A COMPARATIVE ANALYSIS OF SELECTED CHARACTERISTICS OF INTELLECTUALLY SUPERIOR MALE STUDENTS WHO PERSIST AND THOSE WHO DO NOT PERSIST IN AN ADVANCED PLACEMENT PROGRAM

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# A COMPARATIVE ANALYSIS OF SELECTED CHARACTERISTICS OF INTELLECTUALLY SUPERIOR MALE STUDENTS WHO PERSIST AND THOSE WHO DO NOT PERSIST IN AN ADVANCED PLACEMENT PROGRAM

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By

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TABLE OF CONTENTS

LIST OF TABLES

# CHAPTER I

# INTRODUCTION

## Background of This Study

The past decade has seen a confluence of thinking relative to the necessity of the conservation and maximum utilization of the intellective capacities of the nation's citizenry. Some writers have described the expressions of this thinking as representing a near hysteria (11). The educational system has been the focus of much concern as to its role in the aggressive identification and nurture of the intellective resources represented by the academically talented youth enrolled in its classes.

The Education Policies Commission of the National Education Association describes the economic survival aspects of the current concerns with its observation that "higher education is important to the corporations in the matter of the supply of future executives and in the development of products and services" (5, p. 139). Berkner (2) underscores the economic and military urgencies involved in maximal development of human intellective resources as he documents shifts in economic centers to areas emphasizing professional training at the graduate and post-graduate levels.

Those who are concerned with the maintenance and enhancement of a democratic society insist that the interpersonal relationships inherent in such are becoming more complex; hence the nation's most intellectually creative persons must be used toward inventing social techniques and institutions to meet these needs (1). These concerns have been reported to a national audience by means of such widely circulated reports as the several Conant appraisals of the public schools, the President's Commission on National Goals, Goals for Americans, and the 1960 White House Conference on Children and Youth (4, 1, 8).

The Educational Policies Commission states that "the early identification in elementary and secondary schools of pupils having unusual ability and the development of programs for the education of this ability to its highest level are a part of the unfinished educational business of a democracy" (5, p. 3).

In the context of such national concern, a large, metropolitan Southwestern public-school system inaugurated in September, 1958, an Honors Program for academically able Grade VIII youth, which was designed to accelerate the secondary program to the end that Grade XII could be utilized by those able students for classes in mathematics and science which were patterned after first-year college courses. The program was organized around a five-year sequence in mathematics and/or science. College freshman

level courses in mathematics and science were selected for the fifth year of the sequence. Students were encouraged to participate in the Advanced Placement Program, an activity of the College Entrance Examination Board. This planning is in keeping with the National Education Association Project on the Academically Talented Student in its summary of current emphases, which includes a statement that "the advanced placement programs found in many superior high schools appear to be the culturally accepted way of accelerating academically talented students into college" (14, p. 4).

Enrollees for this five-year sequence were selected on the bases of academic aptitude, academic achievement, and nomination by teachers as students evidencing scholastic industry and an expressed interest in the areas of science and mathematics. Data from performances on standardized tests of academic aptitude and achievement were obtained for each potential enrollee. Minimal eligibility requirements generally included group test IQ's of 120 and grade placement equivalents of two grade placements above actual grade placement at the time of testing with standardized academic achievement tests.

This study was designed as part of a more comprehensive study of the graduating seniors in a large, metropolitan Southwestern public-school system who were originally

selected and enrolled in the first year of the Honors Program sequence in September, 1958. The more comprehensive study will include an evaluative examination of the Program and the educational outcomes that are characteristically studied by educators primarily concerned with administrative and curricular areas. Another study will be concerned with the non-intellective functioning of the female youth who were originally enrolled in 1958 and who completed Grade XII at the end of the 1962-1963 school year.

The decision to design this study as a facet of the larger collaborative study was reinforced by the summary made by Findlay in his paper before the First Annual Phi Delta Kappa Symposium on educational research. He states that "the team approach and interdisciplinary character of these larger studies will begin to define a kind of framework within which doctoral studies might well find their place" (6, p. 51). This team approach is the focus of an emerging activity of the Research Committee of the school system involved in this study which seeks to define large research areas and to encourage members of its professional staff to design individual research projects that will be related to the larger problem. Such projects are then supported by the school system in terms of access to data and populations and consultative assistance from staff members.

## The Significance of the Study

The significance of the study would seem to be related to an apparently increasing concern with the need to understand the academically superior child on bases other than the functionings that are usually subsumed in appraisals of intelligence, academic achievement as measured by standardized tests of achievement, and teacher appraisals of academic performance. MacKinnon observes that a review of studies in the areas of selection and guidance of academically able or talented youth completed during the decade of 1948-1958 indicates that "90 per cent of them . . . were concerned solely with the prediction of intellective criteria [grades and academic honors], and by far the largest percentage of these investigated the efficiency of only intellective predictors" (12, p. 486). He emphasizes the need for studies that seek to predict complex criteria that include both intellective and non-intellective performance. To do this, he is convinced that "we shall have to consider not only aptitude and intelligence scores and high school rank . . . but also secure measures of interest and values and such aspects of total personality functioning . . ." (12, p. 489).

In concluding the 1962 Bingham Lecture, MacKinnon observes:

> It is one thing to discover the distinguishing characteristics of mature, creative, and productive individuals. It is quite another matter to conclude that the traits of creative persons observed several years after school and college characterized these same individuals when they were students. Nor can we be certain that finding these same traits in youngsters today will identify those with creative potential. Only empirical, longitudinal research, which we do not yet have, can settle such issues. Considering, however, the nature of the traits which discriminate creative adults from their noncreative peers, I would venture to guess that most students with creative potential have personality structures congruent with, though possibly less sharply delineated than, those of mature creatives (12, p. 491).

This study concerned itself with an investigation of the nonintellective performances of certain academically able youth. These youth were seen as having the potential of becoming the highly trained professional adults of the decades ahead. This study was concerned with the MacKinnon "guess" that such students would be similar to highly productive, creative adults on certain nonintellective dimensions.

This study further was concerned with the need to establish some base-line data about academically able youth against which subsequent findings at later periods may be considered. To facilitate longitudinal research, this study involved data that were obtained through the use of certain psychometric instruments used by MacKinnon and his associates (10) in their studies of mature creatives in the Institute of Personality Assessment and Research.

University of California at Berkeley. The use of these psychometric instruments not only permitted direct comparison of the subjects of this study with MacKinnon's group, but it tended to avoid one source of variability in subsequent studies of these or similar youth; that is, differences in data-gathering devices.

## Statement of the Problem

This study made a comparative analysis of certain selected characteristics of a group of academically able male youth who persisted and those who did not persist in a five-year academic sequence in mathematics and science. Two major questions were dealt with in this study:

1. Can the persisting youth as a group be distinguished from those youth who did not persist in this academic sequence on the basis of their functioning in certain nonintellective areas?

2. Are the performances of the persisting youth on certain dimensions elevated in the same directions as are the performances of mature creatives who have been intensively studied on the same dimensions?

## Hypotheses

Hypotheses tested in this study emerged from the data reported by MacKinnon (10) in the Institute of Personality Assessment and Research investigations of mature creatives. These hypotheses are as follows:

1. Persistors are more self-sufficient than are Nonpersistors.

2. Persistors tend to be motivated to achieve in terms of independence more so than do Nonpersistors.

3. There are differences between the Persistors' and Nonpersistors' preferences for certain attitudes or orientations toward experiencing and evaluating experiencing as originally described in Jungian psychology. Persistors prefer introversive, intuitive, thinking, and judging responses more so than do Nonpersistors.

4. Persistors are more interested in understanding and manipulating the physical environment than are Nonpersistors, and Persistors are less interested in activities peculiar to the business world than are the Nonpersistors.

## Definition of Terms

1. Achievement via independence (Ai). Elevated score on the Ai scale of the California Psychological Inventory (CPI).

2. Honors Program. A five-year sequence of course offerings in mathematics and science beginning in Grade VIII with mathematics/science courses usually scheduled in Grade IX and continuing this accelerated pattern to include college-level courses in elementary analysis and chemistry in Grade XII. Academically able youth enrolled

in this sequence may become eligible for advanced placement or college credits through the Advanced Placement Examinations program of the College Entrance Examinations Board.

3. Five-year sequence. The organization plan of the school for content course offerings in the Honors Program in mathematics and science is as follows:

| Grade Level | Mathematics | Science |
|---|---|---|
| VIII | Algebra 1 and 2 | Science 1 and 2 (earth sciences) |
| IX | Geometry 1 and 2 | Biology 1 and 2 |
| X | Algebra 3, Solid Geometry | Chemistry 1 and 2 |
| XI | Algebra 4, Trigonometry | Physics 1 and 2 |
| XII | Elementary Analysis 10 and 11 | Chemistry 3 and 4 |

4. Nonintellective. Those aspects of psychological functioning that are not primarily associated with academic aptitude and academic achievement but rather with attitudes, motivations, preferences, values, and interests as discussed by Capretta (3).

5. Nonpersistors (NP). Those male youth who were originally enrolled in 1958 in the Grade VIII courses in the Honors Program but had chosen to or had been asked to discontinue the five-year sequence at some point prior to their enrolling for 1963 spring semester courses in Grade XII.

6. Persistors (P). Those male youth who had enrolled in the five-year sequence as Grade VIII students in 1958 and had continued the sequence as 1963 spring mid-semester Grade XII enrollees.

## Limitations of the Study

The study was limited to the population of male youth described as Persistors and Nonpersistors among the 1962-1963 Grade XII students of ten senior-high schools in a large, metropolitan Southwestern public-school system. The findings and conclusions reached in this study were of necessity limited to the extent that these youth were seen as similar to other such youth.

## Basic Assumptions

The major assumptions underlying the study were seen as follows:

1. The human organism develops both physiologically and psychologically by growth processes that have continuity and observable order.

2. The growth processes may be studied at one point, and observational data gathered at that point are related meaningfully to data obtained from a subsequent study at another point in the organism's development.

3. Configurations of nonintellective characteristics of the human organism emerge at comparatively early stages

in the growth processes, are somewhat stable and are seen as similar in subsequent observations of the organism.

4. Observational data gathered at various points in the growth of the organism are more illuminating if the data-gathering devices are identical or similar.

## Method

### Population

The population used in this study included all of the male youth selected in 1958 to enroll in the first year of the five-year sequence of the Honors Program courses in mathematics and science who were in their Grade XII year in ten of the studied school system's senior-high schools and were available for testing during the spring 1963 mid-semester.

In inaugurating the Honors Program in September, 1958, 276 male youth were enrolled in the Grade VIII first-year courses. At the mid-semester point of the 1963 spring semester, 227 of the original 276 were enrolled in Grade XII courses in the school system studied; 49 of the original 276 were not enrolled in the school district; and 18 enrolled students were not available for testing; hence test data were collected from 209 students. Of the 227 male students enrolled, 162 were described as Persistors and

65 were described in terms of this study as Nonpersistors. Available for study were 148 Persistors and 61 Nonpersistors.

Table I indicates the numbers of Persistors and Nonpersistors enrolled in each of the ten schools at the time of data collecting, the numbers of each group available for testing, and the numbers of those Nonpersistors who discontinued the sequence at various grade levels. The number of Nonpersistors in each school as compared with the total number of Persistors and Nonpersistors is shown in terms of the percentage of Nonpersistors to the total in each school. This might be considered as an indication of the attrition or discontinuance rate at each school.

Table I indicates that six students discontinued the Honors Program sequence during or at the completion of Grade VIII, an additional six during or at the end of Grade IX, and fifteen discontinued during or at the end of Grade X. The majority of discontinuing students dropped the sequence during or at the end of Grade XI. The proportion of Nonpersisting students to both Persisting and Nonpersisting students enrolled at the time of data collecting, seen as an attrition indicator, suggests that the attrition rate varied from a low of thirteen in School 9 to a high of fifty-two in School 8. The attrition indicator for the school system was 29.

TABLE I

NUMBERS OF PERSISTORS AND NONPERSISTORS IN TERMS OF ENROLLMENT BY SCHOOLS, YEARS OF DISCONTINUANCE OF SEQUENCE BY NONPERSISTORS, AVAILABILITY FOR TESTING, AND PERCENTAGE OF NONPERSISTORS TO TOTAL ENROLLMENT

| Group | School | | | | | | | | | | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0* | 1 | 2 | 3* | 4* | 5 | 6* | 7* | 8* | 9* | |
| 1. P enrolled | 23 | 11 | 4 | 5 | 14 | 16 | 43 | 5 | 13 | 28 | 162 |
| 2. P tested | 23 | 11 | 4 | 5 | 14 | 13 | 33 | 5 | 12 | 28 | 148 |
| 3. NP enrolled | 9 | 7 | 3 | 1 | 8 | 6 | 8 | 5 | 14 | 4 | 65 |
| 4. NP tested | 9 | 6 | 3 | 1 | 7 | 6 | 6 | 5 | 14 | 4 | 61 |
| a. Dropped VIII | .. | 1 | 1 | .. | .. | .. | .. | .. | 1 | 3 | 6 |
| b. Dropped IX | 1 | .. | .. | .. | .. | 1 | 1 | .. | 3 | .. | 6 |
| c. Dropped X | 2 | 2 | .. | 1 | 1 | 1 | 4 | .. | 3 | 1 | 15 |
| d. Dropped XI | 6 | 4 | 2 | .. | 7 | 4 | 3 | 5 | 7 | .. | 38 |
| 5. Total P and NP | 32 | 18 | 7 | 6 | 22 | 22 | 51 | 10 | 27 | 32 | 227 |
| 6. % NP of total | 27 | 39 | 43 | 17 | 36 | 27 | 16 | 50 | 52 | 13 | 29 |

*Personal interviews conducted in school with certain P and NP students.

