears to be closely connected to field independence on visual tasks. Field independence is positively

related to cultural conditions which allow one to be more assertive and less restricted. Callahan (1980) and McClelland (1977) share the view that parents who overprotect and discourage independent problem solving among their female children consequently foster in them a field dependent cognitive style. "Because girls are not encouraged to be assertive and are restricted in play and exploration of their environment, they are at a disadvantage in developing field independence and, thus, visual-spatial abilities and mathematical abilities" (Callahan, 1980, p.17).

In perceptual and intellectual activities, field independent people use an analytical mode of functioning to re-structure the field with which they must deal when the task at hand requires it. This analytic style allows them to attribute meaning to parts of a stimulus separate from the context in which it is embedded. The analytic style involves logic, and those who use it process information sequentially.

Conversely, field dependent people, having less recourse to internal referents, are likely to adhere to the dominant properties of the field as represented, i.e., they accept it as it is. They use an integrative style of functioning. For them it is the global characteristics of a stimulus that have meaning, and these only in reference to some total context. They tend to process information diffusely and simultaneously (Vasgird, 1980, p.220).

Since re-structuring is, in effect, the expression of field independence in cognitive functioning, it is important to note that standard tests "require subjects to re-structure problem materials if they are to earn high scores" (Witkin, & Goodenough, 1977, p.38). Those who have difficulty disembedding simple figures from complex designs in tests of field dependence tend to do less well in solving that class of problems which require isolating an essential element from the context in which it is presented and using it in a different context (Witkin, Oltman, Raskin, & Karp, 1971, p.6).

In summarizing the effects of the environment, it can be seen that the limited self-nonsel self segregation of field dependent people stimulates the development of social sensitivity and social skills while at the same time limiting the development of restructuring skills. The greater self-nonsel self segregation of field independent people contributes to the development of cognitive restructuring skills, and does not especially encourage the development of social sensitivity. "Relatively field dependent and field independent people thus make their main developmental investment in different psychological domains, so that in effect their growth proceeds along different pathways" (Witkin & Goodenough, 1976, p.50).

While self-nonsel self segregation fosters the development of restructuring ability, people with that competence need not always use it; however, those with limited self-nonsel self segregation have little choice but to go along with the field. Witkin and Goodenough (1976) refer to the former as "mobile" and to the latter as "fixed." There are also those who are "fixed" at the field independent extreme because they are unable to vary their approach to a field.

Witkin and Goodenough write that the person who has access to both modes has the potential for adapting to a wider array of circumstances, compared to the person who is fixed, whether in a field dependent or a field independent mode. Because each pole of the dimension has adaptive properties, supplementation, which equips the person with both sets of characteristics, is clearly preferable to replacing one set with the other. "The achievement of mobility is thus a training goal of preference in the cognitive style domain" (Witkin & Goodenough, 1976, p.52).

Witkin does not feel that field independence is a measure of intelligence. He says: "the significant relationships frequently reported between measures of field independence and total standard intelligence scores is 'carried' largely by those portions of intelligence tests which require analytical functioning" (1962, p.80). He notes that the significant correlations occur with the

Block Design, Picture Completion, and Object Assembly subtests on the WISC but not on the verbal subtests which he considers more indicative of intelligence. Kogan (1976) also supports this point of view when he says "stylistic or strategic dispositions may contribute to performance on IQ tests, instead of IQ level exerting an influence on cognitive styles"(p.123).

The contents of the ten most widely used standardized tests of intelligence and achievement were considered in a series of studies conducted at the University of Pittsburgh and reported by Cohen in 1969. The Cohen group surveyed the researchers who develop and revise such tests in order to identify the generic requirements for achievement on those measures. Three types of requirement were isolated:

1. breadth and depth of general information
2. analytical abstraction, and
3. field articulation (the ability to extract salient information from an embedding context, as in reading comprehension or in the extraction of an arithmetic problem from a word context). (p.829)

Additionally:

Standardized tests of intelligence and achievement are made up of items that assess both increasing assimilation of concepts and general information and increasing skills in formal analysis and field articulation. The latter skills are measured by items requiring the subject to derive analogies or "logical" sequences.

To illustrate this point, Cohen chooses an analogy from the Metropolitan Achievement Inventory (ninth grade level):

Chair; sit; bed; ... (Chair is to sit as bed is to ...
Select from the following:

Lie; bedroom; night; crib; tired.

To arrive at the appropriate response (lie), the subject must abstract the part of speech required, in addition to other attributes of the choices, in order to complete the logical sequence. (p. 829)

In addition, Cohen points out that by virtue of their using intelligence and achievement tests which are weighted on "logical" skill, or skills of analytic abstraction and field articulation, schools require one specific approach to cognitive organization - analytic - so the ability to use it well becomes more critical at higher grade levels. Pupils with inadequate development of these skills and those who develop a different cognitive style could be expected not only to be poor achievers early in their school experience, but also to grow worse, comparatively, as they move to higher grade levels (p. 829).

The Cohen study also reveals that not only test criteria, but the overall ideology and learning environment of the school embody requirements for many social and psychological correlates of the analytic style. For example, the requirements that the pupil learn to sit increasingly long periods of time, to concentrate alone on impersonal learning stimuli, and to observe and value organized time-allotment schedules are all correlates of the analytic style, according to Cohen (p. 830). She reports that it is not uncommon for a child whose cognitive organization

is emphatically relational to have his sociobehavioral correlates considered deviant and disruptive in the analytically oriented learning environment of the school. This opinion is also shared by Kagan, Moss, and Siegal (1963); McClelland (1977); Vasgird (1980); and many others.

Since reading is a sequential task which places significant emphasis on the ability to understand relationships and abstractions, a more analytical approach is required of the student as he processes print. Consequently, the relationship between field dependence/independence and reading has been the focus of considerable research. The results of much of this work has direct implications for the current methods of identifying and attending to the needs of the gifted.

In 1968, Cohn laid claim to the first study linking specific aspects of reading comprehension and perception together. He studied 123 public school sixth graders in New York and found that "field independence was positively and significantly correlated with those aspects of reading comprehension that required reorganization of a field to solve a problem, apparently when the solution had to be found through new cognitive activity rather than through reliance upon experience and external authority" (p. 447-A).

Kaplan (1969) found in studying 100 public school fourth grade students in New York that the "cognitive principles important for reading achievement are concerned with processing information in the context of distractions and with the individual's ability to withhold attention from intrusive and misleading cues" (p. 4278-A). He concluded that problems in reading may be the result of emotional immaturity, whereas higher reading scores may reflect an emotional maturity in meeting environmental demands.

Wineman (1971) studied 270 fourth, fifth, and sixth grade students and found that field independent children were more advanced in reading achievement than field dependent children in the fourth and sixth grades, but not in the fifth grade. In view of the trend toward reduced field dependence between the years of 8 and 15 (Witkin et al., 1967), the lack of a significant positive relationship between reading and field independence for the fifth graders was not expected.

Conoley (1976) found when she studied 89 public school fourth grade students in Texas that good and average readers were more field independent and had greater visual motor ability than poor readers. Good readers were also found to be more visually analytic than average or poor readers.

Also in 1976, Baber studied 71 first grade and 90 fourth grade students in a public school in Tennessee. She concluded "that there appear to be significant correlations between FD/FI, ability to generate permutations, multiplicative classification matrices solutions and silent reading comprehension" (p. 6258-A) for both first and fourth grade students. In addition, there appear to be significant correlations among the above factors and visual memory for pictures and verbal transitive inferential logic for the fourth graders.

Lefever and Ehri (1976) investigated the relationship between field independence and the ability to disambiguate sentences. They used a group of 69 college students in California and found a moderate positive correlation between verbal and visual disambiguation. That relationship is consistent with the contention of Witkin, Lewis, Hertzmann, Matchover, Meissner, and Wapner (1972) that the field independence construct involves more than a simple spatial ability. The ability to restructure a previously organized field might be conceived of as the ability to change mental set. The results of this study indicate that field independence is correlated with the ability to change verbal set (p.105).

Pultz, in testing 18 college students in 1979, found a significant positive correlation between field dependence/independence and several targeted reading skills,

namely: retention, skimming and scanning, comprehension, words in isolation, and completion of a cloze passage.

Smith (1973) reported a significant positive relationship between field dependence/independence and reading for details among the 21 females and for the total sample of 34 first grade students. He concluded that field independent females were better able to selectively attend to and recall details from a short paragraph than field dependent females. A similar relationship was observed for the ability to find the main idea or paragraph topic. This relationship did not exist for males when controlling for IQ.

Petersen and Magaro (1969) found that there was no significant correlation between field independence and reading achievement when controlling for IQ. However, they point out that their results "were all in the predicted direction" (p. 292). Their conclusion was that the IQ, the Embedded Figures Test (EFT), and reading tests are measuring some common factors and the IQ seems to be a better predictor of reading than the EFT. This study also suggests that field dependent readers will need more time to master reading than field independent students.

