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A STUDY OF MASCULINITY-FEMININITY OF
MALE FRESHMEN ENGINEERING STUDENTS

Thesis Approved:

Henry K. Brobst

Thesis Adviser

Mr. Chauncy

A. L. Reed

Wm. T. Smith

Robert MacLean

Dean of the Graduate School

329826

PREFACE

I am indebted to many students, teachers, and colleagues for their direct or indirect contributions to the completion of this study. The largest debt is due to the members of my committee, Dr. Harry K. Brobst, Dr. S. L. Reed, Dr. Ida T. Smith, and Dr. M. R. Chauncey. Their patient guidance and helpful critical suggestions made this study possible. A special debt is acknowledged to Dr. Harry K. Brobst, chairman of the committee, for his understanding and guidance throughout the entire study. I would also like to acknowledge two people who had no direct contributions toward the study but who offered much inspiration. They are Dr. J. Andrew Holley, Dean, School of Education, Oklahoma Agricultural and Mechanical College, and Dr. H. C. Witherington, former Dean of the College of Arts and Sciences, Cumberland University, Lebanon, Tennessee. I would like to express my appreciation to my typist and friend, Miss Elizabeth J. Kerby. Lastly, my very deepest appreciation is for my wife, Audrey Elliott Roye, for her inspiration and tolerance during the writing of this paper.

STRATTON RESEARCHMENT
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CHAPTER I

INTRODUCTION

The fact that there is an anatomical difference between sexes of the human race has led to universal interest in the question of sex differences in personality and temperament. These differences are recognized by the anthropologist, sociologist, and psychologist. There have been in the past and still are many theories regarding the cause of differences between the sexes. These theories range from the biological or hereditary determination to the environmentally conditioned determination of sex differences. A biological or hereditary determination of sex differences in psychological traits would imply the existence of a universal pattern of male and female behavior. On the other hand, if such differences are environmentally conditioned, the traditional behavioristic characteristics of each sex will vary from one culture to another, and, in fact, will vary among members of the same sex.

Whatever the cause, these theories and the resulting social customs are among the most potent of all forces that operate in shaping human behavior. In every culture, and among all levels of social classes, these factors help to determine the accepted patterns of family life, of education,

of industry, of recreational activity, of political organization, and of all phases of human activity. A recent survey by Kinsey¹ and his co-workers has given a new understanding of the range of variation in human sex behavior and the frequency of the so-called deviant forms of sexuality.

Anthropologists sometimes have found that male and female patterns of behavior are virtually non-overlapping and arbitrarily enforced; while, on the other hand, they have shown also that the standard patterns of male and female behavior, in some instances, may be nearly a complete reversal of the roles commonly prevalent in other societies. Nearly always, however, there is a recognized dichotomy which seems to be based upon the tacit assumption that men and women, by the mere fact of their sex, differ more than they resemble, and that the members of either sex considered alone make up a population which, biologically and psychologically, is relatively homogeneous. This assumption, of course, is questioned by professional persons who deal with human nature, especially medical doctors, psychiatrists, and psychologists.

There are few, if any, dichotomies in humans. Even in the biological sex difference there is not a clear cut dichotomy; for example, hermaphroditism in humans. It seems

¹A. C. Kinsey, W. B. Pomeroy, and C. E. Martin, Sexual Behavior in the Human Male (Philadelphia: Saunders, 1948).

impossible, therefore, to explain masculine and feminine behavior by consideration only of the biological factors involved. The psychiatrist and clinical psychologist find in their practices many men and women who, because of biological or psychological factors, have had major difficulties in adjusting to the sexual patterns society has assigned to them. It is well established that there are both masculine men and women and that there are both feminine women and men.

Those concerned have established definitely that each sex has both "male" and "female" endocrine elements with the balance between them varying from time to time in any one person. That this degree of masculinity-femininity will vary from the slightly effeminate male or virile female to the homosexual is evident to the psychiatrists and psychologists. Also evident is the fact that homosexuality is a social problem.

Kraines² states that homosexuality may be divided into three groups with both passive and active homosexuals in each group. First, there is the social group. Here homosexual contacts occur among large groups of men or women who, because of circumstances, have no association with the opposite sex for long periods of time.

Next is the constitutional group wherein there are many physical characteristics of the opposite sex. Thus, a

²Samuel H. Kraines, The Therapy of the Neuroses and Psychoses (Philadelphia: Lea and Febiger, 1948), p. 119.

number of men have a very slight growth of hair upon the chin or chest, a high pitched voice, long eyelashes, a rounded figure, and so forth. The reverse is true in regard to the female. This group is not in the majority.