Students discontinuing the five-year sequence included those who chose to leave the program and those who were asked by school authorities to discontinue as well as those for whom the decision was seen by both student and school personnel as indicated. Definitive data as to the numbers of Nonpersistors who were asked to discontinue, who chose to discontinue, or who agreed with school personnel that dropping the sequence was indicated are not available.

## Bases for Enrolling in Honors Program

Classroom teachers and principals responsible for selecting Honors Program enrollees for the Grade VIII sequence in 1958 were advised to select those students whose performances on standardized tests of academic aptitude and standardized tests of academic achievement indicated exceptional academic capacity and promise. Teachers were asked to examine the cumulative records of students seen as possible eligibles for indications of performances in earning teacher marks usually awarded to consistently high-performing students.

Test data from the California Short Form Test of Mental Maturity administered routinely to students enrolled in Grades II, IV, and VI and from the California Achievement Test Battery administered by most schools of the studied school system in March-April of each school year were

available. Especial emphasis was placed on teacher-assigned marks and standardized test data recorded during Grades VI and VII. Common practice among selecting principals and teachers seemed to be that of describing as eligible for Honors Program a student whose teacher-assigned marks were "mostly 1's," the highest marks assigned elementary students in this school system, whose IQ scores on the California Short Form Tests of Mental Maturity were 120 or above, and whose grade placement equivalent performances on the California Achievement Test Battery were at least two grade placements above actual grade placement at the time of testing.

## Instruments Used

The California Psychological Inventory (CPI) was used in this study to assess some dimensions of self-sufficiency and motives for achievement. The instrument is a self-reporting device consisting of items selected from various sources, including the Minnesota Multiphasic Personality Inventory, for the purpose of identifying and measuring what the author terms "personality characteristics important for social living and social interaction. . . . Each scale is intended to cover one important facet of interpersonal psychology" (8, pp. 7, 30).

The Myers-Briggs Type Indicator, Form F (MBTI), a Jungian-oriented, self-reporting inventory, classifies people into dichotomous categories along each of four dimensions--extroversion-introversion, sensation-intuition, thinking-feeling, and judgment-perception.

The Occupational Interest Inventory, Advanced, 1962 Revision (OII), a self-reporting inventory designed to appraise and analyze the vocationally significant interests of the individual, was used in collecting data relative to an investigation of the direction and degree of interests of the study population in activities that are described as predominantly characteristic of science-oriented vocations and those that are business-oriented. The instrument was used as part of the testing procedures in the studied school system because of its rather high correlation with the Strong Vocational Interest Blank and because its construction lends itself to student self-scoring.

## Collection of Data by Psychometric Testing

The collection of psychometric data for this study was done during the period of one week at mid-semester in the spring semester of the school year 1962-1963. The students comprising the study population were tested in the high-school buildings in which they were enrolled;

testing arrangements included administrative provision for the most adequate physical facilities available in the building and schedule alterations that permitted uninterrupted periods for testing. Test administration was conducted by members of the professional staff of the schools who have been trained by experts in the field. The mid-semester week for testing was one that was relatively free of other than routine school activities.

## Collection of Data by Personal Interviews

Data obtained from personal interviews held with both Persisting and Nonpersisting students in seven of the ten senior-high schools were collected primarily to supplement the data obtained by psychometric approaches. Efforts were made, first, to secure interviewees considered representative of Persistors and Nonpersistors, and, second, to conduct semistructured interviews during which students were encouraged to react to inquiries as to how persisting or nonpersisting in the Honors Program had been seen by the individual student in terms of his own reactions to himself as he was chosen for, enrolled in, and continued or discontinued the five-year sequence, and how he felt significant others--school personnel, familial adults, and peer group members--had reacted to him as he continued or discontinued the sequence. Efforts were made to elicit

responses from the interviewees as to how they perceived the Honors Program and how they felt significant others perceived the Program. More specific descriptions of the foci of the inquiries are given in Chapter III as the interview data are analyzed.

A list of Persistors and Nonpersistors with the times of discontinuance given for the Nonpersistors was furnished each senior counselor in the individual senior-high-school buildings where interviews with students enrolled in that building were conducted. The senior counselor was asked to select from both the list of Persistors and Nonpersistors those students considered by the counselor as representative of those who continued and those who discontinued the Honors Program. Efforts were made to conduct interviews with at least one third of the Persistors and the Nonpersistors in each building. Data from interviews with 47 Persistors and 24 Nonpersistors were obtained from students enrolled in the schools indicated by asterisks in Table I. These schools were seen as representative of the varying socio-economic areas served by the school district.

Interviews were not timed and were held in areas of the several school buildings affording privacy and freedom from interruptions. Students were asked to respond to the inquiries as part of the continuing research study that they had participated in as they had been tested several weeks

prior to the interview. They were assured that their responses would be treated with professional confidentialness, and that their feelings as well as their ideas were solicited. The interviewer used the technique of reflecting the interviewees' responses when it appeared that clarification of feeling tones would obtain through this approach. Interview material was recorded immediately after the interview. When the material seemed to be especially illustrative of feeling tones, efforts were made to do verbatim recording.

## Procedures for Treating Data

### Statistical Techniques

The means and standard deviations for raw scores earned by the Persistors and the Nonpersistors on each of the test variables were computed. Fisher's *t* was used to test the significance of the differences between the means of these two independent groups. In addition to the utilization of Fisher's *t* the chi-square technique was employed to test further the possible independence of the two groups in terms of the variables with which the Myers-Briggs Type Indicator is concerned. The chi-square technique was seen as appropriate as an additional approach to the Fisher *t* in treating data for hypothesis three in that the MBTI scores provide for treatment as continuous data or as

dichotomous data; the Fisher *t* was used in treating the data used as continuous data and the chi square with the scores treated as dichotomous. For each of the dimensions of the MBTI a 2-by-2 contingency table was prepared and chi square computed by the formula suggested by Siegel (16, p. 107) as incorporating a correction for continuity and appropriate for testing the significance of differences of frequencies in discrete categories between two independent groups.

For the purposes of this study a P of .05 or better was considered significant. The resources of the Southern Methodist University computing laboratory were used in preparing test scores for electronic data processing. The computing laboratory of North Texas State University was used in calculating the means, standard deviations, and the Fisher *t* values for the test variables.

## Interview Material

Interview material is presented in this study in terms of the approach suggested by MacKinnon (12, p. 490), which he terms a "summary description" of characteristics common to a group of persons. In his summary description approach MacKinnon describes the typical group member evidencing the most commonly seen characteristics of the group. This same approach is described by Eiduson as a combination of the statistical and the clinical approaches widely used by

psychologists. Eiduson describes her use of this approach thus: "I first do a comparative study . . . in order to elicit the common denominators in the various aspects of behavior . . . and then I treat these data as if this were a case study of a single individual" (6, p. 12). Roe utilizes this approach in her "personality portrait of a scientist" (15, p. 51). Similarly the most frequently reported self-impressions elicited from Persistors and Nonpersistors interviewed were reported as if one Persistor and one Nonpersistor had responded to the inquiries as to how each saw himself and significant others reponding to him and the Honors Program as he continued or discontinued the sequence. Significant exceptions to the most commonly elicited responses were noted.

## CHAPTER BIBLIOGRAPHY


1. The American Assembly, Goals for Americans, Report of the President's Commission on National Goals, New York, Prentice-Hall, Inc., 1960.

2. Berkner, L. V., "Science and Education," unpublished lectures read before the Administrative Conference, Dallas Independent School District, Dallas, Texas, August 17, 1961.

3. Capretta, Patrick J., Reginald I. Jones, Laurence Siegel, and Lila C. Siegel, "Some Noncognitive Characteristics of Honors Program Candidates," Journal of Educational Psychology, LIV (October, 1963), 268.

4. Conant, James B., The American High School Today, New York, McGraw-Hill Book Company, Inc., 1959.

5. Education Policies Commission, Higher Education in a Decade of Decision, Washington, D. C., National Education Association, 1957.

6. Hiduson, Bernice T., Scientists, Their Psychological World, New York, Basic Books, Inc., 1962.

7. Findley, Warren G., "The Impact of Applied Problems on Educational Research," in Frank W. Banghart (ed.), First Annual Phi Delta Kappa Symposium on Educational Research, Bloomington, Indiana, Phi Delta Kappa, 1960, pp. 43-53.

8. Golden Anniversary White House Conference on Children and Youth, Conference Proceedings, Washington, D. C., Golden White House Conference on Children and Youth, Inc., 1962.

9. Gough, Harrison G., California Psychological Inventory Manual, Palo Alto, California, Consulting Psychologists Press, Inc., 1957.

10. Institute of Personality Assessment and Research, The Creative Person, Proceedings, Berkeley, University of California, 1961.

11. Kough, Jack, Practical Programs for the Gifted, Chicago, Illinois, Science Research Associates, Inc., 1960.

12. MacKinnon, Donald W., "The Nature and Nurture of Creative Talent," American Psychologist, XVII (1962), 484-495.

13. National Education Association, An Annotated Bibliography on the Academically Talented, Washington, D. C., National Education Association, 1961.

14. National Education Association, The Identification and Education of the Academically Talented Student in the American Secondary School, Conference Report, Washington, D. C., National Education Association, 1958.

15. National Science Foundation, Scientific Manpower 1960, Papers of the Ninth Conference on Scientific Manpower, Symposium on Sociology and Psychology of Scientists, Washington, D. C., Government Printing Office, 1961.

16. Siegel, Sidney, Nonparametric Statistics for the Behavioral Sciences, New York, McGraw-Hill Book Company, Inc., 1956.

# CHAPTER II

## RELATED LITERATURE

The current emphases in research activities relative to the academically talented youth appear to be in the area of the nonintellective characteristics of such students. Flieger and Bish (4) in their review of the literature on the gifted and highly able believe that this aspect of intellectual superiority has assumed primary significance.

MacKinnon (15 pp. 20-21) observes that this emphasis seems to represent something of a return to original connotation implied in the use of the term "talent." He recalls that the term has its origin in the Greek word for the most valuable monetary unit at the time the word was coined and that fourteenth-century writers used the term to describe a person who was strongly and at times violently moved and motivated to action. He suggests that the term has often been used to describe qualities that the psychologist has come to label nonintellective; that is, emotional, motivating, and dynamic factors.

Prior to the 1959 review of the research of Fliegler and Bish, Newland's summary (20) covered the literature on the gifted to 1953. Miles (17) has done an extensive

summarization of research findings. Gowan (19) has completed an annotated bibliography of the literature relative to the academically talented as part of the publications program of the National Education Association Project on the Academically Talented student. The Terman-Oden (31) report of the Terman Gifted Group at mid-life appeared in 1959, thus bringing the research on the original 1,500 intellectually superior children selected by Terman in 1921 to a point covering a period of more than thirty-five years.

The research emphases of the 1953-1963 decade as inferred from the literature abstracted in the Psychological Abstracts for that period continue to include concerns with the identification and training of the educationally talented and with efforts to evaluate the various scholastic programs and curricula designed to promote maximal development of these human resources; however, there is reflected an increasing attention to the totality of factors that seem to be associated with effective functioning of intellectually superior persons in college and adult life.

## Nonintellective Characteristics of the Gifted

Gowan suggests that "there are certain areas in which research has been replicated to the extent that its findings are consistent enough to put into educational practice" (19, p. 2). Generalizations from such research that relate

to the nonintellective characteristics of the gifted include the following:

1. Personal and social characteristics of academically talented students appear more favorable than those of the generality.

2. Talented students appear in somewhat greater percentages in upper-class groups or are upwardly mobile into such groups.

3. Academically talented children appear well developed physically and are accepted socially by other children.

4. They appear to experience no ill effects, academic, social, or personal, when grouped in school according to specific functional learning differences. Grouping is most effective when provided in terms of a specific performance competency, such as reading skill for a language arts class, numerical skill for a mathematics class, and so forth.

5. Their attitudes toward scholarship and the intellectual life are largely a functioning of community mores, but attitudes can be influenced by concerted actions of school personnel.

6. They indicate their talents early, and often do their best creative work before the age of forty (19, pp. 2-4).

Terman's (31) observations relative to some of the nonintellective aspects of the academically talented suggest that the gifted child prefers to plan for professional and semiprofessional vocations, is more interested in play activities that are less involved with social participation than is his less gifted peer. The gifted child is more self-sufficient. Terman believes that the gifted child deviates from the generality in the upward direction for nearly all traits studied.

Miles (17) summarizes research on the gifted adult on nonintellectual dimensions with observations that

1. They rate far above the average in physical, social, and personality aspects and have wider variations of interests.

2. As adults they are normal to superior in marital status and sexual adjustment, their social and political attitudes are not deviant, and their war records are creditable and in some instances distinguished.

3. As adults they have produced many times the expected number of leaders and competent professionals when compared to any like-sized random selection of age peers.

The etiology of nonintellectual factors related to the academically able is seen by Miles (17, p. 1052) as coming to be an active area of research. She suggests that the etiology might include somatic, motivational, and social

components and calls attention to the data obtained by Terman, Oden, and others that support hypotheses that superior innate somatic potentials tend to support the development of superior personalities. Further, the data support the relationship between giftedness and patterns of familial and subcultural contributions in terms of life patterns, goals, and aspirations--all subsumed under the term motivation. Miles sees the Fels researches as supporting the generalization that parental behaviors indicative of freedom, of emotional warmth, and of accelerator*y* methods, a democratic-acceptant attitude, and a nonindulgent supportive approach are conducive to the development of exceptional academic talent (17, pp. 1052-1054).