Daku (1978) found a significant relationship between field independence and reading achievement among 222 sixth grade students in New Jersey. However, when he examined

his data after controlling for IQ, he found no significant relationship between FD/FI and reading achievement. Daku also interprets his results as indicating that the Group Embedded Figures Test (GEFT) draws on the same intellectual dimensions as the IQ test and is a better indicator of intelligence than of reading ability.

Studies by Dubois and Cohen (1970) and Riley and Denmark (1974) also found strong correlations between FD/FI and tests of verbal ability and intelligence for varied populations. These findings are contrary to Witkin's assertion that the field dependence/independence construct is not a measure of intelligence.

The assertion by Petersen and Magaro (1969) and Daku (1978) that the GEFT is very similar to an intelligence test and is a better indicator of intelligence than of reading may have some support in these other studies.

The investigations reviewed so far all have researched the cognitive relationships between field dependence/independence and reading and between FD/FI and IQ. However, studies have also been undertaken which examine the FD/FI construct along its personality dimensions.

Frank and Davis (1982) examined the effect of FD/FI match or mismatch within the context of a communication task. They used 64 pairs of students who were either matched or mismatched according to field dependence/field

independence. They found that the field independent matched dyads required significantly fewer clues to identify the task words than the field dependent matched dyads. The performance of the mismatched dyads fell between the two matched dyads. Frank and Davis interpret these results to mean that in a classroom situation, the best match is for a FI teacher and a FI student. The next best match is for a FI teacher and a FD student. They suggest that the FD student may learn more from a situation which controlled by the structured, more logical and analytical methods of the FI teacher.

In recent years, the trends of research in the areas of cognitive styles and education for the gifted have overlapped in the study of cerebral hemispheric lateralization. The Witkin Group has made two studies of note.

Zoccolotti and Oltman (1976) found that field independent subjects will show opposite lateral superiorities for verbal and configurational material to a greater extent than will those who are field dependent. They suggest that the FD/FI dimension is related to the degree of functioning between the two hemispheres, rather than to some generalized tendency to use one or the other.

Oltman, Semple, and Goldstein (1978) found that FD/FI was associated with variations between individuals in the extent of differentiation of EEG activity between the two

hemispheres. Fluctuations over time in integrated amplitudes recorded from the left and right hemispheres were more similar to each other (i.e., less differentiated, in individuals with a field dependent cognitive style than in those who were field independent.

From the discussion of cognitive styles, several points can be made. Field independent people tend to exhibit more differentiation in cerebral hemispheric lateralization than those who are field dependent, particularly concerning verbal configurations. Those who are field independent and who have a logical, analytical, sequential method of processing information are more successful at the tasks commonly required of them in the classroom than those who are field dependent. Those who are field dependent and who process information holistically and simultaneously are more successful at tasks which require social interaction.

Field independents achieve higher scores on measures of reading and mathematics achievement and also on measures of spatial ability in intelligence tests. Field dependents tend to be less successful in the academic environment and less successful at the task of reading. There is also some evidence to suggest that the Group Embedded Figures Test may be a better indicator of IQ than it is of reading ability.

Since a child's attitude toward reading is crucial to the amount of success he achieves at the task as well as to the amount of pleasure he derives from it both at school and at home, an investigation into the area of reading attitudes was undertaken.

Reading Attitudes

According to Estes, "a student's attitude toward what he studies in school may well be more crucial to his future than the exact knowledge he accumulates" (in Golicz, 1982, p.22). This opinion is widely shared by others in the field (Alexander and Filler, 1976; Koe, 1975; Tinker & McCullough, 1975), especially as it relates to reading.

Much of what has been written about reading attitudes of the gifted can be found in the literature dealing with the gifted underachiever. Because a poor attitude toward reading most often results in poor reading skills, overall academic underachievement is a very common problem among the gifted (Bachtold, 1969; Bowman, 1960; Carey, 1962; Chester, 1974; Chopra, 1967; Fine & Pitts, 1980; Goldberg, 1960; Golicz, 1982; Gowan, 1955, 1957; Raph, Goldberg, & Passow, 1966; Whitmore, 1980; Zilli, 1971).

In probing the case studies involving gifted under-achievers, it is seen that a poor attitude toward reading is only one of a number of significant factors involving

"combination of personal adjustment problems and limited programs in the schools" (Pirozzo, 1982, p.18). The gifted underachiever tends to feel neglected by his peers because he is gifted and neglected by his teachers and significant adults because he is underachieving. The poor self concept that often results from this set of circumstances and the succeeding academic failures which are then associated with a poor self concept are well documented in the literature.

Underachievement among the gifted is a serious problem which is actively being researched. However, for the purposes of this investigation, it was necessary to locate information concerning the reading attitudes of gifted students who were achieving well. This search was not fruitful. The reason for this appears to be very simple: concerning the affective domain, gifted children are more like their age mates than they are different. Their behaviors, attitudes, and emotions run the same gamut as those of their peers (Arent, 1979).

Because "bad attitudes precipitate intellectual atrophy" (Estes in Golicz, 1982, p.22), not only in the gifted but in all students, it is logical to assume that it must be an educational priority to investigate the parameters of attitudes so that they can be better understood for the good of teachers and students alike.

However, despite the importance of this area, the research reported in the literature is very limited. Much of the writing concerned with reading attitudes has been focused on either the characteristics or the content of the reading materials preferred by students. Although these studies are important in terms of motivation and curriculum planning, they do not reveal specific information about the various dimensions of the concept of reading attitude itself.

The work done by Estes (1971) and Kennedy and Halinski (1975) resulted in Likert-type items for measuring reading attitudes. However, both scales yield a total score - a fact which means that the total is viewed as a quantitative representation of a student's overall attitude toward reading. According to Wallbrown, Vance, and Prichard (1979), "the use of such procedures necessarily involves the assumption that reading attitude is a unitary, global dimension analogous to general intelligence in the cognitive domain" (p.473). In refuting this assumption, they quote Underwood's 1957 warning concerning the scientific approach to global phenomena:

The history of science is a history of relentless analysis. We aim to break down gross phenomena into subphenomena. (p. 473)

In an attempt to provide more than a global measure, Engin, Wallbrown, and Brown collaborated in a series of

studies (Engin, Wallbrown, & Brown, 1976; Wallbrown, Brown, & Engin, 1978) which resulted in the development and refinement (through factor analysis) of an instrument which discriminates eight separate dimensions within the construct of reading attitude. Those dimensions are: Expressed Reading Difficulty, Reading as Direct Reinforcement, Reading as Enjoyment, Alternative Learning Modes, Reading Group, Reading Anxiety, Silent vs. Oral Reading, and Comics.

So far, the Survey of Reading Attitudes (SRA) has been used exclusively with fourth, fifth, and sixth grade students, and it is still considered an experimental instrument. However, it has already been used in the investigation of some important educational issues.

In studying the relationship between reading attitude and locus of control for 431 inner city public school children in Columbus, Ohio, Brown, Engin, and Wallbrown (1979) found that the correlation was highest between the locus of control I- score and the reading attitude dimension of Reading Anxiety. They interpret this to mean "that inner city children who are willing to accept personal responsibility for negative events in their lives also tend to experience more anxiety in their reading" (p. 336).

In surveying the reading attitudes of 84 normal and 116 disabled readers among a sample of Appalachian rural

public school children, Wallbrown, Vance, and Prichard (1979) found that the three dimensions which best discriminate between these two groups are: Expressed Reading Difficulty, Reading as Enjoyment, and Reading Group. "In comparison to normal readers, disabled readers are more likely to feel negatively about their reading group, less likely to see themselves as pursuing reading for its intrinsic value, and more likely to perceive of themselves as having difficulty with reading" (p.472).

In investigating the relationship of reading attitudes to academic aptitude, locus of control, and field independence, Blaha and Chomin (1982) selected a sample of 322 inner city Detroit public school fifth grade students. They found that verbal academic aptitude as measured by the Cognitive Abilities Test (CAT; Thorndike, Hagen, & Lorge, 1974) correlated significantly with Expressed Reading Difficulty, Reading Anxiety, Silent vs. Oral Reading, and Reading as Enjoyment dimensions and nonverbal academic aptitude correlated with Expressed Reading Difficulty and Reading Anxiety. They also found that Expressed Reading Difficulty, Reading Anxiety, Reading Group, Reading as Direct Reinforcement, and Reading as Enjoyment dimensions were significantly related to the locus of control I+ score and no reading attitude dimensions were related to the I-score.

Concerning field independence, only the Expressed Reading Difficulty dimension demonstrated a significant correlation, and that was in a negative direction. Blaha and Chomin interpret this to mean that field dependent children who possess a global cognitive style tend to perceive of themselves as having difficulty with reading and were willing to acknowledge the existence of a problem. Conversely, field independent children with an analytical style expressed the least difficulty in reading.

In 1981, Wallbrown and Blaha examined the relationship between SRA scores and teacher ratings of classroom behavior as measured by the Devereux Elementary School Behavior Rating Scale (DEBS) (Spivack & Swift, 1967). They found certain patterns of behavior to be associated with different dimensions of reading attitude for the 198 fifth grade students from the Detroit public schools. Those students who scored highest on the Expressed Reading Difficulty dimension were "perceived by their teachers as inattentive, withdrawn, avoiding inappropriate verbal statements, and having difficulty understanding what is being taught" (p.165). A slight but significant correlation was also found between Reading as Direct Reinforcement and creative initiative.