The last of the classifications is the psychosexual homosexuality group. Here there has been sex trauma of sufficient intensity to cause the person either to hate members of the opposite sex or to like abnormally members of the same sex.

These extreme deviates are rather rare. It was estimated by Rosanoff³ that about 5 per cent of each sex are potentially or latently homosexual, but only about 1 per cent are overtly homosexual. However, in a more recent survey, Kinsey⁴ found that the rate was much higher. It was reported that 37 per cent of the total male population studied had some overt homosexual experience between adolescence and old age. Among males who had remained single until age 35, this incidence rose to 50 per cent. The corresponding figures for the female population studied were approximately 25 per cent and 33 per cent.

Although homosexuality is a social problem, it does not constitute the main problem for vocational counselors and school psychologists. Vocational counselors and school

³Aaron Rosanoff, Manual of Psychiatry and Mental Hygiene (New York: John Wiley and Sons, 1938).

⁴Kinsey, Sexual Behavior in the Human Male.

psychologists must be aware of homosexuality and must know where to advise an individual to go for professional help and guidance. However, the main problem that confronts the counselor stems from the varying degrees of masculinity and femininity among normal men and women. More research and information is needed in order to advise properly these masculine females and feminine males as to the types of training and future occupations they should seek.

Much research and many words have been expended in an effort to determine if certain patterns of abilities and interests and personality traits characterize the different sexes and workers in different types of occupations. A study by Dvorak⁵ produced evidence showing that distinctive interest patterns did exist between members of the same sex doing different jobs. However, little research has been done on the specific problem of masculinity-femininity in just one sex, male or female.

Hilgard sums up the current thinking concerning this problem as follows:

While neither girls nor boys can be said to show general superiority on tests of general ability, they do score unlike on many special tests. They differ, for example, on tests of verbal and numerical abilities.

1. Girls commonly score higher than boys on tests stressing verbal abilities, including verbal memory. Girls learn to talk earlier than boys, and they never seem to lose this initial advantage.

⁵Beatrice Jeanne Dvorak, Differential Occupational Ability Patterns (Minneapolis: University of Minnesota Press, 1935).

2. Boys commonly do better than girls on tests of arithmetical and other kinds of mathematical abilities. Unlike the girls' superiority in language, the boys' superiority with numbers does not appear early in life. Girls count (recite numerals) better than boys on the early tests of the Stanford-Binet; the boys' arithmetical reasoning abilities as tested show up as superior to girls at age eleven and thereafter. Girls do as well as boys in arithmetic in the early school grades, but boys gain progressively through the elementary school years, especially in arithmetical reasoning as opposed to mechanical computation.

All such sex differences are small, and there is much overlap; that is, on all tests of achievement and ability many girls can be found to exceed the average scoring level of the boys, and many boys can be found to exceed the average scoring level of the girls.⁶

Purpose of the Study

This study has been undertaken with two purposes in mind. First, to ascertain the inter-relationships, if any, that may exist between males predominantly masculine in interest and males predominantly feminine in interest in performance on certain interest, aptitude, and personality tests.

The specific hypotheses to be tested are:

1. A difference in verbal comprehension exists between freshmen engineering students who are predominantly masculine in interest and those predominantly feminine in interest.

⁶ Ernest R. Hilgard, Introduction to Psychology (New York: Harcourt, Brace and Company, 1953), pp. 90-92.

2. A difference in general reasoning exists between freshmen engineering students who are predominantly masculine in interest and those predominantly feminine in interest.
3. A difference in numerical operations exists between freshmen engineering students who are predominantly masculine in interest and those predominantly feminine in interest.
4. A difference in perceptual speed exists between freshmen engineering students who are predominantly masculine in interest and those predominantly feminine in interest.
5. A difference in spatial orientation exists between freshmen engineering students who are predominantly masculine in interest and those predominantly feminine in interest.
6. A difference in spatial visualization exists between freshmen engineering students who are predominantly masculine in interest and those predominantly feminine in interest.
7. A difference in mechanical knowledge exists between freshmen engineering students who are predominantly masculine in interest and those predominantly feminine in interest.
8. A difference in personality adjustment exists between freshmen engineering students who are

predominantly masculine in interest and those predominantly feminine in interest.