While the literature does afford a composite picture of the gifted child and adult, the data require the observation that each member of the studied groups of the exceptionally able is not described by the group portrait. Oden (30) points out that 30 per cent of the Terman group did not graduate from college; and whereas most of the men were in the two highest occupational levels, 3 per cent were employed in farming and semiskilled work. Oden reasons that since the less successful subjects do not differ to any extent in intelligence as measured by tests, the differentiating factors must be nonintellective. These differences were seen to be primarily in the four traits

described in The Gifted Child Grows Up in terms of "a persistence in the accomplishment of ends, integration toward goals, self-confidence, and freedom from inferiority feelings" (29, p. 149).

### The Mature Productive/Creative

The national concerns that served to heighten interest in efforts to identify and provide for the maximal educational experiences for the academically able youth appear to have supported an emphasis on the study of the productive/creative adult professional with an especial attention on those areas directly related to the technological presses of the time. The research strategies range from that of the clinical, psychodynamically-oriented appraisals of Eiduson, Kubie, and McClelland (3, 9, 10, 16) to that of the experimental approach of Barron (1). Among the major concerns of these researchers is that of attempting to describe the productive/creative professional adult, to understand the probable personal-social etiologic antecedents of the adult performance, and to describe those work climates that seem to be more supportive of creative productivity. MacKinnon, reporting the extensive work done by the Institute of Personality Assessment and Research on the Berkeley campus of the University of California, described the purposes of this research as concerned with

"the delineation of characteristics of individuals who, in the personal lives and professional careers, function with high effectiveness . . . and the discovery . . . in the personality structures of such individuals those factors which contribute to and make possible their effective functioning" (8, pp. 1-2).

While the research strategy of the MacKinnon group was that described by him as the assessment method developed during World War II by the Office of Strategic Services, the technique of Eiduson is that of the clinical psychologist. Eiduson (3) employed projective techniques and interviews in gathering data from which she attempted to determine certain common denominators in the various aspects of personality studied and from these prepare a composite as if she were doing a case study of a single individual. The population was forty West Coast research scientists from whom she obtained responses to the Murray Thematic Apperception Test and the Rorschach Psychodiagnostics in addition to interview material relative to the individual's evaluation of his capacities and present attitudes toward his work, the happenings and interpersonal reactions deemed by him as significant during his childhood, and his most frequent areas of conflict and sources of satisfactions. Eiduson describes the composite research scientist as follows:

1. His first gratifying experiences were related to his achievement in intellectual pursuits. While there was little intimacy between the scientist and his family during his childhood, the positive ties that existed were related to intellectual achievement.

2. The scientist fantasizes now as he did as a child; he learned to tolerate ambiguities, frustrations, and tensions.

3. The scientist's investment in his family is secondary to that in his work. His behavior at home shows considerable passivity and a willingness to pass on responsibilities for the household and the children to his wife.

4. Happiness and fulfillment rest primarily in satisfaction at work.

Eidusson believes that these characteristics can be observed in children in grade school and that "great scientific drive is tied up with internally directed motivation . . . " (3, p. 265).

McClelland (16) has abstracted from the work of Knapp, Cattell, Drevdahl, and Roe relative to the characteristics of scientists, primarily those involved in the physical and natural sciences. No social scientists were included in the population studied. McClelland recalls that the subjects termed scientists by the researchers whose data

serve as a base for his abstractions ranged from those who were Nobel Prize winners to undergraduate majors in science. He suggests that there are certain characteristics that are "so striking that they apply (with variations, of course) to all scientifically-oriented subjects but in greater degree to those who are more creative or more eminent" (16, p. 144). The following generalizations appear to summarize these characteristics:

1. Men are more likely to become creative scientists than are women.

2. Scientists appear to come more often from a radical Protestant background and to reject it for science as a way of life.

3. Scientists avoid interpersonal contact. They like being self-sufficient and they like being alone.

4. Creative scientists are considered hard-working to the extent that they appear almost obsessed with their work.

5. Scientists seem to be disturbed by complex human emotions, particularly interpersonal aggression; hence, they try to avoid them.

6. Scientists prefer working with things rather than with people.

7. Scientists develop strong interests in analysis and structure early in life.

8. The scientist is most unlike the businessman in that he withdraws from human involvements whereas the businessman enters into the field of human relationships.

Kubie (9, 10) writes from a psychoanalytic frame of reference as he draws from the literature about the scientist and his own impressions from his work with scientists. Kubie believes that the young person who comes to involve himself in science as a profession is seeking resolution of unconscious conflicts through scientific research. He sees the scientific interest of early childhood as "part of the window dressing for quite different concerns . . . fearful and guilt-laden curiosity about the human body" (9, p. 503). Kubie's thesis is that one cannot differentiate between the productive/creative adult on the basis of intellect or fortuitous happenings; rather, one must describe the aspects of personality that are resultants of the organism's strivings for resolutions of conflicts and the attainment of needs not known to him consciously.

Roe's extensive investigations (21, 22, 23, 24, 25, 26) in the area of the psychology of occupations have eventuated in her assaying an approach to a theory of occupational choice. She relates this to the larger area of personality theory as she observes that in her science group subjects, although intellectual interests and abilities are high, there is an orientation away from people. While the same

characteristic is found in her technology group subjects. this orientation away from people seems to be more defensive on the part of the science group (25, p. 317). Roe further believes that one of the earliest differentiations in orientation of attention is between persons and nonpersons. possibly related to the intensity of the interpersonal relations that obtain in the child's early years. Roe suggests that if the child is adequately loved and approved without intense interpersonal involvements, then the child is able to focus on nonpersons or objects outside of self. This is seen as a possible base for the emergence of interests and involvement in mechanical and scientific interests (25, p. 320).

## Directly Related Studies

Studies directly related to this investigation would seem to be those concerned with two rather distinct populations--academically able male youth in the final year of the senior high school program and mature productive/creatives who have been studied relative to those personality dimensions with which this study is concerned. Further, the data-gathering procedures of this study involve the use of certain psychometric devices--the California Psychological Inventory (CPI), the Myers-Briggs Type Indicator (MBTI), and the Occupational Interest Inventory

(OII); hence, those studies dealing with populations similar to these and employing the same or quite similar data-gathering procedures are reported.

Cooley (2) reports an effort to increase prediction efficiency in determining which students in science major collegiate sequences will enter scientific research after graduation. The battery of tests includes the Strong Vocational Interest Blank (SVIB). He sees the science major who enters research as one who is not particularly interested in the practical applications of science, is not interested in seeking social contacts, and does not prefer to persuade or manipulate other people.

Holland (7) has attempted to find personality correlates of scientific achievement during college. One of his groups included 681 boys who were among the 1957 National Merit Scholarship finalists who took the California Psychological Inventory (CPI). The 1956 group of 369 boys had taken the Strong Vocational Interest Blank (SVIB). None of the scales of the CPI correlated with Holland's criterion of scientific achievement for this group; however, he feels that the data support a recommendation for more systematic appraisals of the students' self-conceptions and interests.

The correlations between the performances of male veterans at a California State College guidance center indicate that the Strong Vocational Interest Blank and the

Occupational Interest Inventory are measuring similar facets of vocational interests and that inferences made on the basis of performance on one instrument are probably relevant to expected performance on the other (13). Data obtained by Kingston and Ewens (11, p. 14) in a comparison of the performances of freshmen men enrolled in engineering, business administration, and agronomy curricula support the hypothesis that these groups can be differentiated on the oasis of vocational interest patterns.

Lessinger and Martinson (12) report the use of the California Psychological Inventory with a group of gifted Grade XII students who were selected as representative of the school population at this academic level in the California State Department of Education Study of Programs for Gifted Pupils. These data provide something of a base of comparison of this study's Grade XII male youth population. The California study findings indicate that the high-school gifted male is significantly superior to his age and grade peer and quite similar to the students on whom the college norms for the CPI were based.

A number of studies are evaluated by Stucker and Ross (28) between various student groups on the basis of performances on the Myers-Briggs Type Indicator. Differences that seem important to this study are those that are reported between college preparatory and general-vocational

high-school program enrollees. More of the boys in the college-preparatory program are classified as extroverts, intuitive, and thinking. Another study indicates that engineering school students tend to be classified as introverts, intuitive, and thinking more than are high-school students. The engineering students had lower E-I and S-N scores and higher mean T-F and J-P scores. A comparison of the performances of a group of 100 male National Merit Scholarship Finalists with a group of Grade XII male youth considered to be representative of the generality indicates that the academically able National Merit finalists appear to be intuitive, introverted, thinking, and perceiving (INTP), whereas the twelfth-grade boys tended to be extroverted, sensing, feeling, and perceiving (ESFP).

The Institute for Personality Assessment and Research Investigations of MacKinnon and Gough (8, 14, 5) point up the essential characteristics of the architects and research scientists who were studied by means of the assessment method which involves bringing the persons to be studied together for several days at the assessment center where, in interaction with each other and the staff, they participate in psychological experiments, take psychometric tests, and are interviewed on the facts of their life histories and professional careers. MacKinnon reports that their performances on the CPI and the MBTI and the

SVIB suggest that the more effective in terms of creative productivity score low on the SVIB scales of purchasing agent, office man, and banker. Their CPI profiles indicate elevated scores on the scales measuring dominance, capacity for status, social presence, and self-acceptance as well as on the scale that purports to measure a drive to achieve via independence. MacKinnon sees as particularly significant the indication that both architects and research scientists are intuitives rather than sense-perceptives as defined by their performances on the MBTI. In comparison with the generality, both architects and research scientists tend to be more introverted than extroverted (15, p. 27).

## Summary

A review of the literature relative to some non-intellective characteristics of the academically talented person is presented as a background for exploring the aspects of functioning in noncognitive areas of several groups of intensively studied productive/creative adults. The studies relating specifically to the approaches with which this study was concerned are summarized. The major findings in the related literature including those studies directly related to this investigation emphasize the apparent importance of other than intellectual aptitudes and developed skills in differentiating between those males

whose scientific pursuits are considered representative of a higher level of effective performance. It appears that nonpersonal involvements are preferred by both youth and adults who are described as exceptionally talented among the intellectually superior.

## CHAPTER BIBLIOGRAPHY


1. Barron, Frank, "Personality Style and Perceptual Choice," Journal of Personality, XX (1952), 385-401.

2. Cooley, W. W., "Predicting Choice of a Career in Scientific Research," Personnel and Guidance Journal, XLII (1963), 21-28.

3. Eiduson, Bernice T., Scientists: Their Psychological World, New York, Basic Books, Inc., 1962.

4. Fliegler, Louis A. and Charles E. Bish, "The Gifted and Talented," Review of Educational Research, XXIX (1959), 408-450.

5. Gough, Harrison G., California Psychological Inventory Manual, Palo Alto, California, Consulting Psychologists Press, Inc., 1957.

6. Gruber, H. E., Glenn Terrell, and M. Wertheimer, Contemporary Approaches to Creative Thinking, New York, Prentice-Hall, Inc., 1962.

7. Holland, John L. and A. W. Astin, "The Prediction of the Academic, Artistic, Scientific, and Social Achievement of Undergraduates of Superior Scholastic Aptitude," Journal of Educational Psychology, LIII (1962), 132-143.

8. Institute of Personality Assessment and Research, The Creative Person, Proceedings, Berkeley, University of California, 1961.

9. Kubie, L. S., "Problems of the Scientific Career," American Scientist, XLI (1953), 596-613.

10. _____, "Some Unsolved Problems of the Scientific Career," American Scientist, XLII (1954), 104-112.

11. Lee, Edwin A. and Louis P. Thorpe, Manual--California Occupational Interest Inventory, Advanced, Monterey, California Test Bureau, 1956.

12. Lessinger, Leon M. and Ruth A. Martinson, "The Use of the California Psychological Inventory with Gifted Pupils," Personnel and Guidance Journal, XXXIX (1961), 572-575.

13. Lindgren, Henry C. and Richard L. Gilberg, "Interpreting Occupational Interest: The Relationship Between the Lee-Thorpe Occupational Interest Inventory and the Strong Vocational Interest Test for Men," California Journal of Educational Research, VI (1955), 15-21.

14. MacKinnon, Donald W., "The Nature and Nurture of Creative Talent," American Psychologist, XVIII (1962), 484-495.

15. _____, "What Do We Mean by Talent?," in The Search for Talent--College Admissions, Number 7, Princeton, New Jersey, Princeton College Entrance Examination Board, 1960, pp. 20-29.

16. McClelland, David C., "On the Psychodynamics of Creative Physical Scientists," in Howard E. Gruber, editor, Contemporary Approaches to Creative Thinking, New York, Atherton Press, 1962, pp. 141-174.

17. Miles, Catherine Cox, "Gifted Children," Manual of Child Psychology, edited by Leonard Carmichael, New York, John Wiley and Sons, Inc., 1954, pp. 984-1063.

18. Myers, I. Briggs, Manual for Myers-Briggs Type Indicator, Princeton, New Jersey, Princeton Educational Testing Service, 1962.

19. National Education Association, An Annotated Bibliography on the Academically Talented, Washington, D. C., National Education Association, 1961.

20. Newland, T. Ernest, "The Gifted," Review of Educational Research, XXIII (1953), 417-431.

21. Roe, A., The American Making of a Scientist, New York, Dodd and Mead Company, 1953.

22. _____, "Group Rorschachs of Physical Scientists," Journal of Projective Techniques, XIV (1950), 385-398.

23. _____, The Making of a Scientist, New York, Dodd and Mead Company, 1953.

24. _____, "A Psychological Study of Physical Scientists," Genetic Psychology, XLIII (1951), 121-239.