Since none of the DESB categories typically associated with acting-out behavior (Disturbance, Impatience, Disrespect-Defiance, and External Blame) showed a significant

relationship with any of the eight dimensions of reading, the authors issue a caution to those who may want to use the SRA with children who have reading problems. Such children typically exhibit some of the DESB behaviors, and because the SRA is a self-report instrument reliant on the accuracy of self-perception, "it may well be that this instrument is of questionable value for measuring the attitudes of students who (psychologically) deny their reading problems" (p.166, italics in original).

The last study located using the SRA was conducted in 1981 by Wallbrown, Levine, and Engin in a rural area of Northeastern Ohio using 312 fifth and sixth grade public school students. In this study, they attempted to determine the extent of sex differences and developmental trends in reading attitude. They found that boys scored significantly higher than girls on Expressed Reading Difficulty, Reading Anxiety, Alternative Learning Modes, and Comics. Girls scored significantly higher on Reading Group, Reading as Direct Reinforcement, and Reading as Enjoyment. They also found that for both groups, there was a significant decrease in scores for Comics from grade five to grade six.

The significant sex differential found across the dimensions of reading attitude in this study prompted the authors to urge other researchers to consider such differences in their own work. They cite the failure of previous investigations to consider sex differences as serious

limitations of those studies.

Common to all of the preceding studies was a caution issued to others interested in applying these findings to different samples of students. Because "there is reason to believe that the development of reading attitudes may be influenced by community values as well as by the emotional climate in the classroom, school, and community" (Wallbrown, Levine, Singleton, & Engin, 1981, p.271), the authors suggest that these results not be generalized without further research.

An attempt to establish the construct validity of the SRA using a principle-factor analysis has revealed that some of the dimensions have been noticed to merge while others have split. Blaha and Chomin (1981) found that Reading Anxiety tended to merge with the Expressed Difficulty dimension, and the Reading as Direct Reinforcement and Reading Group dimensions merged into one. They interpret this to mean that these dimensions may be correlated and suggest that further research should employ an oblique rotation rather than an orthogonal rotation to clarify the relationship.

Blaha and Chomin also found that the dimension of Comics split into two factors: Comic Books and Newspaper Comics. "This suggests that, for this sample, liking and enjoying comic books does not imply that these youngsters

also enjoy reading the comics section of the newspaper" (p. 277).

From this discussion of reading attitude, it can be seen that the literature suggests there is no difference between the overall reading attitudes of the gifted as compared to their average-achieving peers. It can also be seen that the majority of studies have dealt primarily with the characteristics or the content of reading materials rather than on the concept of reading attitude. Several studies were cited as having used an experimental reading attitude survey which is still being validated.

Summary of the Chapter

This chapter contained a review of the theories and research concerning three important issues in gifted education, namely: identification of the gifted, individual cognitive styles, and reading attitude. It was shown that the identification process is hindered in two ways: by the lack of an acceptable definition of giftedness and by less than satisfactory screening devices.

The failure of educators and psychologists to arrive at an acceptable definition of giftedness has historical, political, and cultural origins; and it has been suggested that the definition adopted for use be related to specific areas of application. To this end, the Marland Report

sought to outline the parameters of giftedness for use within the educational context. This report also surveyed the screening procedures most widely used to identify the gifted across the country, and found that most relied heavily on a combination of standardized tests of achievement and intelligence. Questions were raised as to the appropriateness of these measures.

Approaching the same question from the viewpoint of cognitive styles, the same conclusion was reached concerning the standardized tests of achievement and intelligence. That is, these tests have been constructed so as to favor the student who thinks analytically and sequentially, and to penalize those who think globally and simultaneously.

Recent studies conducted in both education and psychology in the area of cerebral hemispheric lateralization have also reached some common conclusions relative to the effect that hemispheric dominance has on the thought, and thereby the learning processes of children. Those who tend to be creative and artistically talented show more evidence of right hemispheric dominance, while those who are more skilled in the academic areas show left hemispheric dominance.

These conclusions have direct implications for the education of the gifted because they reveal that the selection process has a tendency to omit from consideration

those whose classroom behavior, both in work and deportment, tends to be divergent. The research shows that these students show great promise in the area of creative problem solving, but their needs are not being met by the analytical demands of the average classroom.

Concerning the affective area of reading attitude, the literature was limited, but some studies have been undertaken using a new survey which can be used to assess how students feel about the various dimensions of reading activity. It is felt that concerning this dimension of the affective domain, the needs of gifted children are more like than unlike those of their classmates; therefore, it is not expected that gifted children will show a significantly different profile from average children in this area.

Chapter III

Procedure

Introduction

It was the purpose of this investigation to acquire information - both cognitive and affective in nature - from two groups of fifth and sixth grade students - one considered gifted, the other considered average-achieving by their school personnel. It was then planned to analyze these data to see in what areas the gifted and average children were similar and in what areas they were dissimilar.

Hypotheses

1. There will be no significant difference in the cognitive style of field dependence/independence between gifted and average students in the fifth and sixth grades.

2. There will be no significant difference in performance on standardized measures of intelligence between gifted and average students in the fifth and sixth grades.

3. There will be no significant difference in performance on standardized measures of achievement between gifted and average students in the fifth and sixth grades.

4. There will be no significant differences in reading attitudes between gifted and average students in the fifth and sixth grades.

5. There will be no significant difference in the cognitive style of field dependence/independence between males and females in the fifth and sixth grades.

6. There will be no significant difference in performance on standardized measures of intelligence between males and females in the fifth and sixth grades.

7. There will be no significant difference in performance on standardized measures of achievement between males and females in the fifth and sixth grades.

8. There will be no significant differences in reading attitudes between males and females in the fifth and sixth grades.

9. There will be no significant correlations between the cognitive style of field dependence/independence and performance on standardized tests of intelligence for fifth and sixth grade students.

10. There will be no significant correlations between the cognitive style of field dependence/independence and performance on standardized tests of achievement for fifth and sixth grade students.

11. There will be no significant correlations between the cognitive style of field dependence/independence and eight dimensions of reading attitude for fifth and sixth grade students.

Methodology

Subjects

The school district in which this study was conducted is in a middle class suburb in Western New York. In preparation for acceptance into the gifted program, the children are screened and identified in their neighborhood schools in the latter half of fourth grade. Those who qualify are then bussed during grades five and six to the one elementary school in the district which houses the gifted program.

In order to maximize the number of gifted children in this study, it was necessary to combine the 18 fifth graders and 18 sixth graders together to make one group of 36 (20 males and 16 females). An equal number of average children from the fifth and sixth grades was chosen for the control group (22 males and 14 females).

Because it was expected that there would be an obvious and significant difference in their IQ and achievement test performance when compared to the gifted, it was decided to exclude low ability students from this study. This decision was made so that the focus could remain on the differences between the gifted and the average-achieving students, which are not always so easily discernible.

Instruments

Measure of Cognitive Style

The Group Embedded Figures Test (GEFT), Consulting Psychologists, Inc., 1971, was used to determine the degree of field dependence/independence in all the subjects. The GEFT is a version of the individually administered Embedded Figures Test (EFT) which has been modified to make group testing possible. In this test, the task is to locate and outline a previously seen simple figure within a larger, more complex figure which has been designed to obscure or "embed" the smaller one. The score reflects the subject's ability to break up an organized visual field in order to keep a part of it separate from that field, i.e., the ability to overcome perceptual embedding.

The GEFT is divided into three sections. The subject is prevented from seeing simultaneously the simple form and the complex form containing it by virtue of the design of the booklet. The simple forms are all printed on the back cover and the complex forms are individually placed on the booklet pages. Section 1 contains seven very simple items which are used just for practice and are not considered in the scoring. The second and third sections each contain nine items which are arranged in order of ascending difficulty. The maximum score obtainable for correctly outlining all the embedded figures is 18.

The GEFT has validity coefficients of .82 for males and .63 for females when compared with the EFT. A correlation of parallel forms with identical time limits produced a reliability estimate of .82 for both males and females. These estimates also compare favorably with those of the EFT (Witkin, Oltman, Raskin, & Karp, 1971).

The GEFT was chosen for this study for several reasons:

1. It is a group test - as are all the other measures used in this study.
2. It has acceptable reliability and validity coefficients for the age group in question.
3. The use of embedded figures tests to make inferences concerning the dimensions of a subject's personal functioning has been well researched and documented (Witkin et al., 1971, p.3).

Measure of Intelligence Quotient

The Lorge-Thorndike Intelligence Test, Multi-level Edition, Form 1, Levels A and B, 1954 and 1964 was used to measure IQ. This test yields a verbal IQ, a nonverbal IQ, and a total IQ. For the purposes of this study, the raw scores in each of the batteries were used.

The test was developed in 1954 by Irving Lorge and Robert L. Thorndike and was revised in 1964 by Lorge, Thorndike, and Elizabeth Hagen. It was originally stan-

standardized on 136,000 children in 22 states. The communities were selected for varied socioeconomic levels and attributes. The revision standardization data were obtained from 600 pupils per grade in 14 school systems enrolled in the Iowa Basic Skills Testing Program (Clark, 1979, p.413).