9. A difference in scholastic aptitude exists between freshmen engineering students who are predominantly masculine in interest and those predominantly feminine in interest.
10. A difference in interest pattern exists between freshmen engineering students who are predominantly masculine in interest and those predominantly feminine in interest.
11. A difference in the number of students who finish the engineering program exists between those students who are predominantly masculine in interest and those predominantly feminine in interest.
12. A difference in the number of students who finish any four year college program exists between those predominantly masculine in interest and those predominantly feminine in interest.

The second purpose is to ascertain inter-relationships, if any, that may exist between those students who finish an engineering program, those students who finish some other four year college program, and those students who drop out of college.

The specific hypotheses to be tested are:

1. A difference in verbal comprehension exists between those students who finish an engineering program,

- those who finish some other four year college program, and those who drop out of college.
2. A difference in general reasoning exists between those students who finish an engineering program, those who finish some other four year college program, and those who drop out of college.
 3. A difference in numerical operations exists between those students who finish an engineering program, those who finish some other four year college program, and those who drop out of college.
 4. A difference in perceptual speed exists between those students who finish an engineering program, those who finish some other four year college program, and those who drop out of college.
 5. A difference in spatial orientation exists between those students who finish an engineering program, those who finish some other four year college program, and those who drop out of college.
 6. A difference in spatial visualization exists between those students who finish an engineering program, those who finish some other four year college program, and those who drop out of college.
 7. A difference in mechanical knowledge exists between those students who finish an engineering program, those who finish some other four year college program, and those who drop out of college.

8. A difference in personality adjustment exists between those students who finish an engineering program, those who finish some other four year college program, and those who drop out of college.
9. A difference in scholastic aptitude exists between those students who finish an engineering program, those who finish some other four year college program, and those who drop out of college.
10. A difference in interest pattern exists between those students who finish an engineering program, those who finish some other four year college program, and those who drop out of college.

Scope and Design of the Study

This study is limited to male students who enrolled in the freshman year of engineering. The subjects were drawn at random from the male freshman engineering students for the year 1949 at Oklahoma Agricultural and Mechanical College. Data were obtained from the files of the Bureau of Tests and Measurements. Each subject had taken the following tests:

1. American Council on Education Psychological Examination for College Students.⁷

⁷The American Council on Education Psychological Examination for College Students will be referred to hereafter in this study as ACE.

2. Guilford-Zimmerman Aptitude Survey.
3. Bell Adjustment Inventory.
4. Minnesota Multiphasic Personality Inventory.⁸
5. Kuder Preference Record.

The raw data were statistically treated to obtain the mean, the standard deviation, and the standard error of the mean. For each group compared, the difference between means, the standard error of the difference, and t-value were computed. From these statistics the comparisons were made.

In this chapter the purpose and design of the study has been presented briefly. Succeeding chapters will present the experimental design, a detailed description of materials used, the procedure, the findings, and the statistical treatment of the data. These later chapters will include, also, the findings and interpretations accompanied by the tables and graphs developed from the compiled data.

⁸ The Minnesota Multiphasic Personality Inventory will be referred to hereafter in this study as MMPI.

CHAPTER II

SURVEY OF THE LITERATURE

Guidance in all areas of human activity is needed by both young and old. In the administration of guidance, all aspects of human personality must necessarily be taken into consideration. Ability once was considered the only factor in choosing a training program or an occupation. Later, educators, and other concerned persons, realized that ability alone was not a satisfactory method of choosing an occupation. Interest as a factor entered into the problem of guidance. Today, individuals concerned with a guidance program, especially those in vocational guidance, realize that the general factor of personality adjustment must also be taken into account when an individual decides upon a training program which leads to future employment.

There is voluminous literature regarding ability and interest and the relationship that both have in a guidance program, even though much needs to be added. Many studies and experiments on ability and interest are a matter of record in the literature. On the other hand, until just recently there has been little research regarding personality and its relation to interests and abilities in selection of an occupational goal or training program. Some studies

explain that there are differences and similarities between the sexes in ability, interest, and personality. However, very few studies have been directed toward the specific problem of masculinity-femininity of either sex.

This survey of the literature will be concerned with studies of differences between the sexes on interest, ability, and personality. Some studies that deal with the problem of differences in masculinity in just one sex will be presented, also.

Masculinity and femininity can and should be defined in terms of social concepts. Masculinity is the tendency for all people, male or female, to behave or answer items on a test in the socially conceived masculine way. Femininity is the tendency for all people, male or female, to behave or answer items on a test in the socially conceived feminine way.