25. _____, The Psychology of Occupations, New York, John Wiley and Sons, Inc., 1958.

26. _____, "A Study of Imagery in Research Scientists," Journal of Personality, XIX (1951), 459-470.

27. Stein, M., A. J. Vidick, and D. M. White, Identity and Anxiety, Glencoe, Illinois, The Free Press, 1960.

28. Stricker, Laurence J. and John Ross, A Description and Evaluation of the Myers-Briggs Type Indicator, Princeton, New Jersey, Educational Testing Service, 1962.

29. Terman, Lewis M. and Melita H. Oden, The Gifted Child Grows Up, Genetic Studies of Genius, Vol. IV, Stanford, California, Stanford University Press, 1947.

30. _____, The Gifted Group at Mid-Life, Genetic Studies of Genius, Vol. V, Stanford, California, Stanford University Press, 1959.

31. _____, et al., Mental and Physical Traits of a Thousand Gifted Children, Genetic Studies of Genius, Vol. I, Stanford, California, Stanford University Press, 1925.

32. _____, The Promise of Youth, Genetic Studies of Genius, Vol. III, Stanford, California, Stanford University Press, 1930.

33. _____, "Scientists and Nonscientists in a Group of 800 Gifted Men," Psychological Monographs, LXVIII (1954), 44-52.

# CHAPTER III

## PRESENTATION AND ANALYSIS OF THE DATA

The essential concern of this study was related to the question of whether or not a group of Grade XII academically able males who persisted in a five-year academic sequence in mathematics/science could be distinguished from a group of Grade XII males who had entered the sequence with the persisting youth but had not continued through the final year of the five-year program. The dimensions along which it was hypothesized that the differentiations could be made are among those described in the literature as nonintellective; that is, attitudes, motivations, values, interests, and certain personality characteristics (2, p. 268).

Hypotheses under investigation in this study had to do with predicted directions of group differences on various test variables. Table II indicates the hypotheses, the test variables, and the predicted direction of group differences on test scales.

Although not stated in hypothesis form, this study investigated the MacKinnon speculation that academically able youth who have "creative potential have personality

TABLE II

PREDICTED DIRECTION OF GROUP DIFFERENCES ON VARIOUS TEST VARIABLES HYPOTHESIZED AS DIFFERENTIATING PERSISTORS FROM NONPERSISTORS

| Hypothesis | Test Variable | Predicted Direction of Group Differences |
|---|---|---|
| 1 | CPI | P NP on combined Do, Cs, Sp and Sa scales of CPI |
| 2 | CPI | P NP on Achievement via independence (Ai) |
| 3 | MBTI | P NP on E-I, S-N; NP on T-F, N-P of MBTI |
| 4 | OII | P NP on sciences; NP on business fields of OII |

structure congruent with, though possibly less sharply delineated than those of mature creatives" (10, p. 491). Data relative to this facet of the study are presented in tables of hierarchies of means of performances and incidences of occurrence as measured by the psychometric instruments used with the Persistors and Nonpersistors.

## Hypothesis One

Hypothesis One stated that Persistors are more self-sufficient than are Nonpersistors. The operational definition of self-sufficiency in this study involved the relative performances of the two groups on scales Do, Cs, Sp, and Sa on the California Psychological Inventory.

Those earning higher scores on these scales were deemed more self-sufficient than those earning lower scores. A score that was above the mean for the normative male group was described as an elevated score. Self-sufficiency scores were assigned to the two groups. This self-sufficiency score was obtained for each group by calculating the mean of the arithmetic total of the raw scores of the two groups on the four named scales of the CPI.

Table III presents the statistical data relevant to this hypothesis. That Hypothesis One must be rejected on the basis of data presented in Table III is obvious. One variable (Do) approached significantly differentiating between the Persistors and the Nonpersistors (significance level less than .10 but greater than .05). Further examination of Table III indicates that the Nonpersistors earned numerically higher scores on the Sp and Sa scales. These differences were not statistically significant; however, the differences were obtained and as such are noted. The self-sufficiency score did not serve to differentiate between the groups.

Despite the rejection of the hypothesis of a difference between the two groups, it is noted that both groups performed at or above the mean for the male normative group and consistently above the mean for male high-school students. The mean scores of this high-school academically

TABLE III

MEANS, STANDARD DEVIATIONS, AND t TESTS OF DIFFERENCES BETWEEN PERSISTORS AND NONPERSISTORS ON SELF-SUFFICIENCY SCORES

| Variable | Persistors | | | Nonpersistors | | | t |
|---|---|---|---|---|---|---|---|
| | N | M | SD | N | M | SD | |
| Do (Dominance) | 148 | 28.81 | 6.91 | 61 | 26.69 | 8.41 | 1.88 |
| Cs (Capacity for status) | 148 | 19.98 | 4.11 | 61 | 19.80 | 3.87 | .29 |
| Sp (Social presence) | 148 | 36.68 | 5.88 | 61 | 37.88 | 5.81 | 1.34 |
| Sa (Self-acceptance) | 148 | 23.35 | 3.70 | 61 | 24.08 | 3.89 | 1.27 |
| Self-sufficiency | 148 | 108.86 | 15.30 | 61 | 108.33 | 17.45 | .21 |

df = 207.

able population are almost congruent with that of the male college students population reported by Gough (5, p. 10).

Scales selected for this study are those described by Gough as designed to assess an individual's poise, self-assurance, and capacity for aspiring to or assuming leadership or status positions. Both Persistors and Nonpersistors on the basis of their scores on these scales would be

described as seeing themselves as persons of personal worth who have the capacity and the ambition to assume positions of leadership or status. They are probably quite verbally able to present themselves and their reactions with insight and forcefulness (5, pp. 12-13). The Persistors' scores on the Do (Dominance) scale suggest that this group is possibly characterized by a more aggressive planfulness and self-reliance than is the Nonpersistor group; however, the difference does not support expectancies for other than possible tendencies.

## Hypothesis Two

Hypothesis Two stated that Persistors tend to be motivated to achieve in terms of independence more so than do Nonpersistors. Operationally defined, the hypothesis would state that the Persistors' scores on the Ai (Achievement via independence) scale of the CPI would be higher than the scores of the Nonpersistors on this scale. This scale is described by Gough as tapping those "factors of interest and motivation which facilitate achievement in any setting where autonomy and independence are positive behaviors" (5, p. 13). High scorers on this scale tend to be seen as mature, forceful, strong, dominant, demanding, and foresighted; as being independent and self-reliant; and as having superior intellectual ability and judgment.

Table IV presents the data related to Hypothesis Two. That this population of Grade XII males is achievement-oriented is strongly supported by the data. That the

TABLE IV

MEANS, STANDARD DEVIATIONS, AND t TESTS OF DIFFERENCES BETWEEN PERSISTORS AND NONPERSISTORS ON SCALES RELATING TO ACHIEVEMENT POTENTIAL

| Variable | Persistors | | | Nonpersistors | | | t |
|---|---|---|---|---|---|---|---|
| | N | M | SD | N | M | SD | |
| Ai (Achievement via independence) | 148 | 20.70 | 4.01 | 61 | 17.70 | 3.85 | 4.93* |
| Ac (Achievement via conformance) | 148 | 27.30 | 4.97 | 61 | 24.74 | 5.26 | 3.32* |

df = 207.

*Significant at .001 level or better.

Persistors are more strongly achievement-oriented than are the Nonpersistors is underscored by the statistical significance level (.001) at which the hypothesis is accepted that Persistors are motivated to achieve in terms of independence more so than are Nonpersistors. Although the hypothesis did not include a reference to the comparative indices of achievement in terms of conformance, the data

on this dimension are included to implement the analysis of the achievement motivation of the two groups. The Persistors' scores are higher on the Ac (Achievement via conformance) scale than those of the Nonpersistors at a significance level of .001, yet are below the mean for males in general. The suggestion is that whereas the Persistors are achievement-oriented more so than are the Nonpersistors, they are more achievement-oriented in terms of independence than they are in terms of conformance. This is in keeping with expectations arising out of the study of adult male creatives by MacKinnon and others, and cited previously. A tabular presentation of a hierarchy of mean standard scores earned by various comparative groups to be presented later in an analysis of the comparative elevation of scores on the CPI will amplify this point.

The pattern of achievement motivation scores of the Persistors is suggestive of the pattern of professional research scientists reported by Gough and described as those whose "achievement drives are strong, particularly along lines of independent, autonomous effort" (6, pp. 3-5).

## Hypothesis Three

The descriptions of nonintellective areas of functioning of the male creative/effectives studied by Eiduson (4) and MacKinnon (11, pp. 23-26) and summarized by McClelland (12) served as a base for Hypothesis Three of this study. McClelland's summary suggests that mature creative/effectives seem to evidence a consistent preference for operating intuitively, for exercising rational control over their percepts, for "thinking" rather than "feeling," and that they tend more toward introversion than extraversion.

Hypothesis Three stated that there are differences between Persistors and Nonpersistors in their preferences for experiencing and evaluating experiencing as originally described in Jungian psychology. The hypothesis was stated operationally in terms of predicted preferences of Persistors for introversive, intuitive, thinking, and judging responses to a greater extent than Nonpersistors. Response preferences to items of the Myers-Briggs Type Indicator (MBTI) by the Persistors and by the Nonpersistors were scores in keeping with the authors' directions for obtaining two types of scores for each of the four variables with which the MBTI is concerned. It is believed that these data will be more meaningful when presented if some attention is given to the rationale and construction of the instrument.

The Myers-Briggs Type Indicator is built around the hypothesis that much apparently random variation in human behavior is due to certain basic differences in the way people prefer to use perception and judgment. In the MBTI terminology, "perception" is understood to include the processes of becoming aware of people, occurrences, or ideas, whereas "judgment" is understood to include the processes of coming-to-conclusions about what has been perceived. The authors maintain that perceiving and judging not only constitute a large portion of the individual's mental activity, but they govern a large portion of his outer behavior, since "his perception determines what he sees in a situation and judgment determines what he decides to do about it" (13, p. 51).

The instrument is concerned with assessing preferences for extraversive and introversive monitoring of one's inner and outer worlds. The introvert's main interests are in the inner world of concepts and ideas, whereas the extravert's main interests are in the outer world of people and things. The authors suggest that "when circumstances permit, the introvert directs both perception and judgment upon ideas, and the extravert likes to direct both upon his outside environment" (13, p. 57). The symbols used in the MBTI to indicate major preferences for either extraversive or introversive responses are E for extraversive preferences and I for introversive.

The MBTI attempts to assess the individual's preference for perceiving through "sensing" or through "intuition." Sensing as used in interpreting responses to the MBTI refers to the process of becoming aware of things directly through the five senses, whereas intuition involves the process of indirect awareness through the unconscious, accompanied by ideas or associations which the unconscious tacks on to the perceptions coming from the outside. The symbol used for sensing or direct perception is S and the symbol for intuition or indirect perception is N.

The authors state that there are basic differences in the preferences of individuals for judging the percepts that they obtain through their perceptual processes. Some people tend to prefer to come to conclusions through a logical process purportedly involving impersonal evaluations. This preference is described as "thinking" and is symbolized by T in the MBTI. Some people come to conclusions by the use of "feeling," which is seen as a process of appreciating, ascribing personal, subjective values to the various percepts that are used in coming to a conclusion. This preference is given the MBTI symbol of F.

The fourth dimension with which the Myers-Briggs Type Indicator is concerned is that which involves the

predominant preference of the individual for "judging" or "perceiving." The MBTI rationale holds that a "perceiving" attitude is one in which one does not seek to arrive at a final judgment but rather expects that there may be new evidence or developments, that there is more involved than is presently apparent, and that one prefers to withhold judgment. The "perceiving" person in MBTI terms is seen as more open minded than is the "judging" person who prefers to shut off the inflow of information and wishes to act on the basis of available evidence, to arrive at a verdict, and "get things settled." The preference for judging is termed J, and the preference for perceiving is P.

Thus the Myers-Briggs Type Indicator purports to assess one's preferences along four dimensions: extraversion (E) versus introversion (I), sensing (S) versus intuition (N), thinking (T) versus feeling (F), and judging (J) versus perceiving (P). The MBTI rationale provides for the use of two kinds of scores. One is called the preference score and is calculated for each of the four indices: E-I, S-N, T-F, and J-P. Each testee's responses are scored on the basis of the number of responses that are keyed as E, I, S, N, T, F, J, and P responses. To determine the preference score in each category, the difference between the number of each type of response

is tabulated; for example, the difference between numbers of E responses and I responses is calculated. If there are more E responses than I responses, the symbol E with the numeral representing the difference is assigned as the testee's score on the E-I dimension. A similar preference score is assigned the testee for each variable or dimension. The letter shows the direction of the preference; the numeral indicates the degree of preference.

The other scoring procedure suggested by the authors is that which permits the calculating of a continuous score for use when certain statistical procedures assume such continuity. The continuous score is obtained by adding 100 to the preference score when the preference direction is I, N, F, or P, and subtracting 100 from the preference scores E, S, T, or J. This scheme permits a numeric continuum from 33 to 161 on each dimension.

Performances of the members of the two groups, Persistors and Nonpersistors, on the Myers-Briggs Type Indicator provide quantitative data for testing Hypothesis Three and are presented in Tables V and VI. Table V presents the means, standard deviations, and the values of t when continuous scores of Persistors and Nonpersistors on each of the four dimensions are treated.