Freeman in Buros (1959) commends the test as being among the sounder instruments available because of the psychological insights shown in selecting and developing materials and because of the statistical analysis of the standardization data (p.481).

The test is considered a power test and is timed. The manual reports high correlations with tests of achievement (.60 to .70) and moderate to high with tests of intelligence. Nonverbal scores do not seem as effective as verbal scores in predicting school achievement. The verbal battery also shows better reliability (.83 - .91; non-verbal: .80 - .88) (Lorge, Thorndike, & Hagen, 1964).

The Lorge-Thorndike Intelligence Test was used in this study because it is given district-wide in the town where this study was conducted. The scores were obtained from school records.

Measure of Academic Achievement

The Iowa Tests of Basic Skills, Multi-level Battery, Form 7, Levels 10 and 11, 1978, subtest raw scores for math concepts, math computation, math problem solving,

total math, and reading comprehension were used as the measures of academic achievement. According to the manual, The Iowa Tests of Basic Skills are intended to provide objective information about skills performance that will constitute a partial basis for making instructional decisions for individual students (Hieronymous, Lindquist, & Hoover, 1978, p.1).

The multi-level battery is intended for use in grades 3-8 and comprises eleven subtests which are not graded, but which consist of a continuous scale from low level grade 3 to superior grade 8 performance. There are six levels which are numbered to correspond roughly to chronological age, and which also relate to the average developmental level of that chronological age. In the case of this study, the most recent ITBS scores available on the subjects were dated May 1981. The fifth grade had used Level 10, which corresponds to Age 10, Grade 4; the sixth grade had used Level 11, which corresponds to Age 11, Grade 5.

For scoring purposes, raw scores are converted to grade equivalents, age equivalents, or standard scores. Grade equivalents and standard scores are converted to percentile ranks in grade, stanines, and normal curve equivalents for fall, midyear, and spring. Age equivalents are converted to percentile ranks and stanines in age group (Hieronymous et al., 1978).

The ITBS was standardized using approximately 19,000 pupils per grade. Criteria used in selecting and weighting were region, size of school district, family income, and education. While final reliability figures are not yet available, the coefficients are expected to be comparable to those of previous forms, i.e., to vary from .80 to .93 across subtests and levels (Hieronymous et al., 1978).

In the town where this study was conducted, the ITBS is given district-wide, and therefore was a common factor in the records of all the students who participated.

Measure of Reading Attitude

A Survey of Reading Attitudes, Intermediate Level, Form A, Third Experimental Edition, 1977, by Wallbrown, Brown, and Engin was used to determine the reading attitudes of all the subjects.

In the course of their work, Engin, Wallbrown, and Brown (1976), and Wallbrown, Brown, and Engin (1978) have articulated a difference between reading interests and reading attitudes. This distinction is helpful in organizing research so that examination of students' preferences for certain content, styles, and structures (interests) can be held separate from assessment of their feelings toward the reading process itself (attitudes) (Brown, Engin, & Wallbrown, 1979a, p.259). To this end, they

have devised an instrument which treats reading attitude as a complex, multidimensional phenomenon rather than a simple, unitary dimension.

The Third Experimental Edition of the Survey contains 92 Likert-type attitude statements to which the students respond by checking one of five possible opinions: 1. strongly agree; 2. agree; 3. not sure; 4. disagree; 5. strongly disagree.

The Survey statements were drawn from the reading literature as well as from interviews with teachers and students themselves. The items were factor-analyzed for a cumulative sample of 1,435 intermediate grade students with varying socioeconomic and ethnic backgrounds. Eight independent dimensions of reading attitude were thus obtained and interpreted on the basis of the common elements present in the items defining each factor (Brown et al., 1979a).

The eight dimensions of reading attitude and the number of Survey items related to each are:

1. Expressed Reading Difficulty	19
2. Reading Anxiety	11
3. Alternative Learning Modes	9
4. Silent vs. Oral Reading	12
5. Comics	6
6. Reading Group	7
7. Reading as Direct Reinforcement	15
8. Reading as Enjoyment	<u>13</u>
	92 Total

Within each category, all of the items are scored in the same direction. The meaning of a high score varies according to whether or not a dimension measures a negative, positive, or questionable attitude toward reading.

The Survey of Reading Attitudes was chosen for this study because it offered the possibility of relating eight discrete dimensions of the reading attitudes of the gifted to the other variables under consideration in this study, namely: intelligence, academic achievement, and the cognitive style of field dependence/independence. Also, since it is still an experimental instrument, using it with a gifted population will widen its range and contribute to its construct validity.

Administration of the Tests

Group Embedded Figures Test (GEFT)

The testing for this project took place on two successive days in January 1982. This researcher administered the GEFT in the school auditoria in two group sessions. In order to preserve the anonymity of purpose, these sessions were organized by grade level rather than by ability groups. The first session was devoted to the fifth grade; the second session was for the sixth grade.

The manual for the GEFT specifies time limits for adult subjects, but it allows the administrator to adjust those limits when testing children. In this case, the subjects were allowed 3 minutes for Section 1 (the practice section for which adults are allowed 2 minutes) and 8 minutes each for Sections 2 and 3 (the scored sections for which adults are permitted only 5 minutes each).

Survey of Reading Attitudes (SRA)

On the next day, this researcher administered the Survey of Reading Attitudes to the same groups of children at the same time of day and in the same place. In accordance with the directions for administration, each of the items was read aloud while the students read along silently and then marked their responses. The time needed for this task was approximately 30 minutes per group.

Lorge-Thorndike Intelligence Test (IQ) and the Iowa Tests of Basic Skills (ITBS)

The raw scores on the subscales of the Lorge-Thorndike IQ and the ITBS achievement measures were obtained from student records.

Sex Factors

In a personal communication with Dr. Ann Engin (one of the authors of the Survey of Reading Attitudes) she

expressed particular interest in examining the question of whether or not this study would reveal any significant sex differences within and between the groups. She has found such differences in her own work, and she expects to include separate norm tables for males and females in the published version of the survey.

In view of this request, and because the question of sex differences in field dependence/independence is still unsettled (Witkin et al., 1971), it was decided to make sex one of the variables in this study.

Statistical Design

To test the first eight hypotheses, repeated one-way analyses of variance (ANOVA) were performed on the data. A Pearson product-moment correlation matrix was used to test the remaining hypotheses. All analyses were performed using the Statistical Package for the Social Sciences (SPSS) (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975) computer program available through the State University College at Brockport Academic Computer Center.

Summary

The purpose of this study was to reveal the significance of relationship among the cognitive style of field dependence/independence, reading attitudes and academic achievement for a sample of fifth and sixth grade gifted children and to compare these relationships with those found for a sample of students of average ability.

This was accomplished through the use of two types of statistical analysis. Repeated one-way analyses of variance (ANOVA) using ability as the independent variable and scores on the GEFT, SRA, IQ, and ITBS as the dependent variables were used to establish the significance of the differences between the gifted and the average groups. A correlation matrix was used to test the significance of the relationships among the measures used.

Chapter IV

Analysis of the Data

Purpose

The purpose of this study was to investigate cognitive style and its relationship to reading attitudes and academic achievement in gifted children. Specifically, the intent of the study was to determine the relationships among field dependence/independence, eight dimensions of reading attitude, and the academic achievement skills of mathematics and reading as differentiated by sex and ability among fifth and sixth grade students.

The data of this study were derived from testing 72 fifth and sixth grade students (36 gifted; 36 average). A cognitive style determinant test, the Group Embedded Figures Test (GEFT), was given to establish a measure of field dependence/independence. A Survey of Reading Attitudes (SRA) was administered to obtain a measure of eight dimensions of reading attitude. Intelligence test scores for the Lorge-Thorndike IQ Test and achievement subtest scores in math concepts, math computation, math problem solving, total math, and reading comprehension for the Iowa Tests of Basic Skills (ITBS) were obtained from student records.

Statistical analyses used were repeated one-way ana-

lyses of variance (ANOVA) and a Pearson product-moment correlation matrix. The findings and their interpretation are presented in this chapter.

Findings from the Repeated One-way Analyses of Variance

The first eight null hypotheses were tested at the .05 level of significance by repeated one-way analyses of variance. In reference to Hypotheses 1-4, ability was the independent variable; in Hypotheses 5-8, sex was the independent variable. The dependent variables for all of the first eight hypotheses were the scores on the GEFT, SRA, IQ, and ITBS measures. These results are presented in Tables 1-8.

The first hypothesis states that there will be no significant difference in the cognitive style of field dependence/independence between gifted and average students in the fifth and sixth grades. The second hypothesis states that there will be no significant difference in performance on standardized measures of intelligence between gifted and average students in the fifth and sixth grades. The third hypothesis states that there will be no significant difference in performance on standardized measures of achievement between gifted and average students in the fifth and sixth grades. The data pertaining to these hypotheses are presented in Tables 1 and 2. On the basis of these data, the first three hypotheses were rejected.