When discussing men and women, it has always been customary to emphasize differences between them. However, the fact remains that the two sexes are quite similar in most psychological respects. This similarity holds true whether the question under consideration is in regard to interests, abilities, or personality. Strong, in his discussion of differences in interest patterns of men and women, states that "they are more similar than dissimilar."¹

¹Edward K. Strong, Jr., Vocational Interests of Men and Women (Stanford, California: Stanford University Press, 1943), p. 226.

Gray used Jung's psychological types as the criterion and came to these conclusions in his study of differences between males and females:

As to introversion versus extroversion, no significant differences found between sexes. As to sensation versus intuition, females more often intuitive than males. As to thinking versus valuing, the females were significantly more often feelers than males. The traditional view of femininity with regard to intuition and feeling-valuing is supported by the present evidence.²

Still along the line of differences between the sexes in interests and personality, Cottle and Powell found that high feminine scorers among males exhibit greater objective sensitivity to their environment and an increasing warmth of feeling for others. Also, high feminine scorers among males are interested in people and language, like reading and music, and dislike activities involving manipulating material objects. In other words, there are few differences between males predominantly feminine in interest and average females in interest patterns.³

Most evidence points to little differences in mental abilities between the sexes. Using the Chicago Tests of Primary Mental Abilities, Hobson found males exceeded females significantly in Spatial Orientation; females

²Horace Gray, "Jung's Psychological Types in Men and Women," Stanford Medical Bulletin, 6 (1948), pp. 29-36.

³William C. Cottle and Jackson O. Powell, "Relationship of Mean Scores on the Strong, Kuder, and Bell Inventories with the MMPI M-F Scale as the Criterion," Trans. Kansas Academy of Science, 1949, No. 52, pp. 396-98.

exceeded males significantly in Word-Fluency, Inductive Reasoning, and Visual Memory. No other differences were significant. Hobson concluded also that there were no significant sex differences in variability.⁴

In another study which used Thurstone's Primary Mental Abilities Test, Havighurst and Bruse found that girls excelled boys in Number, Word Fluency, Reasoning, and Memory tests while boys excelled girls in Space tests. No reliable difference was found in Verbal Comprehension.⁵

Thiede found that among university juniors males exceeded females on the total score of the ACE. This difference was significant at the 5 per cent level of confidence.⁶

The belief that males and females are more similar than dissimilar seems to hold true for attitudes as well as for mental abilities and interests. For example, Skaggs, investigating moral attitudes of college students of both sexes, concluded that, in general, the views of the two groups were remarkably similar. Skaggs estimated that sex differences can be found in roughly about 20 per cent of comparisons and

⁴James R. Hobson, "Sex Differences in Primary Mental Abilities," Journal of Educational Research, 41 (1947), pp. 126-32.

⁵Robert J. Havighurst and Fay H. Bruse, "Sex Differences in Mental Ability," Journal of Educational Psychology, 38 (1947), pp. 241-47.

⁶Wilson Bickford Thiede, "Some Characteristics of Juniors Enrolled in Selected Curricula at the University of Wisconsin," Journal of Experimental Education, 19 (1950), pp. 1-62.

that no sex differences can be found in about 80 per cent of comparisons.⁷

Newcomb and Svehla⁸ reported correlations of .76, .43, and .58 for husbands and wives on three Thurstone attitude scales--church, war, and communism. Terman⁹ listed the rank-order for husbands and for wives of grievances they had respecting their spouses; the two lists correlated at .76. Stagner¹⁰ reported correlations of .57 for reactions to a set of stereotypes and .61 for responses to ten opinions.

When psychologists and sociologists more fully realize that the interests and attitudes of the two sexes are far more similar than dissimilar, it is believed that writers will not endeavor so much to find explanations of why husbands and wives agree as often as they do.

In general, there seems to be little change in an individual's psychological make-up throughout his life span. Even masculinity-femininity scores change comparatively little with age. Strong¹¹ brought out that an individual's

⁷E. B. Skaggs, "Sex Differences in Moral Attitudes," Journal of Social Psychology, 11 (1940), pp. 3-10.

⁸T. Newcomb and G. Svehla, "Intra-family Relationship in Attitude," Sociometry, 1 (1940), pp. 180-205.

⁹L. M. Terman, Psychological Factors in Marital Happiness, (New York: McGraw-Hill Book Company, 1938), p. 105.

¹⁰Ross Stagner, "Marital Similarity in Socio-economic Attitudes," Journal of Applied Psychology, 22 (1938), pp. 340-46.

¹¹Strong, Vocational Interests of Men and Women, p. 226.

masculinity-femininity index was fairly well established as early as thirteen or fourteen years of age. However, most data reveals a slight increase with age for both sexes toward femininity.