An examination of the t values in Table V indicates that while both Persistors and Nonpersistors score at a

TABLE V

MEANS, STANDARD DEVIATIONS, AND t TESTS OF DIFFERENCES BETWEEN PERSISTORS AND NONPERSISTORS ON THE MYERS-BRIGGS TYPE INDICATOR

| Variable | Persistors | | | Nonpersistors | | | t |
|---|---|---|---|---|---|---|---|
| | N | M | SD | N | M | SD | |
| Extraversion-Introversion (E-I) | 146 | 99.03 | 26.85 | 60 | 88.8 | 22.27 | 2.59* |
| Sensation-Intuition (S-N) | 146 | 113.70 | 27.50 | 60 | 104.87 | 25.59 | 2.13** |
| Thinking-Feeling (T-F) | 146 | 99.80 | 22.34 | 60 | 94.53 | 22.89 | .00 |
| Judging-Perceiving (J-P) | 146 | 99.38 | 29.06 | 60 | 108.05 | 29.34 | 1.93 |

df = 204.

*Significant at .01 level or better.

**Significant at .05 level or better.

point on the dimension E-I that is approximately at the mid-point of that score continuum, the mean score of the Persistors is larger than the mean score of the Nonpersistors and in the hypothesized direction. The level of significance for this difference is better than the .01 level.

On the S-N dimension, the difference between mean scores of the Persistors and Nonpersistors is again in the hypothesized direction. The difference significance is at a level of .05 or better.

The hypothesized difference between the two groups on the T-F dimension did not obtain; the *t* value is .08. It is noted that the Nonpersistors obtained a mean continuous score that is suggestive of a greater preference for "thinking" responses than that suggested by the mean score of the Persistors on this dimension; thus, while not statistically significant, the tendency evidenced is a reversal of that hypothesized. That both groups prefer "thinking" responses over "feeling" responses is indicated.

The mean continuous score difference between the Persistors and Nonpersistors on the judging-perceiving (J-P) dimension was in the direction hypothesized, but the *t* value did not reach the .05 level of significance. That it approached this level of significance is noted (*t* value of 1.93 as compared with the *t* value of 1.96 required for .05 level of significance) and that the mean continuous score of the Persistors (99.38) is considered a "judging" or J score, whereas the mean score of the Nonpersistors (108.05) in MBTI terms is a "perceiving" or P score.

The Myers-Briggs Type Indicator manual suggests that after four preference scores have been computed, the type

formula, consisting of the letters from the four scores listed in order, be entered for the individual tested. If the mean scores for each group were considered as scores for an individual, the Persistor's type formula would be ENTJ, and the type formula of the Nonpersistor would be ENTP. From a type formula frame of reference, the difference between the two groups would be in terms of the difference between those who "judge" and those who "perceive." In this respect, the Persistors more closely resemble the research scientists reported by MacKinnon, whereas the Nonpersistors more closely resemble the architects and the women mathematicians studied in the IPAR experiments (11, p. 26).

The Myers-Briggs Type Indicator rationale strongly favors a dichotomous interpretation of the responses of testees on the instrument; hence, it would seem appropriate to convert the continuous scores, calculated to permit the use of the *t* test of significance of differences of means, to dichotomous or preference scores. This was done for each of the Persistors and Nonpersistors, and the chi-square technique was used to provide an extension of the examination of the data. Since the dichotomous scoring approach permitted categorizing each student's responses as either E or I, S or N, T or F, J or P, the use of 2-by-2 contingency tables was seen as

appropriate. The formula suggested by Siegel as "incorporating a correction of continuity which markedly improves the approximation of the distribution of the computed $\chi^2$ by the chi-square distribution" (15, p. 107) was used in treating the data in 4 fourfold tables. In each table the frequencies of preferred responses by Persistors and Nonpersistors on each dimension were entered and the $\chi^2$ value was calculated. Table VI gives the frequencies of response preferences on each dimension by Persistors and Nonpersistors and the $\chi^2$ values obtained. Significance levels are indicated.

Again the data indicate that the two groups are differentiated on the extraversion-introversion and the sensing-intuition dimensions. The chi-square values are significant at the .01 and the .05 levels or better. As was indicated in the treatment of the data as continuous scores and reported in Table V, the response preferences of the two groups on the T-F dimension were quite similar; however, on the basis of a comparison of the ratios of T to F among Persistors and Nonpersistors, the Nonpersistors tend to prefer T responses more so than do the Persistors.

More Persistors are categorized as J than are categorized as P, whereas more Nonpersistors are categorized

TABLE VI

CHI SQUARE VALUES OF FREQUENCIES OF RESPONSE PREFERENCES OF PERSISTORS AND NONPERSISTORS ON THE MYERS-BRIGGS TYPE INDICATOR

| Response Preference | Persistors (N=148) | Nonpersistors (N=60) | Chi-square Value |
|---|---|---|---|
| Extraversion (E) | 74 | 43 | |
| Introversion (I) | 74 | 17 | 9.05* |
| Sensing (S) | 41 | 27 | |
| Intuition (N) | 107 | 33 | 6.62** |
| Thinking (T) | 78 | 34 | |
| Feeling (F) | 70 | 26 | .67 |
| Judging (J) | 80 | 25 | |
| Perceiving (P) | 68 | 35 | 2.15 |

df = 1.

*Significant at the .01 level or better.

**Significant at the .05 level or better.

as P than are as J. This is in the hypothesized direction, although neither the chi-square nor the t values obtained in treating data on this dimension are statistically significant.

### Hypothesis Four

Hypothesis Four stated that Persistors express interests in understanding and manipulating the physical environment more so than do Nonpersistors and that they are less interested in activities peculiar to the business

world. The operational definition of this hypothesis is that scores obtained by Persistors in the sciences field (OII) of interest are larger than those obtained by Nonpersistors in this field, and scores obtained by Persistors in the field of business interests are lower than are those obtained by Nonpersistors.

Table VII presents the data relevant to Hypothesis Four.

TABLE VII

COMPARISONS OF DIFFERENCES BETWEEN INVENTORIED INTERESTS OF PERSISTORS AND NONPERSISTORS ON SCIENCE AND BUSINESS FIELDS OF OCCUPATIONAL INTEREST INVENTORY

| Variable | Persistors | | | Nonpersistors | | | t |
|---|---|---|---|---|---|---|---|
| | N | M | SD | N | M | SD | |
| Sciences | 146 | 28.41 | 6.40 | 60 | 22.35 | 5.77 | 6.32* |
| Business | 146 | 18.94 | 7.09 | 60 | 24.27 | 7.89 | 4.71* |

df = 204.

*Significant at the .001 level or better.

As indicated in Table VII, Hypothesis Four is accepted at a highly significant level. The data point up the marked preference on the part of Persistors for indicating a preference for those activities described by the authors of the

OII as related to a "desire to understand and manipulate the physical environment . . ." as compared to their indicated interest in "all activities peculiar to the business world . . ." (7, p. 4).

On the basis of raw scores, the observation is made that of 40 items in the sciences field, the Persistors group marked a preference toward 28 as compared with 18 preferences from a possible choice of 40 in the business field, whereas the Nonpersistors group chose more business field items than science field items. A later discussion of the relative performances of the Grade XII population of this study and comparison groups will enable further comparison when percentile ranks are presented in tabular form.

This finding is quite in keeping with numerous studies related to this investigation; however, the power of this occupational interest inventory approach to discriminate between members of a relatively homogeneous group highly selected on the basis of intelligence and academic talent achievement both from subjective teacher-assigned grades and nominations as excellent students as well as standardized academic achievement tests is especially striking.

MacKinnon's venture that most students with creative potential have personality structure congruent with, though possibly less sharply delineated than, those of

mature creatives provided a basic frame of reference to explore a comparison of the present study's population with other groups of males. These comparative groups include those who are assumed to be somewhat similar or representative of those males at advanced educational stages which the high-school youth of this study must assay before they will be allowed to present themselves as adults who will assume the roles now filled by the male creatives cited previously as intensively studied by MacKinnon and others.

### Persistors, Nonpersistors, and Comparison Groups

Table VIII presents data obtained from the various investigations having to do with the performances of certain male groups on the CPI. The performances on the scales of the CPI with which this study is concerned are arranged to present what might be described as a hierarchy of means. The mean standard scores of the reported male groups on the self-sufficiency grouping of scales Do, Cs, Sp, and Sa and scales Ac and Ai are arranged in descending order of magnitude for the self-sufficiency scores.

Although the self-sufficiency scores of the Persistors and Nonpersistors groups were quite similar, both are elevated; that is, above the mean for males in general and in the direction of those studied male creative/effectives

TABLE VIII

MEAN STANDARD SCORES ON SELECTED SCALES OF CALIFORNIA PSYCHOLOGICAL INVENTORY OF MALE COMPARISON GROUPS AND PERSISTORS AND NONPERSISTORS

| Group | Self-sufficiency Score | Ac | Ai |
|---|---|---|---|
| Research scientists | 61 | 58 | 67 |
| Architects I | 59.5 | 50 | 59 |
| California gifted high-school males | 58.8 | 51 | 58 |
| Architects II | 57.5 | 53 | 60 |
| Male mathematicians | 56.5 | 52 | 67 |
| Architects III | 55.5 | 56 | 58 |
| Persistors | 55.2 | 49 | 56 |
| Nonpersistors | 55 | 44 | 48 |
| College males | 55 | 53 | 58 |
| High-school males | 44.5 | 38 | 41 |

described previously. Not only are the scores elevated in the direction of the male creative effectives they are appreciably above the mean standard score of high-school males in general. The Persistors' and Nonpersistors' scores are almost identical with those of Architects III, the group described by MacKinnon as the least creative of the studied architects. The Persistors' and Nonpersistors' scores are

identical with the college males group and similar to but lower than the California gifted high-school male group, a group of 183 Grade XI and XII males with a mean Stanford-Binet IQ of 140 who served in an experimental program of education for the gifted during 1957 to 1960 (1, p. 166).

On the Ai scale of the CPI, the performances of all male creatives, college males, and California gifted males along with the Persistors group earned standard scores elevated above the mean of males in general, whereas the Nonpersistors group and high-school males in general earned standard scores whose mean was below the mean for the male generality.

With the exception of the Persistors, Nonpersistors, and high-school males groups, all others earned mean standard scores above the mean on the Ac scale. It is noted that the numeric difference between standard scores on the Ac and Ai scales is greater in the Ai direction for all male creative groups, with the exception of the least creative architects, the Persistors, and California gifted high-school groups. This difference is that suggested by the IPAR studies of MacKinnon and others (6).

Myers asserts that Jungian psychology posits two distinct and sharply contrasting ways of perceiving--the sensing (S) and the intuitive (N). Sensing involves becoming aware of the environment directly through the five senses, whereas intuition involves an indirect perception

by ways of the unconscious. The intuitive approach includes an interest in the possibilities that obtain, something of a "reading between the lines." The preference for the intuitive approach seems to be the sine qua non of those who pursue occupational activities that are usually described as professional, nonbusiness. Strong's Groups I, II, V, and X are described as preferring N over S. The preference for S is noted among Strong's Groups III, VIII, IX, and XI. Each of these groups is a business activity group--production manager, business detail and administration, business contact, and president of a manufacturing concern (11).

Table IX presents the percentage of males in various groups with which the Persistor and Nonpersistor groups might be compared in terms of the incidence of type preferences.

Recalling that N seems to be particularly associated with a preference or pursuit of activities somewhat similar to those of male creative effectives, it is apparent that an ordering of groups in terms of the incidence of those who prefer N is in essence an ordering of the groups whose members, on an a priori or "common sense" basis, are increasingly similar to the male creative effectives. The male creatives are almost unanimous in their preferences for N followed in terms of incidence by the National Merit

TABLE IX

PERCENTAGE DISTRIBUTION OF PREFERENCES ON THE MYERS-BRIGGS TYPE INDICATOR BY VARIOUS MALE COMPARISON GROUPS AND PERSISTORS AND NONPERSISTORS

| Group | No. | E | I | S | N | T | F | J | P |
|---|---|---|---|---|---|---|---|---|---|
| Architects | 40 | 17 | 77 | 0 | 100 | 50 | 50 | 42 | 58 |
| Mathematicians, male | 28 | 29 | 71 | 4 | 96 | 68 | 32 | 35 | 65 |
| Research scientists | 45 | 33 | 67 | 7 | 93 | 77 | 23 | 60 | 40 |
| California science students | 705 | 38 | 62 | 17 | 83 | 69 | 31 | 49 | 51 |
| National Merit finalists | 671 | 41 | 59 | 17 | 83 | 66 | 34 | 45 | 55 |
| Persistors | 148 | 50 | 50 | 28 | 72 | 53 | 47 | 54 | 46 |
| Engineering students | 2188 | 49 | 51 | 35 | 65 | 67 | 33 | 65 | 35 |
| Nonpersistors | 60 | 72 | 28 | 45 | 55 | 57 | 43 | 42 | 58 |
| Male high school--college preparatory | 3503 | 62 | 38 | 58 | 42 | 62 | 38 | 51 | 49 |

Scholarship finalists, the college science students, the Persistors, engineering students Nonpersistors, and college preparatory high-school males. It would seem that a preference for S would be negatively weighted in a selection procedure for those who might be found in the

group of highly effective males in professional activities that are nonbusiness.

A preference for I appears to be less similar to the preferences of male creatives than is N, but the increasing preference for I among the college science students, the National Merit Scholarship finalists over the Nonpersistors and the male high-school students is suggestive of the possible value of a preference for I in appraising the potential of male youth for effective pursuit of formal training in college curricula leading to entry in a professional area involving science research and mathematics.