Table 1

Source Table for the Repeated One-Way Analyses of Variance
of Test Scores - by Ability

(N=72)

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
GEFT	1	1360.7	1360.7	85.76*
<u>Error</u>	<u>70</u>	<u>1110.6</u>	15.9	
Total	71	2471.3		

Lorge-Thorndike				
Verbal IQ	1	9157.5	9157.5	115.59*
<u>Error</u>	<u>70</u>	<u>5545.7</u>	79.2	
Total	71	14703.3		

Nonverbal IQ	1	7180.0	7180.0	104.51*
<u>Error</u>	<u>70</u>	<u>4809.3</u>	68.7	
Total	71	11989.3		

Total IQ	1	32555.	32555.	147.30*
<u>Error</u>	<u>70</u>	<u>15470.</u>	221.	
	71	48025.		

Table 1 - Continued

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
ITBS				
Math concepts	1	1386.9	1386.9	106.17*
<u>Error</u>	<u>70</u>	<u>914.4</u>	13.1	
Total	71	2301.3		

Math Computa- tion	1	364.5	364.5	11.58*
<u>Error</u>	<u>70</u>	<u>2203.9</u>	31.5	
Total	71	2568.4		

Math Problem Solving	1	666.13	666.13	77.51*
<u>Error</u>	<u>70</u>	<u>601.53</u>	8.59	
Total	71	1267.65		

Total Math	1	6747.3	6747.3	72.72*
<u>Error</u>	<u>70</u>	<u>6495.0</u>	92.8	
Total	71	13242.3		

Reading Com- prehension	1	2616.1	2616.1	87.88*
<u>Error</u>	<u>70</u>	<u>2083.9</u>	29.8	
Total	71	4699.9		

* $p < 0.05$ Critical F (5.28)

Table 2
Mean Test Scores and Standard Deviations - by Ability (N=72)

Variable	Gifted		Average	
	Mean	<u>SD</u>	Mean	<u>SD</u>
GEFT	14.50	3.59	5.81	4.34
Large Thorndike				
Verbal IQ	78.97	6.92	56.42	10.51
Nonverbal IQ	69.14	4.20	49.17	10.95
Total IQ	148.1	9.5	105.6	18.7
ITBS				
Math Concepts	31.19	3.32	22.42	3.89
Math Computa- tion	37.97	5.82	33.47	5.40
Math Problem Solving	23.61	2.09	17.53	3.58
Total Math	92.78	9.17	73.42	10.08
Reading Com- prehension	43.56	4.70	31.50	6.12
Total (<u>N</u>)	36		36	

The fourth hypothesis states that there will be no significant difference in reading attitudes between gifted and average students in the fifth and sixth grades. The data pertaining to this hypothesis are presented in Tables 3 and 4. On the basis of these data, the hypothesis is rejected for two of the eight dimensions of reading attitude:

1. Expressed Reading Difficulty and 2. Reading for Enjoyment. The data presented failed to reject the hypothesis for the remaining six dimensions of reading attitude:

1. Reading for Direct Reinforcement 2. Alternative Learning Modes 3. Reading Group 4. Reading Anxiety 5. Silent vs. Oral Reading 6. Comics.

The fifth hypothesis states that there will be no significant difference in field dependence/independence between males and females in the fifth and sixth grades. The sixth hypothesis states that there will be no significant difference in performance on standardized measures of intelligence between males and females in the fifth and sixth grades. The seventh hypothesis states that there will be no significant difference in performance on standardized measures of achievement between males and females in the fifth and sixth grades. The data pertaining to these hypotheses are presented in Tables 5 and 6. The data presented failed to reject all three hypotheses.

The eighth hypothesis states that there will be no significant difference in reading attitudes between males and females in the fifth and sixth grades. The data pertaining to this hypothesis are in Tables 7 and 8. On the basis of this data, the hypothesis is rejected for one of the dimensions of reading attitude: Reading for Enjoyment. The data failed to reject the hypothesis for the remaining seven dimensions.

Table 3
Source Table for the Repeated One-Way Analyses of Variance
of Attitude Scores - by Ability
(N=72)

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Expressed Reading Difficulty	1	1810.0	1810.0	29.93*
Error	70	4232.9	60.5	
Total	71	6042.9		

Reading as Direct Reinforcement	1	3.1	3.1	0.04
Error	70	4879.9	69.7	
Total	71	4883.0		

Reading as Enjoyment	1	800.	800.	6.78*
Error	70	8255.	118	
Total	71	9055.		

Alternative Learning Modes	1	120.1	120.1	4.77
Error	70	1763.7	25.2	
Total	71	1883.9		

Reading Group	1	112.5	112.5	2.44
Error	70	3226.1	46.1	
Total	71	3338.6		

Table 3 - Continued

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Reading Anxiety	1	190.1	190.1	4.70
<u>Error</u>	<u>70</u>	<u>2830.5</u>	40.4	
Total	71	3020.7		

Silent vs. Oral Reading	1	70.0	70.0	0.97
<u>Error</u>	<u>70</u>	<u>5075.6</u>	72.5	
Total	71	5145.6		

Comics	1	0.2	0.2	0.01
<u>Error</u>	<u>70</u>	<u>1807.8</u>	25.8	
Total	71	1808.0		

* $p < 0.05$ Critical F (5.28)

Table 4

Mean Attitude Scores and Standard Deviations - by Ability

Variable	Gifted		Average	
	Mean	<u>SD</u>	Mean	<u>SD</u>
Expressed Reading Difficulty (Range: 19-95)*	33.69	9.01	43.72	6.30
Reading as Direct Reinforcement (Range: 15-75)*	45.19	9.98	44.78	6.31
Reading as Enjoyment (Range: 13-65)*	43.8	11.4	37.1	10.3
Alternative Learning Modes (Range: 9-45)*	28.25	5.21	30.83	4.82
Reading Group (Range: 7-35)*	20.11	8.27	22.61	4.87
Reading Anxiety (Range: 11-55)*	19.56	7.57	22.81	4.86
Silent vs. Oral Reading (Range: 12-60)*	38.67	8.28	36.69	8.74
Comics (Range: 6-30)*	16.22	5.04	16.11	5.12

* Range = Total possible raw score for each dimension
NOT range of actual responses.

Table 5
Source Table for the Repeated One-Way Analyses of Variance
of Test Scores - by Sex
(N=72)

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
GEFT	1	21.9	21.9	0.63
<u>Error</u>	70	<u>2449.4</u>	35.0	
Total	71	2471.3		

Lorge Thorndike				
Verbal IQ	1	27.	27.	0.13
<u>Error</u>	70	<u>14676.</u>	210.	
Total	71	14703.		

Nonverbal IQ	1	0.	0.	0.00
<u>Error</u>	70	<u>11989.</u>	171.	
Total	71	11989.		

Total IQ	1	22.	22.	0.03
<u>Error</u>	70	<u>48004.</u>	686	
Total	71	48025		

Table 5 - Continued

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
ITBS				
Math Concepts	1	8.5	8.5	0.26
<u>Error</u>	<u>70</u>	<u>2292.8</u>	32.8	
	71	2301.3		

Math Computa- tion	1	6.1	6.1	0.17
<u>Error</u>	<u>70</u>	<u>2562.3</u>	36.6	
Total	71	2568.4		

Math Problem Solving	1	3.6	3.6	0.20
<u>Error</u>	<u>70</u>	<u>1264.1</u>	18.1	
Total	71	1267.7		

Total Math	1	2.	2.	0.01
<u>Error</u>	<u>70</u>	<u>13240.</u>	189.	
Total	71	13242.		

Reading Compre- hension	1	0.1	0.1	0.00
<u>Error</u>	<u>70</u>	<u>4699.9</u>	67.1	
Total	71	4699.9		

$p < 0.05$ Critical F (5.28)

Table 6

Mean Test Scores and Standard Deviations - by Sex (N=72)

Variable	Male		Female	
	Mean	<u>SD</u>	Mean	<u>SD</u>
GEFT	10.62	6.25	9.50	5.40
Lorge-Thorndike				
Verbal IQ	68.2	13.8	67.0	15.4
Nonverbal IQ	59.1	13.4	59.2	12.7
Total IQ	127.3	25.6	126.2	27.1
ITBS				
Math Concepts	27.10	5.41	26.40	6.13
Math Computa- tion	35.48	5.93	36.07	6.21
Math Problem Solving	20.38	4.21	20.83	4.31
Total Math	83.0	13.3	83.3	14.4
Reading Com- prehension	37.50	8.38	37.57	7.93
Total (<u>N</u>)	42		30	

Table 7
Source Table for the Repeated One-Way Analyses of Variance
of Attitude Scores - by Sex
(N=72)

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Expressed Reading Difficulty	1	19.0	19.0	0.22
Error	70	6023.8	86.1	
Total	71	6042.9		

Reading for Direct Reinforcement	1	275.4	275.4	4.18
Error	70	4607.6	65.8	
Total	71	4883.0		

Reading for Enjoyment	1	973.	973.	8.43*
Error	70	8082.	115.	
Total	71	9055.		