Some investigations have been conducted regarding the degree of masculinity-femininity of various social and occupational groups. Terman and Miles¹², in their study of masculinity-femininity, recorded information concerning the masculinity-femininity of various groups. For example, the most socially masculine males were male college athletes, engineers, and architects. Moderately socially masculine males were farmers, policemen, firemen, and men in Who's Who. Less socially masculine males were journalists, artists, clergymen, and men over sixty.

For females, Terman and Miles found the most socially feminine females to be domestic employees, stenographers, dressmakers and hairdressers, and women over sixty. Moderately socially feminine females were twenty year old women, teachers, and nurses. Less socially feminine females were women in Who's Who, women with Ph.D.'s and M.D.'s, and superior women athletes.

In recent years, much research in the area of interest personality patterns for various occupational groups and

¹²Lewis M. Terman and Catharine Cox Miles, Sex and Personality, (New York: McGraw-Hill Book Company, 1936), pp. 160-181.

students in various curricular fields in college has been reported. In 1935, Dodge¹³, working with unemployed men and women, used the Bernreuter Personality Inventory in a battery of tests. He chose thirteen occupational groups, composed of persons who were unemployed but who had had at least two years of successful employment in their special fields. The occupational groups included engineers, draftsmen, high school teachers, elementary school teachers, secretaries, stenographers (women), accountants, traveling salesmen, retail saleswomen, retail salesmen, bookkeepers (men), bookkeepers (women), and office workers. Although very reliable differences were found between abilities of occupational groups, individual variation within a group makes profiles of little value for individual counseling.

Patterns on both ability and personality tests for accountants and bookkeepers were closely alike in their general outline. Engineers and draftsmen were somewhat similar in ability and personality; also, patterns for traveling salesmen and retail salesmen were similar in form. Even high school and elementary teachers had profiles which were similar. There tended to be similar ability and personality patterns for workers in a given occupation without

¹³Arthur Farwell Dodge, Occupational Ability Patterns. (New York: Teachers College, Columbia University Contribution to Education, N. 658, 1935), pp. 1-97.

regard to sex.¹⁴ Dodge concluded that certain patterns that were derived from groups in similar occupations, tended to be similar, while certain patterns derived from groups of individuals from unlike occupations tended to be dissimilar. Patterns of individuals within groups showed very little resemblance; consequently, Dodge suggested that patterns should be based on minimum scores found to accompany certain degrees of success rather than median and average scores.¹⁵

Interest tests and personality tests such as the Kuder Preference Record and the MMPI have been used extensively during the past few years. A number of studies tend to shed some light on the relationship of interests and personality traits to various occupational and college groups.

Verniaud¹⁶ gave the MMPI to ninety-seven women in three contrasting occupations. The subjects were forty clerks, twenty-seven department store workers, and thirty optical workers. Saleswomen were the most masculine group; however, all three groups were above the mean T score on the Masculinity and Hypomania scales. Optical workers showed definite differentiation of the Hypomania and Psychasthenia scales. These occupational differences in personality,

¹⁴Dodge, Occupational Ability Patterns, p. 45.

¹⁵Ibid., p. 74.

¹⁶Willie Maude Verniaud, "Occupational Differences in the MMPI," Journal of Applied Psychology, 30 (1946), pp. 604-13.

although small, are significant and measurable. Verniaud concluded that "there are group differences in the personality of successful workers corresponding to gross differences in job requirements and some may be identified by the MMPI."¹⁷

Michaelis and Tyler expressed the belief that the MMPI might be useful as one of the instruments in the selection of students for certain curricula in college.¹⁸

Blum¹⁹ made a study of one-hundred and twenty-five male students, drawn equally from the five following fields of training: the schools of Education, Law, Journalism, Medicine, and Engineering. Personal data were gathered by means of a questionnaire, the MMPI, and the Strong Vocational Interest Blank. The greatest differences between the five groups of professional students were in vocational and non-vocational interest tendencies, rather than in personality traits. All the personality profiles were fairly level, and any differences were not statistically significant. The slight correlation found between the personality traits and interest supported previous findings to the effect "that in

¹⁷Ibid., p. 612.

¹⁸J. U. Michaelis and F. J. Tyler, "MMPI and Student Teaching," Journal of Applied Psychology, 35 (1951), pp. 122-124.