The differences in incidence between preferences for J and P are apparently less evident than on any other dimension of the MBTI among the groups serving as comparison groups for observing the performances of Persistors and Nonpersistors; however, it is seen that 60 per cent of the research scientists and 64.8 per cent of the engineering students group prefer J responses over P responses as contrasted with the mathematicians among whom but 35 per cent prefer J responses. It would appear that among high-school males, the preference pattern between J and P is less well differentiated than it will be as continuing formal educational experiences either to provide increasing opportunities for the practice of

judging and perceiving, or the necessity for making more specific curricular/professional choices precipitates a pattern establishment which then becomes more evident as more clearly cut study/work activities are pursued.

### Inventoried Interests of Persistors, Nonpersistors, and Comparison Groups

MacKinnon's IPAR studies of male creatives/effectives evidence what he sees as a repeated pattern of inventoried occupational interests among those described as highly original and/or productive. He saw this pattern emerge in his original study of graduate students. This pattern is one that involves elevated preferences on the SVIB similar to Groups I and II and lowered preferences on Groups VIII and IX (11, p. 27). Lindgren and Gilberg's study demonstrates a sign correlation between SVIB Groups I and II and the sciences field of the OII and a negative correlation between SVIB Groups I and II and the OII business field. The SVIB Groups VIII and IX correlated positively with the OII business field and negatively with the OII sciences field (9, p. 19).

Table X presents data relative to inventoried interests of certain male comparison groups on the business and sciences fields of the OII. The Brown University groups

were composed of students who were candidates for the Bachelor of Science degree in the major areas of chemistry, physics, and engineering. The OII scores were obtained from testing done when the candidates were freshmen (3, p. 79). The Texas Agricultural and Mechanical College (A. and M.) group scores were obtained from freshman students who declared intentions of pursuing an engineering degree (7, p. 14).

TABLE X

MEANS AND PERCENTILE RANKS OF SCORES EARNED BY PERSISTORS AND NONPERSISTORS AND CERTAIN MALE COMPARISON GROUPS ON BUSINESS AND SCIENCE FIELDS OF THE OCCUPATIONAL INTEREST INVENTORY

| Group | Business Field | | | The Sciences | |
|---|---|---|---|---|---|
| | N | M | P. R.* | M | P. R.* |
| Brown University B. S. Degree in Chemistry | 73 | 17 | 40 | 34 | 95 |
| Physics | 36 | 16 | 30 | 34 | 95 |
| Engineering | 190 | 17 | 40 | 28 | 80 |
| A. and M. Engineering Freshmen | 134 | 19 | 50 | 28 | 80 |
| Persistors | 146 | 19 | 50 | 28 | 80 |
| Nonpersistors | 60 | 24 | 70 | 22 | 40 |

*1956 revision norms for males used.

The marked differences in percentile ranks of the mean scores in the business and sciences fields for the Persistors and the college male groups point up the inventoried interests pattern described by MacKinnon. The percentile ranks of the mean scores of Nonpersistors suggest a reversal of the pattern in that the percentile rank of the Nonpersistors mean score in the business field is one that is described by the test authors as indicating a major interest area whereas the percentile rank of the mean score of the Nonpersistors in the sciences field is approaching the level (percentile rank of 30) described by the authors as a rejected area (7, p. 19). Although the Persistors indicate preferences in the sciences field that would be described as a major interest, the lower percentile rank in the business field is neither indicative of a rejection nor of a major interest. It is noted that the percentile ranks of the business and the sciences fields scores of the Brown University degree candidates suggest a major interest in sciences and a rejection of business by the physics group and near-rejection by the chemistry and engineering groups. Since the Persistors and Nonpersistors must secure formal education at and beyond the baccalaureate level, it appears reasonable on the basis of these data to see heightened inventoried interest in science activities and a lowered interest in business

pursuits as predictive of continuance to successful entry, advancement, and establishment in professional pursuits similar to those of the IPAR male creatives/effectives. The Persistors appear to evidence those nonintellective characteristics to a degree more nearly like the IPAR group than do the Nonpersistors.

## Analysis of Interview Data

Leonard has suggested that the self-perceptions of the academically talented student provide a source of study of academic behavior in noncognitive areas. She reports a study involving interviews during which college women of high scholarship ability described how they saw themselves functioning as they do. Leonard described these interviews as focused interviews (8). Rogers (14, p. 6) summarizes his views on the motivation substratum of the human organism as "best conceptualized as a tendency toward fulfillment, toward actualization, toward the maintenance and enhancement of the organism."

The interview material obtained during the last month of the Grade XII youths' academic year was organized around the task of inferring from responses of the Persistors and the Nonpersistors what persisting or not persisting in the academic sequence contributed to the self-actualization of the individual. It was believed that the

individual Persistor or Nonpersistor was monitoring the responses of himself, of his peers, of significant adults, and of significant professional staff members of his school to him as he continued or discontinued the five-year mathematics/sciences program.

The questions about which inferences were made from the verbalizations of the interviewed youth were:

1. How do your parents feel about your participation in the Honors Program?

2. How do you think your friends and other students feel about you and the Honors Program?

3. How do you feel teachers and other staff members regard you and the Honors Program?

4. How do you feel about the Honors Program? How do you feel about your participation in it?

## Perceptions of Persistors

Persistors see themselves as quite able academically. When they were discussing their being selected in 1958 as an Honors Program eligible, they stated that they were not surprised that they were chosen for a program of study that was open to youth whose academic ability and achievement were like those of the upper 10 per cent of the population of Grade VII pupils. They had long recognized that learning school tasks was quite easily done by them and that their grades had always been good.

They stated that they were pleased that they had been chosen and "just wanted to know all about it."

Grades assigned by teachers during the subsequent years were not seen as particularly tension-producing by the Persistors. They had heard that one could earn higher grades with less effort in regular classes, but they liked what they were allowed or encouraged to do in Honors sections and continued despite the generally held understanding that higher grades for less work were obtained in other classes by less able students. Persistors felt that Honors Class participation had been rewarding and they urged that such classes be continued.

Persistors reported their parents as pleased with them as Honors Program students. They reported at least one parent or family adult as equally interested in intellectual pursuits, and they seemed to feel a sense of continuing emotional support from these significant family adults. They reported little feeling or awareness of family anxieties about them as students who might not earn a "good high-school transcript." There appeared to be little expressed concern about continuing formal training after high school; they either had scholarships or family-arranged financing had been planned. This planning for formal training included graduate study.

Persisting males verbalized little concern about possible negative reactions from peers and friends about their continuing in the Honors Program. They stated their belief that most students seem to "think it's fine" to be in the Honors Program. They did indicate they probably dated less than most boys their age. They seemed to need to talk about their concerns that a girl be one with whom they could discuss things. This perceived lowered frequency of dating activity seemed to be an area of some anxiety for them.

Persistors seemed to seek some faculty member who afforded them an ego ideal as an educated person. Most often they were able to find this in the person of the mathematics or science teacher who was assigned to Honors Program courses, but in some instances they found this person in curricular areas not included in the program. One Persistor described a young English teacher as the person in his school who was "very intelligent, has had a fine education, and is not afraid to let students talk about important things." Persistors are quite aware of the administrative problems related to the comparatively small number of Honors Program students in some high-school buildings, and they are quite sympathetic with the realities that obtain; one interviewee proffered a plan for utilizing programmed learning approaches, independent

study, and resources area arrangements to meet the problem. The most frequently expressed negative reaction to school adults was a disdain for "stupid teachers." One student discussed what he considered to be a pervasive anti-intellectual atmosphere in his school, but he explained that he and his father had discussed the possible bases for this as "residing in the value system of the community."

Persistors saw their participation in the Honors Program as a self-congruent experience; it enabled them to confirm their perceptions of themselves as capable students, approved of as capable students by their peers, and experiencing reinforcement by some significant familial adult. They saw this accelerated academic program as fitting in with life plans. The Persistors evidenced a heightened planfulness and saw this academic experience as an integral part of their expectations of themselves. The Persistors were aware of the possible ambivalence they sensed on the part of some school staff members who sometimes reminded them that Honors Program class members could and did make poor grades. Those who sought to so motivate were generally tolerated, whereas the teacher who presented the image of an educated adult who supported the Persistor's needs to explore what he termed "really important issues" was readily acknowledged

as an admired and helpful adult. The Persistors appeared to feel the Honors Program served as one of the arenas in which they found self-actualizing experiences.

## Perceptions of the Nonpersistors

The Honors Program was considered to be a worth-while academic program by the Nonpersistors, but they were not sure it was valuable for them. When discussing their feelings about having discontinued the sequence, they seemed to express some regret that they had not continued through the fifth year. In contrast to the Persistors' certitude about their being quite able students and possessing high scholastic aptitude, the Nonpersistors were not as certain that they were as capable as their Persistor peers. They recalled some possible apprehensions significant family adults felt about their earning grades high enough to secure scholarships if they found Honors Program unlike the regular classes in which they had made high grades.

The Nonpersistors spoke of their parents' pride in their having been seen as eligible for Honors Program placement, but discussions of this pride often were followed by verbalized anxieties about difficulties that might be experienced if the grades dropped.

The Nonpersistors felt that peers did not doubt their ability to continue the sequence through to completion, but

saw them as interested in a wider variety of school and community activities than those primarily involved in cognitive areas. The Nonpersistors appeared to seek feedback from persons in a number of social, athletic, and recreational activities more than did the Persistors; hence, they often stated that they dropped the sequence because they found themselves expending more of themselves than their energies and time permitted. They chose non-Honors Program continuance.

The Nonpersistors were markedly more critical of the Honors Program than were the Persistors. They detailed their misgivings about preparation of teachers; they often detailed what they considered inequities and inconsistencies in grading; they criticized course-sequence requirements, and detailed administrative ineptness in removing the negative aspects, which were the subject of much of the focused interview that had to do with their feelings about how teachers and staff members regarded the Honors Program enrollees. They seemed to say that they felt that teachers and staff in their schools were either not capable or were not interested in coping with the negatives. The Nonpersistors seemed to have a number of suggestions related to what they understood other administrators and other teachers were doing that appeared to be superior to the practices they questioned in their schools.

The Nonpersistors did not seem to have the certainty about plans for their immediate futures or long-range goals that the Persistors evidenced. Several Nonpersistors were not sure whether they would enroll in the colleges about which they had been thinking. Some had somewhat nebulous ideas about majors in college; few mentioned that they planned graduate-level work in college. The Nonpersistors were not heard to mention the universities that have been described as prestige schools as frequently as did the Persistors.

The essential difference that was inferred from the self-reported reactions of the Persistors and Nonpersistors to the Honors Program was that Persistors sought continued participation in the sequence because of the intrinsic worth of the experience whereas the Nonpersistor sought the values that were related to the extrinsic aspects of the program. These seemed to be the values inherent in having been identified as a highly capable student who would enroll in courses not taken at the same grade level by most students. After having been so identified, the Nonpersistors seemed to become concerned about earning grades necessary to remain in the Program and obtain "a good high-school transcript." In addition to maintaining the high-grades status, Nonpersistors appeared to seek other tangible evidences of superiority among peers in areas not

necessarily related to academic or intellectually-oriented activities.

## Reporting of Individual Interview Material

Although the summary descriptions of the Persistors and the Nonpersistors in terms of most commonly inferred characteristics of the members of the two groups suggest generalizations that may obtain about differences between them, it is believed that additional illumination of the data can be secured through a reporting of interview material in terms of the statements made by Nonpersistors who withdrew from the sequence at various grade levels.

Grade VIII withdrawees.--Six students dropped the sequence during or at the end of Grade VIII. Interviews with four of these six students indicated that although three of the four stated that they would enter professions that require college training curricula including mathematics and science (doctor of medicine and electrical and "free-lance" engineering), they seemed to feel that it was quite appropriate that they were discontinued for such reasons as, "I was getting ahead of my maturity"; and "I had to drop it because of my poor grades, and besides it [ the Honors Program] might tend to deprive me of all the important social life of the school." One student recalled that he preferred to spend his spare time "finding

something exciting to do, even if it's just going to see my girl; besides, I want to become a skilled auto mechanic."

Those who discontinued at Grade VIII seemed to evidence little assurance that their vocational plans would materialize. One student remarked, "I really don't trust the world; we're a family of all individuals; I am a high-school 'beatnik.' Do you know whether or not agriculture is taught at X College?"

Grade IX withdrawees.--Six students discontinued the Honors Program during or at the end of Grade IX. Four of these students indicated no vocational plans that included college training in mathematics or science areas; one stated that he would be in a "parts department of a big automobile manufacturer"; another stated that he would enter the personnel management field; another declared journalism as his intended vocational area; and the fourth believed that he would be in commercial aviation. Verbalizations about reasons for dropping the program included the following: "Hot rodding is my favorite enthusiasm, and besides my algebra is weak." "I dropped the program because I moved from school to school; besides, Honors tends to separate the students too much into two groups." "My grades dropped and this my parents will not tolerate." One student was somewhat more succinct: "I

dropped because I could not keep pace and save face at the same time."

Grade X withdrawees.--Fifteen students withdrew from the Honors Program during or at the end of Grade X. Interviews with eight of the fifteen students indicated that the vocational plans of this group were those that did not logically include a continued acceleration in a mathematics-science sequence; hence, there is some basis for feeling that these decisions to discontinue might be associated with reality planning. None of the interviewed students stated that he planned a career in the fields of natural or physical sciences or mathematics; these students tended to name teaching as a career with an emphasis on teaching at the secondary or college levels in music and the social sciences. One student intended to pursue an operatic singing career; and two indicated that they were interested in law. Most students indicated that they were aware that mathematics as a subject was one in which they had either the least interest or the least aptitude. Their remarks about their aptitudes for continuing an accelerated program in mathematics included: "As I advanced in mathematics, I became more and more confused. . . . My aptitude in mathematics was evidently not as high as first believed." "It was the first time I had made bad grades. . . . A child can be easily pushed into a program where he should

not be, especially the borderline group, around 115 to 120 IQ." "I had rather compete with students in the heterogeneous group than be low man on the totem pole in Honors. Besides, I'm going to be a high-school football coach." "I could never keep up; I passed by the skin of my teeth. Honors sometimes puts some of us where we are not ready in a situation we can't maintain."