Alternative Learning Modes	1	55.8	55.8	2.14
Error	70	1828.1	26.1	
Total	71	1883.9		

Table 7 - Continued

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Reading Group	1	111.5	111.5	2.42
<u>Error</u>	<u>70</u>	<u>3227.1</u>	46.1	
Total	71	3338.6		

Reading Anxiety	1	93.3	93.3	2.23
<u>Error</u>	<u>70</u>	<u>2927.3</u>	41.8	
Total	71	3020.7		

Silent vs. Oral Reading	1	112.7	112.7	1.57
<u>Error</u>	<u>70</u>	<u>5032.9</u>	71.9	
Total	71	5145.6		

Comics	1	0.9	0.9	0.04
<u>Error</u>	<u>70</u>	<u>1807.1</u>	25.8	
Total	71	1808.0		

* $p < 0.05$ Critical F (5.28)

Table 8

Mean Attitude Scores and Standard Deviations - by Sex (N=72)

Variable	Male		Female	
	Mean	<u>SD</u>	Mean	<u>SD</u>
Expressed Reading Difficulty (Range: 19-95)*	39.14	8.60	38.10	10.16
Reading as Direct Reinforcement (Range: 15-75)*	43.33	7.45	47.30	8.97
Reading as Enjoyment (Range: 13-65)*	37.3	10.2	44.8	11.5
Alternative Learning Modes (Range: 9-45)*	30.29	5.11	28.50	5.11
Reading Group (Range: 7-35)*	20.31	5.77	22.83	8.02
Reading Anxiety (Range: 11-55)*	22.14	6.62	19.83	6.25
Silent vs. Oral Reading (Range: 12-60)*	38.74	7.92	36.20	9.21
Comics (Range: 6-30)*	16.07	6.04	16.30	3.27
Total (N)	42		30	

*Range = Total possible raw score for each dimension
Not range of actual responses.

Interpretation of the Data from the Analyses of Variance

The first three hypotheses were rejected. The mean scores on the GEFT, IQ, and ITBS measures were significantly higher for the gifted students than for the average students.

The fourth hypothesis was partially rejected in two areas. The gifted students reported significantly less Expressed Reading Difficulty and significantly more Reading for Enjoyment than the average students did. Concerning the remaining six reading attitudes, although the results were not statistically significant, the tendencies should be noted.

For Alternative Learning Modes, Reading Group, and Expressed Reading Anxiety, the mean scores of the gifted students were lower than the mean scores of the average students. Thus, the gifted students preferred alternatives to reading less than the average students, enjoyed reading group less than the average students, and suffered less reading anxiety than the average group. Conversely, they preferred silent reading to oral reading more than the average group. On the points of comics and reading for direct reinforcement, the mean scores of the two groups were practically equal.

The data failed to reject the fifth, sixth, and seventh hypotheses. The mean scores on the GEFT, IQ, and ITBS measures were no different relative to sex. However,

in reference to the question of field dependence/independence, the data point toward supporting Witkin's work which suggests that males tend to be more field independent than females.

The eighth hypothesis was partially rejected in one area. The females in the sample read for enjoyment significantly more than the males do. The data failed to reject the hypothesis for the remaining seven dimensions of reading attitude; however, the direction of the results should be noted. The males preferred alternative learning modes more than the females. The females read for direct reinforcement and enjoyed reading group more than the males. They also experienced less reading anxiety than the males did.

Findings from the Correlational Study

A correlation study was conducted to test the remaining three hypotheses at the .05 level of significance. Data pertaining to these hypotheses are in Tables 9-11. Correlation coefficients were calculated between the variables of field dependence/independence (scores on the Group Embedded Figures Test) and scores on the measures of IQ, academic achievement, and reading attitude. Because the nature of a correlational study assumes a range of variability in both variables (Blalock, 1972, p.381), it was

necessary to pool the gifted and average students together for this phase of the analysis.

The ninth hypothesis states that there will be no significant correlations between the cognitive style of field dependence/independence and performance on standardized tests of intelligence for fifth and sixth grade students. Data pertaining to this hypothesis appear in Table 9. On the basis of this data, the ninth hypothesis is rejected.

Table 9
Correlation Coefficients between Field Dependence/Independence and Standardized Measures of Intelligence

	Field Dependence/Independence
Verbal IQ	0.566*
Nonverbal IQ	0.682*
Total IQ	0.654*

$$r_{\text{crit}} (\alpha = 0.05, df = 70) = \pm 0.2319$$

* = significant correlation

The tenth hypothesis states that there will be no significant correlations between the cognitive style of field dependence/independence and performance on standardized tests of achievement for fifth and sixth grade students. The data pertaining to this hypothesis is in Table 10.

On the basis of this data, the hypothesis is rejected for four areas of academic achievement: Math concepts, math problem solving, total math, and reading comprehension. The data failed to reject the hypothesis for the area of math computation.

Table 10

Correlation Coefficients between Field Dependence/Independence and Standardized Measures of Achievement

	Field Dependence/Independence
Math Concepts	0.632*
Math Computation	0.227
Math Problem Solving	0.553*
Total Math	0.535*
Reading Comprehension	0.564*

$$r_{\text{crit}} (\alpha = 0.05, df = 70) = \pm 0.2319$$

* = significant correlation

The eleventh hypothesis states that there will be no significant correlations between the cognitive style of field dependence/independence and eight dimensions of reading attitude for fifth and sixth grade students. The data concerning this hypothesis is presented in Table 11. On the basis of this data, the hypothesis is rejected for the reading dimension of Expressed Reading Difficulty. The data failed to reject the hypothesis with respect to the remaining seven dimensions.

Table 11

Correlation Coefficients between Field Dependence/Independence and Eight Dimensions of Reading Attitude

	Field Dependence/Independence
Expressed Reading Difficulty	-0.413*
Reading as Direct Reinforcement	-0.175
Reading as Enjoyment	0.098
Alternative Learning Modes	-0.175
Reading Group	-0.152
Reading Anxiety	-0.201
Silent vs. Oral Reading	0.123
Comics	0.088

$$r_{\text{crit}} (\alpha = 0.05, df = 70) = \pm 0.2319$$

* = significant correlation

Additional Findings from the Correlational Study

In addition to the data specifically relating to the hypotheses of this study, the correlation matrix yielded coefficients relative to the general purpose of this work. These data are presented in Tables 12-15.

Besides exhibiting significant positive relationships with the GEFT scores, all the measures of intelligence and of academic achievement (with the exception of math computation as noted above) correlate positively with each other and negatively with the dimension of Expressed Reading Difficulty, as presented in Tables 12 and 13.

Table 12

Correlation Coefficients between Standardized Measures of Intelligence and Measures of Academic Achievement

	Verbal IQ	Nonverbal IQ	Total IQ
Math Concepts	0.639*	0.667*	0.687*
Math Computation	0.335*	0.356*	0.363*
Math Problem Solving	0.667*	0.556*	0.647*
Total Math	0.620*	0.607*	0.646*
Reading Comprehension	0.592*	0.565*	0.610*

$$r_{\text{crit}}(\alpha = 0.05, df = 70) = \pm 0.2319$$

* = significant correlation

Table 13

Correlation Coefficients between Standardized Measures of Intelligence and Eight Dimensions of Reading Attitude

	Verbal IQ	Nonverbal IQ	Total IQ
Expressed Reading Diff.	-0.467*	-0.360*	-0.438*
Reading as Dir.Reinf.	0.012	-0.046	-0.016
Reading as Enjoyment	0.098	0.109	0.109
Alternative Learning M	-0.129	-0.085	-0.114
Reading Group	-0.253*	-0.197	-0.238*
Reading Anxiety	-0.167	-0.135	-0.160
Silent vs. Oral	0.233*	0.166	0.212
Comics	-0.123	0.043	-0.046

$$r_{\text{crit}}(\alpha = 0.05, df = 70) = \pm 0.2319$$

* = Significant correlation

As seen in Table 14, the subtest of Math Concepts correlates negatively with Reading Anxiety as do Math Problem Solving, Total Math, and Reading Comprehension. Math Problem Solving and Reading Comprehension also correlate negatively with Alternative Learning Modes. Reading Comprehension correlates positively with Reading for Enjoyment. The measurements of Verbal and Total IQ reveal negative correlations to Reading Group, and Verbal IQ has a positive correlation to Silent vs. Oral Reading.

Within the eight dimensions of reading attitude, as seen in Table 15, positive correlations appeared between Expressed Reading Difficulty and Alternative Learning Modes and Reading Anxiety; between Reading for Direct Reinforcement and Reading for Enjoyment and Reading Group; between Reading Anxiety and Silent vs. Oral Reading and Comics.

Negative correlations appeared between Expressed Reading Difficulty and Reading for Enjoyment; between Reading for Enjoyment and Alternative Learning Modes and Reading Anxiety; and between Reading Group and Silent vs. Oral Reading.

Interpretations of the Data from the Correlation Study

The rejection of the ninth hypothesis can be interpreted to mean that there is a significant positive relationship between performance on a test of field dependence/independence and performance on a standardized test of intel-

ligence for students in the fifth and sixth grades; or those who are more field independent tend to do better on IQ tests than those who are field dependent.