¹⁹Lawrence Philip Blum, "A Comparative Study of Students Preparing for Five Selected Professions Including Teaching," Journal of Experimental Education, 16 (1947), pp. 31-65.

general there is little in common between scores on interest inventories and those of personality."²⁰

Cook²¹ concluded that on a test that measures masculinity-femininity an individual who scores high in femininity will, also, score low in mechanical ability. Hake²², in her study of interests scores and subject grades, came to the conclusion that interests, as measured by the Kuder, are a relatively minor factor in predicting college achievement.

There appears to be evidence that differences, however slight they may be, exist between the sexes. Moreover, there is evidence to show that there are differences between members of the same sex in interests, abilities, and personality patterns. Terman and Miles summarized the difference between males and females as follows:

It is obvious that from whatever point we have started, whether from the knowledge shown by the sexes or from their associations or their likes and dislikes for people, vocations, pastimes, books, or objects of travel; or whether we have explored directly or deviously their emotions, tastes, opinions, and inner experiences, we have found ourselves arriving at much the same conclusions--all our ways have led to Rome. But the final scene has two aspects--two sides of the same picture--one showing differences in the direction of emotions and impulses.

²⁰ Ibid., p. 65.

²¹ Ellsworth B. Cook, "A Factor-analysis of MMPI and Aptitude Test Data," Journal of Applied Psychology, 34 (1950), pp. 260-66.

²² Dorothy Terry Hake, "Predicting Subject Grades of Liberal Arts Freshmen with Kuder Preference Record," Journal of Applied Psychology, 33 (1949), 553-58.

From whatever angle we have examined them the males included in the standardization groups evinced a distinctive interest in exploit and adventure, in outdoor and physically strenuous occupations, in machinery and tools, in science, physical phenomena, and inventions; and, from rather occasional evidence, in business and commerce. On the other hand, the females of our groups have evinced a distinctive interest in domestic affairs and in aesthetic objects and occupations, and occupations more directly ministrative, particularly to the young, the helpless, the distressed. Supporting and supplementing these are the more subjective differences--those in emotional disposition and direction. The males directly or indirectly manifest the greater self-assertion and aggressiveness; they express more hardihood and fearlessness, and more roughness of manners, language and sentiments. The females express themselves as more compassionate and sympathetic, more timid, more fastidious and aesthetically sensitive, more emotional in general (or at least more expressive of the four emotions considered), severer moralists, yet admit in themselves more weaknesses in emotional control and (less noticeably) in physique.

But we must define some of our terms more precisely, for instance, "aggressiveness" and "self-assertion." The evidence is for initiative, enterprise, vigorous activity, outdoor adventure; "aggressiveness" need not imply selfishness or tyranny or unfair attack. The compassion and sympathy of the female, again, appears from the evidence personal rather than abstract, less a principled humanitarianism than an active sympathy for palpable misfortune or distress. In disgust, in aesthetic judgment, and in moral censure, the evidence is rather for the influence of fashion and of feeling than of principle or reason. Our evidence need not imply the possession of a "truer" taste or a more discerning conscience.²³

²³ Ferman and Miles, Sex and Personality, pp. 447-48.

CHAPTER III

DESCRIPTION OF MATERIALS USED AND EXPERIMENTAL DESIGN

A survey of the literature indicates that interest and personality patterns tend to characterize people not only in certain industries and vocations, but also in particular curricular fields of higher education. There is some indication that different patterns exist between males and females, and there is some evidence that differences in personality, interest, and ability patterns exist between males predominantly masculine in interest and males predominantly feminine in interest.

Many preconceived social concepts exist regarding the temperament of individuals who are predominantly masculine in interest and those predominantly feminine in interest, regardless of sex. Are there significant personality, interest, and ability differences for those males predominantly masculine in interest and those predominantly feminine in interest? If there are differences, do they coincide with those socially popular concepts believed to exist?

This investigation attempts to study these aspects of the problem as related to the high and low masculine interest of males. In what areas, if any, are there significant

differences in interest patterns as measured by the Kuder Preference Record of a group of males with a high masculine interest and a group of similar males with a low masculine interest? In what areas, if any, are there significant differences in personality patterns as measured by the MMPI and the Bell Adjustment Inventory? In what areas, if any, are there significant differences in ability and aptitude as measured by the ACE and the Guilford-Zimmerman Aptitude Survey?

Furthermore, this study seeks to determine the inter-relationship between interest, personality, and ability that may exist between male students who began their college program in engineering and finished engineering, those students who began their college program in engineering but changed to and finished some other college program, and those students who began their college program in engineering but then dropped out of college.

If differences in interest, personality, and ability patterns are found to be significant, such differences might prove of value when used in conjunction with other techniques as an aid in educational and vocational guidance.