Problems with important familial adults were cited with much more frequency by those who discontinued at this level. One student stated, "I was just angry--angry with everybody, but especially with my father." Another stated that his discontinuance was, "Because of my home problems, I just couldn't seem to concentrate." Another said, "Please don't grade those tests you gave us. I'm so confused; I have been for a long time. I need psychiatric treatment, but my family won't hear of it. They'd be disgraced."

Nonpersistors who withdrew at this level seemed to feel that their peers understood their motivations for dropping out of the Honors Program. One student stated, "All students seem to know who can and who can't do the work. Some of us struggle and just give up; some of us decide that this is not for us; some of us say, 'Okay, I've proved I'm smart, so why keep on with it?' and then we go on and do other things. Other students understand

this." Another student reported, "Sometimes I'm teased about being an ex-brain, but there's no real feeling about it--no real antagonism."

Grade XI withdrawees.--A review of the stated occupational plans of twenty-eight of the thirty-eight students who withdrew from the sequence during or at the end of Grade XI revealed only two who indicated they planned to enter occupations that would require extensive college-level training in the natural and physical sciences and mathematics other than that included in the usual liberal arts program. These students cited civil engineering and "field" engineering. The remainder stated that they were planning careers in law, business, teaching (primarily English and social sciences), armed services, and accounting; and one student asked, "Who knows?"

Ten of these students were interviewed. None of them evidenced regret about participating in the sequence up to the point at which he had discontinued, and statements such as the following were typical: "Calculus just isn't too important in law." "I have an athletic scholarship; my father and my coach think it really isn't necessary to keep on. I might have if they hadn't changed mathematics teachers, but this one doesn't know as much about it as some of us, and he doesn't make us get it. I just wasn't

getting anything out of it." Others felt that it was to one's advantage in terms of seeking scholarships to make top grades in non-Honors courses. One student stated, "If you want to get a scholarship, get out of Honors." Another observed, "Those in Honors don't get the honors: those in regular classes get all the honors." Others said, "Honors classes are wonderful, but grading isn't fair." One student who saw himself as a college teacher of political science reasoned, "To get scholarships and other recognitions, students must have high grades, but how can they make them in Honors courses? I withdrew because I felt I could not keep up the pace and enjoy the same activities as my friends outside the Program." Three of the ten described their reactions to grades: "I was putting more into it than I was getting out of it--pressures to make top grades, petty jealousies of common students, and then those grades!" "I was disappointed in my failure to make the grades." "I couldn't be an all-around student and make good grades."

Several students stated that they dropped the sequence because they found it necessary to devote their nonschool hours to working at jobs. One student was forthright in saying, "It's as simple as this: if I didn't work I wouldn't eat." Another stated that he intended to have "a big tire company someday, and I'm starting right now to afford it."

Personal reactions of Persistors.--Of the forty-seven Persistors interviewed, only one indicated that he probably should never have been selected for the Honors Program. He said, "I always doubted that I was as bright as the rest of them; I kept having a feeling that I was in a place that someone else should have had." The remainder were able to say that they knew that they were quite able academically. One stated that he was encouraged by being "singled out." Another expressed his pleasure at being in a school and a group where "it's all right to be intelligent." Another described his reaction to his selection as verifying what he had felt certain of for some time, "I was always ahead in school." None of the Persistors seemed to feel that his being in the Honors Program was other than an asset as far as student acceptance of him as a person. Several of the Persistors stated that other students thought being in Honors was "really something."

For the most part, Persistors saw their parents as actively providing emotional support for their continuation in the sequence but one student stated, "I wish I could get some sort of real communication with my family; I wish I could make real contact. I'm not an extravert, and I wish I didn't feel that I had to be." Another wished that his parents understood why he wanted to remain in Honors when "they know that other kids are making better

grades than I am and they just don't understand me. But I'm so sure this is right for me."

Not all Persistors felt that school personnel understood either the Program or the students enrolled in it. One student stated he felt that there was too much emphasis on filling the Honors classes. Another felt that selection procedures and orientation for initial enrollment in the Program were not as he felt they should be. He recalled, "I was always at the tail end of the Honors students. . . . When I was in elementary school, I just breezed along, but then came Honors, and wow!" He went on to say he felt that students should be helped to evaluate their own aptitudes and interests as well as motivations for enrolling in the sequence.

Questions about teacher preparation and attitudes toward Honors Program enrollees were raised. Most students felt that they had had the best available teachers for their mathematics and sciences courses, but one student recalled, "Dr. X was wonderful, but he left to go to a college, and the man that we have now--well!" Others believed that although teachers might have had an adequate foundation in the subject matter per se, some were not what they wanted to see in a man who should be an example of an educated man who "can talk intelligently about many things." One student was concerned about the marks he

was receiving from one of his teachers, but he said, "When I looked at one of the A papers in a regular class and compared it with my C paper, I knew that mine was so much better that I felt all right about it because I knew that A didn't really mean anything."

Although the majority of the Persistors seemed to have been able to cope successfully with the demands made on them in interpersonal relationships areas, two students expressed their continuing misgivings about what they felt were external demands for them to participate in more of the social activities in school. One of them said, "A large crowd bothers me because they talk about unimportant things." Another discussed his reactions to dating, "I date both Honors girls and other girls. I have more fun with other girls, but I really feel more compatible with Honors girls. . . . They can really talk with you, but some of them always want to correct you."

## Summary

Data relevant to an examination of the hypothesized differences between persisting and nonpersisting Grade XII males in an Honors Program of accelerated mathematics/sciences course offerings were analyzed. The hypothesis that persisting youth were more self-sufficient than were nonpersisting youth was rejected, whereas the hypotheses

that persisting youth were more oriented toward achievement in terms of independence and autonomy and that they reported interests in activities related to the sciences more than they reported interests in business-oriented activities were accepted at significant levels. Persisting youth tended to express preferences for introversive, intuitive, and judging responses to experiences more so than did the nonpersisting youth who appeared to prefer extraversive, sensing, and perceiving responses. There was no significant differences seen between the two groups in terms of preference for thinking or feeling responses.

When persisting and nonpersisting youth were compared with male comparison groups who had been identified as especially effective/creative adults and with groups of various degree candidates in college curricula representing formal training prerequisites, the persisting youth evidenced performances on the same or similar psychometric instruments that suggested that they were supporting the MacKinnon venture that these nonintellective characteristics would obtain in those youth with potential for assaying the male adult creative/effective role.

Unstructured interviews were held with representative Persistors and Nonpersistors in the individual senior high-school buildings in which the students were enrolled in an attempt to secure data permitting inferences as to how

the Persistors and Nonpersistors saw themselves as they continued or discontinued the Honors Program and how they perceived the reactions of others important to them. Persistors tended to see continuing in the Program as self-actualizing whereas Nonpersistors saw such continuation as contrary to their perceived self-needs. Persistors seemed to find values in the Program in terms of intrinsic values. Nonpersistors appeared to find values in the Program in terms of extrinsic rewards.

## CHAPTER BIBLIOGRAPHY


1. California State Department of Education, Educational Programs for Gifted Pupils, A Report to the California Legislature Prepared Pursuant to Section 2 of Chapter 2385, Statutes of 1957, Sacramento, California State Department of Education, 1961.

2. Capretta, Patrick J., Reginald I. Jones, Laurence Siegal, and Lila C. Siegel, "Some Noncognitive Characteristics of Honors Program Candidates," Journal of Educational Psychology, LIV (October, 1963), 268-276.

3. Dunn, Frances E., "Interest Patterns of College Majors," Journal of College Student Personnel, IX (December, 1962), 79-86.

4. Eiduson, Bernice T., Scientists: Their Psychological World, New York, Basic Books, Inc., 1962.

5. Gough, Harrison G., California Psychological Inventory Manual, Palo Alto, California, Consulting Psychologists Press, Inc., 1957.

6. Institute of Personality Assessment and Research, University of California, The Creative Person, Proceedings, Berkeley, California, The University of California, 1961.

7. Lee, Edwin A. and Louis P. Thorpe, Manual--California Occupational Interest Inventory--Advanced, Monterey, California, California Test Bureau, 1956.

8. Leonard, Louise C., "Self-Descriptive Factors of the Academically Talented Woman," unpublished paper read before the American Personnel and Guidance Association, Boston, Massachusetts, April 19, 1963.

9. Lindgren, Henry C. and Richard L. Gilberg, "Interpreting Occupational Interest: The Relationship Between the Lee-Thorpe Occupational Interest Inventory and the Strong Vocational Interest Test for Men," California Journal of Educational Research, VI (1955), 15-21.

10. MacKinnon, Donald W., "The Nature and Nurture of Creative Talent," American Psychologist, XVII (1962), 484-495.

11. _____, "What Do We Mean by Talent?," in The Search for Talent--College Admissions, Princeton, New Jersey, Princeton College Entrance Examination Board, 1960, pp. 20-29.

12. McClelland, David C., "On the Psychodynamics of Creative Physical Scientists," in Contemporary Approaches to Creative Thinking, edited by Howard E. Gruber, New York, Atherton Press, 1962, pp. 141-174.

13. Myers, I. Briggs, Manual for Myers-Briggs Type Indicator, Princeton, New Jersey, Educational Testing Service, 1962.

14. Rogers, Carl R., "The Actualizing Tendency in Relation to 'Motives' and to Consciousness," in Nebraska Symposium on Motivation, edited by Marshall R. Jones, Lincoln, Nebraska, University of Nebraska Press, 1963.

15. Siegel, Sidney, Nonparametric Statistics for the Behavioral Sciences, New York, McGraw-Hill Book Company, Inc., 1956.

# CHAPTER IV

# SUMMARY, FINDINGS, CONCLUSIONS, RECOMMENDATIONS, AND IMPLICATIONS

## Summary

The basic concern of this study had to do with whether or not a group of academically able Grade XII male youth who had persisted in a five-year sequence of an accelerated mathematics/science curriculum could be differentiated on certain nonintellective dimensions from another group of equally able Grade XII males who had not persisted in this curriculum. These youth, completing their Grade XII years in ten senior-high schools of a large, metropolitan Southwestern public-school system, had been selected in 1958 as eligible for enrolling in the Grade VIII first year of the sequence. Eligibility for enrollment in the sequence was established on the bases of a minimal psychometric performance of at least two grade-placement equivalents above actual grade placement at the time of testing on standardized achievement tests, and an academic aptitude level of at least 120 IQ, plus nomination by teachers as students of consistent application and productivity in classroom work.

The original 1958 Grade VIII group consisted of 276 enrollees. During the second semester of the academic year 1962-1963, 227 of the original group were enrolled in Grade XII classes in the school district; and 49 students had moved from the district or were enrolled in private schools.

An examination of the literature relative to non-intellective characteristics of adult males who had been described as especially creative or productive in areas generally involving mathematics and the physical sciences indicated a number of noncognitive facets of functioning that served as a framework from which the hypotheses of this study were formulated. It was hypothesized that the persisting youth would tend to be more self-sufficient than the nonpersisting youth, that the Persistors would be motivated to achieve in terms of independence of thought and action more so than would the Nonpersistors; that Persistors would tend to be more introversive, intuitive, analytical, and judgmental than would Nonpersistors; and, finally, that Persistors would prefer those activities having to do with an involvement with objects and ideas rather than with people and commodities in business interactions. A further concern was whether or not performances of Persistors as measured by psychometric instruments used

in the IPAR studies would be elevated in the direction of the measured performances of the male creative/productives of the IPAR investigation.

To secure objective test data to be used in testing the hypotheses, the same or similar psychometric instruments used in the IPAR studies were employed with those students who were available for testing during a mid-semester period of the second semester of the academic year 1962-1963. Usable test data were obtained from the performances of 209 subjects (148 Persistors and 61 Nonpersistors) on the California Psychological Inventory (CPI), of 206 subjects (146 Persistors and 60 Nonpersistors) on the Myers-Briggs Type Indicator (MBTI) and the Occupational Interest Inventory (OII).

Additional data obtained three weeks after objective testing by means of semistructured interviews with representative Persistors and Nonpersistors were treated by means of abstracting from these materials composite descriptions of the Persistors and the Nonpersistors as each viewed his experiences in persisting or not persisting in the program.

## Findings

Hypothesis One that stated that Persistors would be more self-sufficient than would Nonpersistors was rejected.

The operationally defined self-sufficiency score combined scores from the CPI Scales Do, Cs, Sp, and Sa suggested that both groups were quite similar, and that scores were elevated above the mean for males in general and in the direction of the IPAR males.

Hypothesis Two stated that Persistors tend to be motivated to achieve in terms of independence more so than Nonpersistors. This hypothesis was accepted at a significance level of better than .001. Again the score elevation was in the direction of the IPAR group.

Hypothesis Three stated that Persistors would tend to prefer introversive, intuitive, thinking, and judging responses more so than would Nonpersistors. The Persistors did appear to prefer introversive responses more so than did the Nonpersistors as well as intuitive and judging modes of responding (significant at the .05 level or better); however, there was no significant difference between the two groups on the thinking-feeling dimension. The Persistors' responses were more like those of the IPAR research scientists, and the Nonpersistors' responses were suggestive of the architects and women mathematicians in the IPAR group.