The partial rejection of the tenth hypothesis reveals that there is a significant positive relationship between field dependence/independence and performance on tests of math concepts, math problem solving, total math, and reading comprehension. However, the relationship with math computation, although in the positive direction, is not significant. These factors can be interpreted to mean that those who are more field independent tend to do better on measures of academic achievement than students who are more field dependent.

The rejection of the eleventh hypothesis for the dimension of Expressed Reading Difficulty can be interpreted to mean that those who score well on the GEFT (or who are more field independent) tend to express less difficulty with reading than students who are more field dependent.

The results of the testing undertaken for this study have been graphically represented in Figure 1. From the data presented, it can be seen that the major differences between the gifted and the average groups occurred within the cognitive domain. Where the affective domain is concerned, the two groups were remarkably similar.

Table 14
Correlation Coefficients between Standardized Measures of Achievement and Eight
Dimensions of Reading Attitude

	Math Con- cepts	Math Compu- tation	Math Problem Solving	Total Math	Reading Compre- hension
Expressed Reading Difficulty	-0.529*	-0.306*	-0.438*	-0.491*	-0.471*
Reading as Direct Reinforcement	-0.020	0.080	0.034	0.037	0.074
Reading as Enjoyment	0.218	0.052	0.229	0.185	0.301*
Alternative Learning Modes	-0.223	-0.069	-0.267*	-0.206	-0.264*
Reading Group	-0.075	0.003	-0.024	-0.037	-0.082
Reading Anxiety	-0.279*	-0.153	-0.264*	-0.266*	-0.302*
Silent vs. Oral Reading	0.056	-0.021	-0.012	0.010	0.021
Comics	-0.048	-0.128	-0.032	-0.086	-0.031

$$r_{\text{crit}}(\alpha = 0.05, df = 70) = \pm 0.2319$$

* = Significant correlation

Table 15
Correlation Coefficients among the Eight Dimensions of Reading Attitude

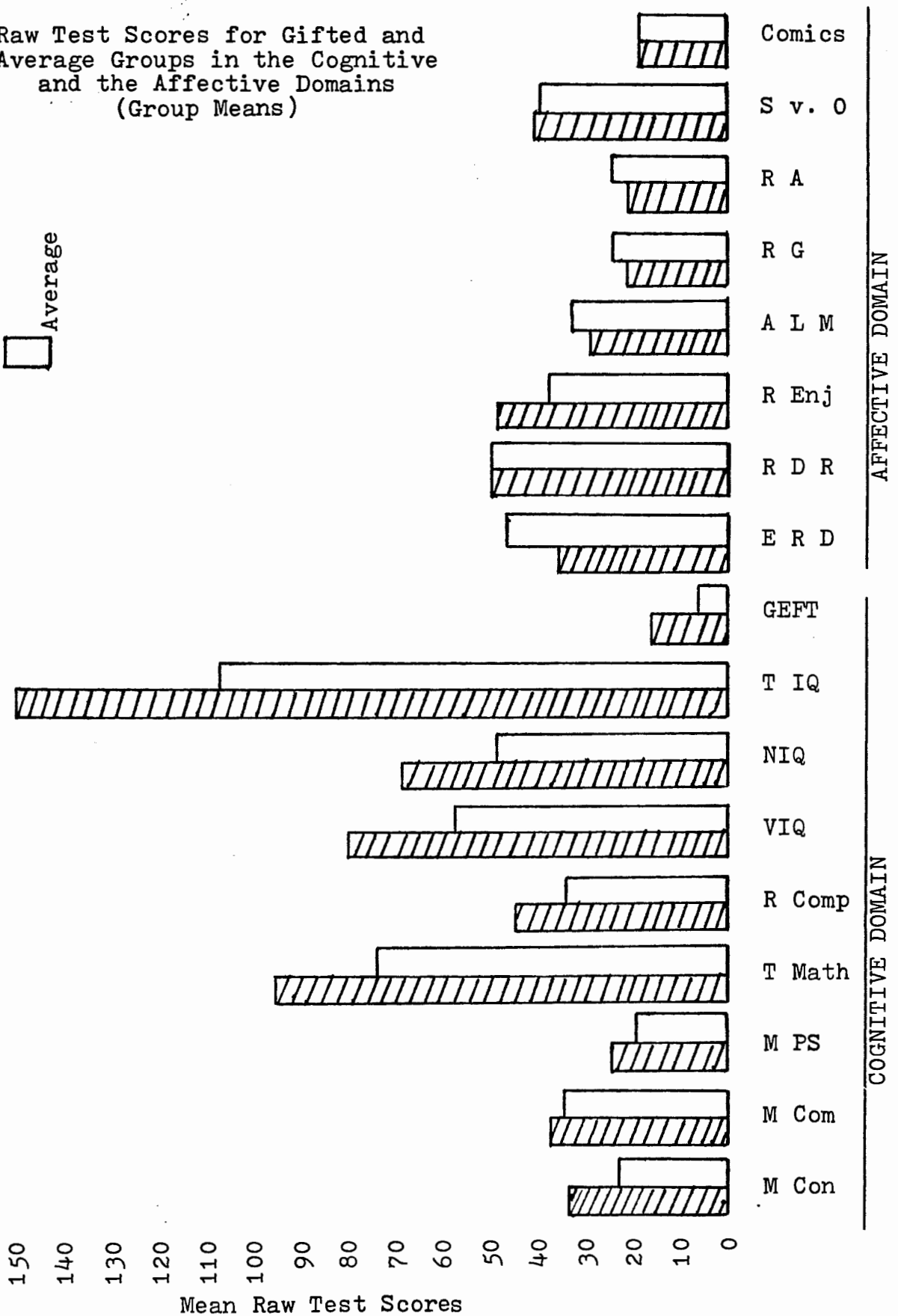
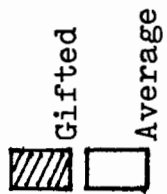
(1)	Expressed Difficulty	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(2)	Reading as Direct Reinforce- ment	-0.215						
(3)	Reading as Enjoyment	-0.401*	0.516*					
(4)	Alternative Learning Modes	0.532*	-0.222	-0.634*				
(5)	Reading Group	0.055	0.543*	0.361*	-0.162			
(6)	Reading Anxiety	0.706*	-0.190	-0.475*	0.428*	-0.012		
(7)	Silent vs. Oral	0.179	-0.181	-0.220	0.153	-0.270*	0.329*	
(8)	Comics	0.200	-0.009	-0.008	0.001	0.146	0.245*	0.088

$r_{crit} (\alpha = 0.05, df = 70) = \pm 0.2319$

* = significant correlation

Figure 1.

Raw Test Scores for Gifted and
Average Groups in the Cognitive
and the Affective Domains
(Group Means)



Summary

The purpose of this study was to investigate cognitive style and its relationship to reading attitudes and academic achievement in gifted children. Eleven hypotheses were generated and analyzed. Repeated one-way analyses of variance revealed significant differences between gifted and average children in their performance on measures of IQ, academic achievement, and reading attitudes.

Additional one-way analyses of variance revealed that the females in this sample read for enjoyment more than the males do. Aside from that, there are no statistical differences between males and females in the scores obtained on the GEFT, SRA, IQ, and ITBS measures.

A correlational study revealed significant positive relationships between performance on a test of field dependence/independence and measures of IQ and academic achievement. A significant negative relationship was also revealed to exist between field dependence/independence and the Expressed Difficulty dimension of reading.

Chapter V

Conclusions and Implications

Purpose

The specific intent of this study was to determine the relationships among field dependence/independence, eight dimensions of reading attitude, and the academic achievement skills of mathematics and reading as differentiated by sex and ability among fifth and sixth grade students.

Conclusions

It should be noted that the conclusions drawn in this chapter refer specifically to the fifth and sixth grade students who participated in the study. Any generalizations should be applied with this fact in mind.

Cognitive Considerations

The data which reveal a significant difference in field dependence/independence, performance on standardized measures of intelligence, and performance on standardized measures of achievement between the gifted and average students are all consistent with the findings in the literature: those who are more field independent tend to do better on standardized tests; those who do better on standardized tests tend to be selected for gifted programs.

What is striking in this case, however, is the size of the difference between the two mean GEFT scores: the mean

for the gifted group was two and one half times higher than the mean for the average group. The conclusion to be drawn from this factor is that, as a group, the gifted students tend to be highly field independent. It is also interesting to note that in this particular group of gifted children, the lowest score fell within one point of the mean score for the control group - which means that this gifted group does not contain even one highly field dependent student. This result is also consistent with the research.

The data which reflect no significant difference between males and females in terms of intelligence or achievement scores were also consistent with the literature. As Callahan (1980) points out, "The results of studies of sex difference in the general population among gifted students offer little evidence that innate intellectual abilities account for the overwhelming dominance of males among those identified as gifted adults" (p.16).

The fact that the males tended to be slightly more field independent than the females reflects the concern of Callahan (1980) and McClelland (1977) that field dependence may be more common in females because of our cultural patterns of socialization. The fact that the differences were not significant suggest several interpretations.