The remaining part of this chapter will present a description of various psychological tests used in this study, and an outline of the procedure used.

Kuder Preference Record¹

The Kuder Preference Record, Vocational Form B, was used for measuring the interests of experimental groups in this study. This instrument attempts to identify certain general activity patterns which are psychologically meaningful. The Kuder is a systematic approach to the problem of discovering the person's real interests and enabling him to prepare for the type of work which is going to bring him maximum satisfaction. Scores obtained enable the counselor to call the person's attention to such areas of work and, possibly, to indicate types of work which may have not been considered previously.

Some of the specific uses to which this test may be put are as follows:

1. To call attention to vocations which may not be familiar to the student, but which include activities for which he has expressed a preference. These interests are, of course, no substitutes for ability, but they may furnish the starting point for further explorations.
2. To determine whether a person's occupational choice is in harmony with the things he usually prefers to do. Occasionally an occupational choice is made

¹G. Fredric Kuder, Examiner's Manual (Chicago: Science Research Association, 1947).

because of a superficial motivation, such as admiration for an individual in such work or because it is the choice of a friend of the family, and so forth.

Scores on Form B are obtained in these nine general areas: (1) Mechanical, (2) Computational, (3) Scientific, (4) Persuasive, (5) Artistic, (6) Literary, (7) Musical, (8) Social Service, and (9) Clerical.

Such an approach of measuring interest patterns is consistent with the "pattern analysis" interpretation of interest inventories, as suggested by Darley in his study.²

Form B contains a number of activities listed in groups of three. There are one hundred and sixty-eight groups of threes, or a total of five hundred and four items or activities. On an early edition of the Kuder, items were selected for the various scales, other than Mechanical and Clerical, in such a way that a specific item to be used for one of the general areas, had a low correlation with the other general areas. The scales, Mechanical and Clerical, being new for Form B, were developed by the method of internal consistency without regard to the correlation with the other scales.

Form B is published in booklet form with a self-scoring answer pad. An individual taking the Inventory is given a booklet and instructed to read and follow the simple

²John G. Darley, Clinical Aspects and Interpretations of the Strong Vocational Interest Blank (New York: New York Psychological Corporation, 1941).

directions. Subjects are told that a number of activities are listed in groups of three. They are to read these three activities and decide which of the three activities is best liked. Next, the subject is to decide which of the remaining two activities he likes least. The proper notation is made on the answer sheet for the best liked and the least liked activity. This choosing of the best liked activity and least liked activity continues until all groups have been scored.

Subjects are further informed that some of the activities named involve a certain amount of preparation and training. In such cases, choice should be made on the assumption that the individual could first have the training and experience necessary for all the activities named. It is pointed out that no choice should be made merely because the activity is new or unusual. A choice must be made even though all three activities are liked or disliked.

Many studies using the Kuder Preference Record have been published, and the author of this instrument has accumulated the interest scores of people engaged in a large number of occupations. To date, profiles have been developed for one hundred and twelve occupational groups, and many of the groups have been sub-divided into specific areas within the occupation, with profiles available for each.³

³Kuder, Examiner's Manual, pp. 13-15.

Minnesota Multiphasic Personality Inventory

The MMPI is a psychometric instrument designed ultimately to provide, in a single test, scores on all the more important phases of personality. The point of view the authors took in determining the important of a trait was that of the clinical or personnel worker who wishes to assay those traits that are commonly characteristic of disabling psychological abnormality.

The personality characteristics now in available form for scoring are Hypochondriasis, Depression, Hysteria, Psychopathic deviate, Masculinity-femininity, Paranoia, Psychasthenia, Schizophrenia, and Hypomania. Although the scales are named according to the abnormal manifestation of the symptomatic complex, the authors claim that the scales have meaning within the normal range.

The first form of the MMPI was an individual type test. The instrument itself comprised five hundred and fifty statements, each printed in simple language on a separate card. They covered a wide range of subject matter from the physical condition to the morale and the social attitudes of the individual being tested. In taking the test, the subject was asked to sort all the cards into three categories indicated by guide cards--True, False, and Cannot say. The numbers of cards thus sorted were tabulated on a simplified record sheet which provided the basic record for any of the various scales.

To meet the demand for a form permitting administration to large groups of individuals, the booklet form of the MMPI was designed. The items which are on the cards in the "Individual Set" are now presented in a booklet. The booklet form was used in this study.