Hypothesis Four stated that Persistors would indicate preference for activities in understanding and manipulating the physical environment more so than would the Nonpersistors

and that they would be less interested in those activities peculiar to the business world. This hypothesis was accepted at the .0001 level. The responses of Persistors would be interpreted by the OII authors as evidencing a major interest in the sciences field of the OII, and the Nonpersistors would be interpreted as evidencing a near rejection of the sciences field and indicating a major interest in the business field. Again the performances of the Persistors were more congruent with the indicated occupational preferences of the IPAR group than were those of the Nonpersistors.

Interview data were interpreted to indicate that the Persistor saw his experiences in the five-year sequence as congruent with his self-actualization tendency. He saw important others in his world reinforcing his generally positive reactions to the program; he seemed to value participation in the sequence as intrinsically worthwhile. The Nonpersistor found value in his having been selected as an eligible for the program in that it provided another external evidence of his being a highly capable student; however, he seemed to find that the expenditures of time and energies toward persisting in the program greater than he cared to make. He seemed to need to have additional reinforcements of his efforts at seeing himself as a person of value through social and

other noncognitively oriented student activities. He sensed that important others saw the program as offering possibilities for securing extrinsic rather than intrinsic rewards.

## Conclusions

The following conclusions may be drawn from the present study:

1. Academically able male youth who elect to continue in an accelerated mathematics/science sequence of high-school courses appear to evidence the characteristics of achievement motivation and preferences for reacting to their experiences much as do mature male productive/creatives.

2. Academically able male youth who persist and who do not persist in the accelerated program are more nearly like older males in terms of self-assurance, capacity for seeking and assuming status, and reacting effectively with the externals of their environment than are their age peers in high-school populations.

3. Academically able male youth who persist in a mathematics/sciences curriculum are quite likely to prefer to become aware of things intuitively through an indirect perception of deeper meanings and possibilities inherent in situations and things.

4. The persisting able youth is markedly more interested in involving himself in manipulating things and ideas than he is in interactions involving business pursuits.

## Recommendations

Recommendations for further study and possible experimentations in planning academic experiences for academically able male youth resulting from this study include:

1. A replication of this study with Grade VIII males who were completing the first year of the five-year mathematics/sciences sequence would assist in determining at what earlier age the differentiations found in this study might obtain.

2. Persisting youth should be followed through the baccalaureate degree level with attention paid to curricula pursued, relative constancy of declared major study areas, and continuance to graduate levels of study.

3. The utilization of an occupational interest inventory should be included in the psychometric battery used in selecting male youth for an accelerated high-school academic program.

4. Appraisal of nonintellective aspects of functioning among those high-school youth whose academic potential is at least minimal for mastering certain bodies of knowledge should be considered as basic in educational guidance and counseling.

5. Experimentation in studying classroom climates that would appear to assist academically able youth in achieving maximum creative potentials through nurture of intuitive responses should be pursued at both elementary and high-school levels.

## Implications

During the processes of designing this study, reviewing related literature, collecting the data, analyzing and reporting the findings, a great many impressions, ideas, tenuously held hypotheses, and "hunches" presented themselves. In the terminology of the Gestaltist there was something of a clamoring of "ground" elements to become "figure" elements long before the formalized study procedures inherent in the preparation of a dissertation would permit. The presentation of these inferential leaps as implications is done with full knowledge that the data reported in this study do not support them. As the study was pursued it appeared that these speculative inferences centered about (1) the secondary-school curriculum, (2) the teaching personnel for academically able youth, and (3) the relationships of guidance personnel and these youth.

## Implications for Secondary-School Curricula

This study is seen as reinforcing the research that holds that acceleration is quite desirable as a principle for the design and organization of secondary-school curricula for academically able youth. Secondary-school faculty members observed and interviewed in the collecting of data for this study saw an accelerated curriculum as providing more structure for them as teachers of academically able youth than would be provided by a curriculum that was built on the enrichment principle.

An accelerated curriculum for academically able youth who are not finding intellectual pursuits in the mathematics/sciences areas vehicles for self-actualization should be offered in those areas usually described as the humanities. It is believed that this curricular emphasis would have been more rewarding to some of the nonpersisting subjects of this study. In view of the high rate of nonpersisting among the female youth of the studied schools, it would seem that the humanities emphasis in an organizational framework of acceleration would be quite desirable.

## Implications for Teacher Selection and Utilization

The importance of a teacher who could serve as an ego model as an educated person was amplified in the interview

data obtained from the subjects in this study. That there were limited numbers of professional staff members in the mathematics/sciences areas who did serve as ego models was an inference made during the pursuit of the study. It is believed that the availability of personnel who have the intellectual, cultural, and psychological qualities subsumed by these able youth as representative of what "an educated person should be" might be limited in the academic specialties of mathematics and science at the secondary level. This would suggest that it would be important to entertain the value of selecting a teacher for these youth who could serve as an ego model whose teaching specialty might not be in the mathematics/sciences area, but who could coordinate a program that utilized automated teaching, audio-visual media, and professional persons from the community's noncertificated, as well as individualized study procedures. This would attempt to cope with the possible limited supply of ego models among teachers of mathematics and sciences at the high-school level. These youth do not demand that the teacher know more than they know, but they do seem to have high regard for an intelligent person who knows how to seek information and to evaluate it when it is obtained. This ego model would hopefully be one who welcomes the opportunity to explore with able youth "really important things."

## Implications for Guidance Personnel

This study seems to reinforce the principle of self-actualization as a process that has its origins in the very early interpretations of the individual of himself as an entity, and continues as an important determinant of behavior. That guidance counselors and other pupil-serving adults understand and seek to function in the framework suggested by the dynamisms of this principle in planning and implementing the guidance function of the secondary school is suggested as particularly important. Both persisting and nonpersisting students seemed to react to curricula, school procedures, peers, and professional staff members largely in terms of how these externals--as perceived by the individual--served to shape the self-actualization of the individual.

It appears that these youth were particularly resistive to the efforts of those adults who saw them as needing to become more involved in the peer group activities that involve usually accepted modes of social interaction. These youth reacted negatively toward being seen in terms of the stereotype of the "typical American teen-ager." Counselors and youth-activities directors will probably find efforts to effect a "well-rounded, well-adjusted" response pattern from these youth as very unrewarding.

The basic impression relative to the subjects of this study is that they reflected the interactions of those who have quite adequate somatic potentials for perceiving the supportive reactions of persons--familial, school, or community--who value intellectual pursuits as inherently valuable and as particularly suitable as a vehicle for self-actualization. Techniques for arousing or implementing this potential are seen as particularly unimportant in the absence of psychologically supporting persons and climates.

# BIBLIOGRAPHY

## Books


Conant, James B., The American High School Today, New York, McGraw-Hill Book Company, Inc., 1959.

Eiduson, Bernice T., Scientists, Their Psychological World, New York, Basic Books, Inc., 1962.

Findley, Warren G., "The Impact of Applied Problems on Educational Research," in Frank W. Banghart (ed.), First Annual Phi Delta Kappa Symposium on Educational Research, Bloomington, Indiana, Phi Delta Kappa, 1960.

Gruber, H. E., Glenn Terrell, and M. Wertheimer, Contemporary Approaches to Creative Thinking, New York, Prentice-Hall, Inc., 1962.

Kough, Jack, Practical Programs for the Gifted, Chicago, Science Research Associates, Inc., 1960.

McClelland, David C., "On the Psychodynamics of Creative Physical Scientists," in Howard E. Gruber (ed.), Contemporary Approaches to Creative Thinking, New York, Atherton Press, 1962.

MacKinnon, Donald W., "What Do We Mean by Talent?," in The Search for Talent--College Admissions, Number 7, Princeton, New Jersey, Princeton College Entrance Examination Board, 1960.

Miles, Catherine Cox, "Gifted Children," in Manual of Child Psychology, edited by Leonard Carmichael, New York, John Wiley and Sons, Inc., 1954.

Roe, A., The Making of a Scientist, New York, Dodd, Mead and Company, 1953.

_____, The Psychology of Occupations, New York, John Wiley and Sons, Inc., 1958.

Rogers, Carl R., "The Actualizing Tendency in Relation to 'Motives' and to Consciousness," in Nebraska Symposium on Motivation, edited by Marshall R. Jones, Lincoln, University of Nebraska Press, 1963.

Siegel, Sidney, Nonparametric Statistics for the Behavioral Sciences, New York, McGraw-Hill Book Company, Inc., 1956.

Stein, M., A. J. Vidick, and D. M. White, Identity and Anxiety, Glencoe, Illinois, The Free Press, 1960.

Stricker, Laurence J. and John Ross, A Description and Evaluation of the Myers-Briggs Type Indicator, Princeton, New Jersey, Educational Testing Service, 1962.

Terman, Lewis M., The Promise of Youth, Genetic Studies of Genius, Volume III, Stanford, California, Stanford University Press, 1930.

_____, et al., Mental and Physical Traits of a Thousand Gifted Children, Genetic Studies of Genius, Volume I, Stanford, California, Stanford University Press, 1925.

_____ and Melita H. Oden, The Gifted Child Grows Up, Genetic Studies of Genius, Volume IV, Stanford, California, Stanford University Press, 1947.

_____, The Gifted Group at Mid-Life, Genetic Studies of Genius, Volume V, Stanford, California, Stanford University Press, 1959.

## Articles

Barron, Frank, "Personality Style and Perceptual Choice," Journal of Personality, XX (1952), 385-401.

Capretta, Patrick J., Reginald I. Jones, Laurence Siegel, and Lila C. Siegel, "Some Noncognitive Characteristics of Honors Program Candidates," Journal of Educational Psychology, LIV (October, 1963), 268-276.

Cooley, W. W., "Predicting Choice of a Career in Scientific Research," Personnel and Guidance Journal, XLII (1963), 21-28.

Dunn, Frances E., "Interest Patterns of College Majors," Journal of College Student Personnel, IX (December, 1962), 79-86.

Fliegler, Louis A. and Charles E. Bish, "The Gifted and Talented," Review of Educational Research, XXIX (1959), 408-450.

Holland, John L., "Creative and Academic Performances Among Talented Adolescents," Journal of Educational Psychology, LII (1961), 136-147.

_____ and A. W. Astin, "The Prediction of the Academic, Artistic, Scientific, and Social Achievement of Undergraduates of Superior Scholastic Aptitude," Journal of Educational Psychology, LIII (1962), 132-143.

Kubie, L. S., "Problems of the Scientific Career," American Scientist, XLI (1953), 596-613.

_____, "Some Unsolved Problems of the Scientific Career," American Scientist, XLII (1954), 104-112.

Lessinger, Leon M. and Ruth A. Martinson, "The Use of the California Psychological Inventory with Gifted Pupils," Personnel and Guidance Journal, XXXIX (1961), 572-575.

Lindgren, Henry C. and Richard L. Gilberg, "Interpicting Occupational Interest: The Relationship Between the Lee-Thorpe Occupational Interest Inventory and the Strong Vocational Interest Test for Men," California Journal of Educational Research, VI (1955), 15-21.

MacKinnon, Donald W., "The Nature and Nurture of Creative Talent," American Psychologist, XVII (1962), 484-495.

Newland, T. Ernest, "The Gifted," Review of Educational Research, XXIII (1953), 417-431.

Roe, A., "Group Rorschachs of Physical Scientists," Journal of Projective Techniques, XIV (1950), 385-398.

_____, "A Psychological Study of Physical Scientists," Genetic Psychology, XLIII (1951), 121-239.

_____, "A Study of Imagery in Research Scientists," Journal of Personality, XIX (1951), 459-470.

Terman, Lewis M., "Scientists and Nonscientists in a Group of 800 Gifted Men," Psychological Monographs, LXVIII (1954), 44-52.

Reports

The American Assembly, Goals for Americans, Report of the President's Commission on National Goals, New York, Prentice-Hall, Inc., 1960.

California State Department of Education, Educational Programs for Gifted Pupils, A Report to the California Legislature Prepared Pursuant to Section 2 of Chapter 2385, Statutes of 1957, Sacramento, California State Department of Education, 1961.

Golden Anniversary White House Conference on Children and Youth, Conference Proceedings, Washington, D. C., Golden White House Conference on Children and Youth, Inc., 1962.

Institute of Personality Assessment and Research, The Creative Person, Proceedings, Berkeley, University of California, 1961.

National Education Association, The Identification and Education of the Academically Talented Student in the American Secondary School, Conference Report, Washington, D. C., National Education Association, 1958.

Publications of Learned Organizations

Education Policies Commission, Higher Education in a Decade of Decision, Washington, D. C., National Education Association, 1957.

National Education Association, An Annotated Bibliography on the Academically Talented, Washington, D. C., National Education Association, 1961.

National Science Foundation, Scientific Manpower 1960, Papers of the Ninth Conference on Scientific Manpower, Symposium on Sociology and Psychology of Scientists, Washington, D. C., Government Printing Office, 1961.

## Test Manuals

Gough, Harrison G., California Psychological Inventory Manual, Palo Alto, California, Consulting Psychologists Press, Inc., 1957.

Lee, Edwin A. and Louis P. Thorpe, Manual--California Occupational Interest Inventory Manual--Advanced, Monterey, California Test Bureau, 1956.

Myers, I. Briggs, Manual for Myers-Briggs Type Indicator, Princeton, New Jersey, Educational Testing Service, 1962.

## Unpublished Materials

Berkner, L. V., "Science and Education," unpublished lectures read by the Administrative Conference, Dallas Independent School District, Dallas, Texas, August 17, 1961.

Leonard, Louise C., "Self-Descriptive Factors of the Academically Talented Woman," unpublished paper read before the American Personnel and Guidance Association, Boston, Massachusetts, April 19, 1963.