Perhaps at the fifth and sixth grades, young children

are still forming their cognitive style preferences. This would support the Witkin group (1971) who say that the progression from field dependence to field independence takes place increasingly between the ages of 8 and 15. The lack of significance in these data, however, could also reflect the changing stereotype of sex-role behavior that is evolving as a result of the recent efforts to eliminate sexual discrimination in our society.

The linking of the ability and sex dimensions considered in this study raises some questions concerning the potential for inadvertent discrimination in the current educational processes. Clearly, the system has discriminated against the field dependent gifted who, with increasing age, have a tendency to be female. Not only is it unreasonable to believe that no field dependents are gifted, it is also contrary to the belief of Witkin et al. (1962, 1967, 1972, 1971, 1977) that the FD/FI construct is bipolar and not a measure of intelligence. Yet, the prevailing system implies that field independence contributes significantly to "giftedness," while field dependence is of questionable value.

The data of this study which reveal no significant difference between males and females along the cognitive dimensions support the accepted practice of early screening and identification of gifted students. These results combined with the data from the Witkin group (1971) tend to

imply that the older the population of students tested, the more likelihood there is that the field-independently socialized males will be identified as gifted in preference to the more field-dependently socialized females. This reasoning extends into the strongly sexually biased results cited by Callahan (1980) for gifted adults.

In view of the slight predominance of field independence among the fifth and sixth grade males in this study, consideration might also be given to screening for gifted programs even earlier than the fourth grade to minimize the effect of culturally induced sexual bias in the identification of the gifted.

Affective Considerations

Given the consistence of the positive correlations between field independence and the measures of IQ and academic achievement and the negative correlations of all those measures with the reading attitude dimension of Expressed Difficulty, it was expected that the average students, who are more field dependent, would score higher in this dimension than the gifted children. These results are consistent with those of Blaha and Chomin (1981) who also found that field independent students are better readers who tend to express less reading difficulty than those who are field dependent.

Similarly, since the gifted children are admitted to their special program partially because of their high IQ and achievement scores, their previous success in reading has been demonstrated. It is also a natural consequence of their success in reading that they revealed significantly higher interest in Reading as Enjoyment than the control group.

If one were to predict the attitudes of the separate groups concerning the dimension of Reading as Direct Reinforcement based only on knowledge of their cognitive test scores, it would be logical to assume that the gifted would score significantly higher in this dimension than the average students because their cognitive scores were so much higher. However, if one were acquainted with the research which suggests that their attitudes are more similar than dissimilar to those of their peers, one would predict that there would be no significant difference. The results of this study support the research.

Keeping in mind Wallbrown, Brown, and Engin's definition of that dimension ("the extent to which students perceive of themselves as receiving direct extrinsic reinforcement from their friends, classmates, parents, and teachers for reading type activities") (1979a, p.260), it appears that these gifted students did not place any more value on the task of reading for praise or support than their counterparts did.

In view of the results which show that the gifted favor Silent over Oral reading, it is not surprising that they also enjoy Reading Group less than the average students do. Since they read for enjoyment more, it is predictable that they do not prefer Alternative Learning Modes to the same degree as the control group, and they do not exhibit as much Anxiety over the task of reading.

Concerning the dimension of Comics, the results took an interesting turn. While there were no significant differences between the attitudes of the gifted and the average groups, nor differences between the males and females, there was a difference revealed within the dimension itself. The children in both groups had somewhat different feelings about comic books and newspaper comics. The data reflected a more positive attitude toward newspaper comics than for comic books. While these results support those obtained by Blaha and Chomin (1981) in terms of splitting the dimension of Comics into Comic Books and Newspaper Comics, the preferential trend for this sample of suburban children appears to be in the reversed direction from the sample of inner-city children used in that study.

In this study the Comics dimension was split even further within the Newspaper Comics sub-dimension. The tendency of this sample of children was to prefer the Sunday comics to the weekday comics. One possible reason for

this distinction may lie in the fact that the Sunday comics are printed in color, while the weekday comics are black and white.

Careful examination of the survey instrument also reveals that the splitting of the Comics dimension may have been induced by unintentional bias in the wording of the attitude statements. For instance, the statement "I often buy comic books with my own money" involves two decisions on the part of the student: 1. how often to buy comics, and 2. whose money should be spent on comics.

Implications for the Classroom

The research has shown that the relative independence of cognitive style indices from the usual indices of ability and aptitude is of important educational significance since it indicates that the standardized test information obtained in most school districts does not begin to tap the many forms of cognitive variations present in the repertoire of all children (Kogen, 1971, p.290). A cognitive style approach allows a teacher to study patterns of functioning on a relatively value free basis and to reach a better understanding of his/her students in terms of how they perceive the educational environment. This knowledge in turn permits the teacher to focus on the process rather than the products of learning. The better understanding a teacher has of a student's needs and abilities, the better environment for learning and the more effective instruction

that teacher can provide.

Recalling Gallagher's definition of giftedness ("the ability to manipulate internally learned symbol systems" 1975, pp. 10-11), the many criticisms of the IQ tests, and the research which suggests that the GEFT is a better indicator of intelligence than it is of reading achievement, it would appear that a culture-free, symbol manipulating test of field dependence/independence would be a useful addition to a battery of screening devices to be used for identifying the gifted. If such a test were used, there would still exist the higher probability of identifying the analytical field independents, but an opportunity would be provided for the field dependents to be recognized as more divergent thinkers and to at least reach a second stage in the identification process.

For the teacher who must deal with the gifted in a heterogeneously grouped classroom, a measurement of field dependence/independence can be of great help in planning for the acceleration and enrichment of those students. Keeping Witkin's goal of "mobility for all" in mind, periodic sessions in creative problem solving can provide opportunities for the divergent thinkers to contribute the inspiration and the imagery and for the convergent thinkers to provide the logic. The field independents can be taught how to tap into their right hemispheric functions, and the field dependents how to structure and discipline their creativity.

A cognitive style approach would also be helpful to those who work with students who have reading problems. Some of the recent research dealing with hemispheric laterality reviewed by Leong (1980) has suggested that some types of reading disorders: visual dyslexia, "surface" dyslexia, and "deep" or syntacticosemantic dyslexia show evidence of being related to right- rather than left-hemispheric reading strategies. If this is true, the children who experience these disorders can profit from a more global rather than an analytical approach to remediation.

Concerning the affective domain, the teacher who must offer differentiated programs for the gifted can benefit significantly from a knowledge of how they view the reading process. The temptation to give the gifted more to read on a given topic in the name of "enrichment" should not be indulged without careful thought as to the individuals involved. Granted, some students will be very interested in reading more about a given topic such as nuclear power. However, others may prefer a more "hands on" activity such as building a table model of a nuclear reactor. Field dependent gifted students would especially prefer to interview people and then make an oral report concerning their findings, thus making use of their special social skills.

Being aware of how the students in the classroom feel about the various dimensions of reading can help the teacher avoid the mixed feelings which sometimes accompany

what appears to be a very routine task. The reading group, for instance, may not be the situation where the field independent gifted children get the most satisfaction. It may be, however, the very place for the field dependent gifted to receive optimum reinforcement.

Suggestions for Further Research

In the search for measurable individual differences in the variables which distinguish the gifted children in the schools, this study has focused on only a small area. It is through more precise examination of other distinguishing factors that more equitable identification procedures can be established. To this end, further research in this field should be directed at the following:

1. Investigation of the relationship between field dependence/independence and underachievement in gifted children, particularly in the area of reading.

2. Investigation into the relationship between field dependence/independence and creativity. Since creativity is associated with giftedness, but is not measured on standardized tests of IQ, further studies should examine the significance of the relationships which exist between the measures of FD/FI and the currently used measures of creativity.

3. Development of a suitable measure of global performance. When paired with a test of analytical performance,

the results would give an accurate picture of the extent to which the subject exercises mobility between modes of functioning.

4. Replication of this study with a much larger sample. This would permit more detailed analysis of the extremes on the continuum of FD/FI. A larger sample would also benefit from a more vigorous computer-assisted statistical analysis of the resultant data. An analysis of covariance controlling for IQ on data acquired from a larger sample would provide additional confirmation of the findings of this study.

5. Investigation of the flexibility of field independents to function globally, but the difficulty of field dependents to function analytically. A linkage of this phenomenon to current research in hemispheric laterality might provide new insights into the mechanisms of learning.

6. Applications of the cognitive style approach to the field of adult education. The FD/FI continuum offers a tool which might be brought to bear not only in the classroom, but also in situations involving career counseling and job re-training.

Section 901 (2) of the "Gifted and Talented Children's Education Act of 1978" states:

unless the special abilities of gifted and talented children are developed during their elementary and secondary school years, their special potentials for assisting the Nation may be lost ... (92 STAT.2292)

Central to this problem is the accurate identification of the gifted. However, it has been shown through the pursuit of a definition that the concept of "giftedness" is actually a time-, culture-, and thus value-based idea. The criteria by which giftedness is judged today will determine the thinking methods of the leaders of tomorrow.

Consequently, if future research can provide a way for the divergent thinkers among children to work their way into the educational programs now being offered for the gifted, then, to quote Gowan (1979a, p.13):

The civilization we save thereby may be our own.

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