The booklet presents the Inventory in five hundred and sixty-six items, all of which should be answered to obtain scores on the scales now available. This booklet form actually contains five hundred and fifty different items, as sixteen items have been duplicated in the booklet. Materials necessary for administering the Inventory include test booklets and special answer sheets. There are no definite time limits, but usually somewhat rapid answering is considered to be better than long deliberation.

After the answer sheets have been scored, a profile is made, and is evaluated on the basis of a standard or T score. A T score between 30 and 70, which is considered normal, represents values two standard deviations below and above the mean, respectively, in which the mean of the normative group is assigned a value of 50 and the standard deviation adjusted to 10. When only one end of a scale has been identified as abnormal, as is the case with the MMPI, in a clinically recognized sense, the scale is always oriented so that the larger T scores--that is, those about 50--represent the abnormal direction. On the MMPI a score of 70 is a borderline score. No clinical use is made of scores below

30; in fact, very few subjects would ever score this low (good).

In addition to the nine personality characteristic scales, the booklet form has four validating scores. First of these validating scores is the question (?) score which corresponds to the "cannot say" score on the individual set. If no more than an average of one unanswered item occurs in every block of fifteen items, the T score for this scale is considered to be 50. This number of unanswered items is obtained by inspection of the answer sheet.

The next validating scale is the L, or Lie, scale. This scale is made up of fifteen items. The items are all stated in a way that tends to make even the most socialized subject who answers honestly confess to deviations from what is usually considered socially desirable conduct. A score above 70 on the L scale does not invalidate a record, but it does indicate a need for cautious interpretation.

Another validating scale is the Validity or F score. The F score is derived from a group of sixty-four items that have been very infrequently answered in the scored direction⁴ by normal persons. Very few of these items are inter-correlated to a significant extent. These items as a group do not form a scale in the usual sense, but they do indicate

⁴The scored direction on the MMPI is always toward the abnormal.

whether or not the subject has made many responses that are avoided by most persons.

For some persons, the F score will validly be somewhat high because first, some persons who are highly individual and independent may honestly make infrequent responses to these items on the F score, and second, a number of rather badly neurotic or psychotic subjects obtain high F scores.

Scores above 70 on the F score indicate the whole record to be invalid, except in the special cases mentioned above. In any case, when in doubt, it is believed best to be very cautious in accepting a profile with a high F score.

The last validating scale is essentially a correction factor, which the authors have developed over a period of years on the basis of continued statistical analyses of new clinical groups and new normal groups of subjects who have taken the MMPI. This new scale was given the name "K".

K does not have much clinical significance in itself, and its use with the MMPI does not add another variable in the clinical profile. Its effect is only to accentuate the validity of five of the nine existing clinical scales and to make normal individuals appear more normal.

K acts as a suppressor variable. Accordingly, a subject's score, or the K factor, is probably quite variable according to the influences operating upon him at the time of answering the inventory. College students usually score above 50 on K.

The correction of clinical scales by the use of K increases the proportion of clinically diagnosed cases scoring above the 90th percentile of normals, on the appropriate scale, by 5 to 20 per cent over the proportion diagnosed by the uncorrected scales. In some cases, the K factor decreased inter-correlation of scales, and in others it increased inter-correlation.⁵

In the current edition of the MMPI, five scales of personality have increased validity when corrected with K. Differing amounts of K are optimum for increasing the validity of these scales. The scales and the K fractions to be used are as follows: Hypochondriasis, plus .5 K; Psychopathic deviate, plus .4 K; Psychasthenia, plus 1.0 K; Schizophrenia, plus 1.0 K; and Hypomania, plus .2 K.

No certain interpretative significance is attributable to K at the present time; however, an elevated K does suggest a certain defensiveness or lack of insight, whereas K deviations much below 50 suggest varying amounts of dishonesty, self-criticality or unusual semantic habits.

Hypochondriasis (Hs)

The first of the personality scales to be described is the Hypochondriasis scale. An individual scoring high on

⁵P. E. Meehl and S. R. Hathaway, "The K Factor as a Suppressor Variable in the Minnesota Multiphasic Personality Inventory," Journal of Applied Psychology, 30 (1946).

this scale is characterized by abnormal concern about bodily functions. These individuals frequently complain of pains and disorders which are difficult to identify and for which no clear organic basis can be found. Characteristic of the hypochondriac is his immature approach to adult problems in tending to fail to respond with adequate insight.

Hypochondriacal complaints differ from hysterical complaints of bodily malfunction in that the hypochondriac is often more vague in describing his complaints, and also in that he does not show such clear evidence of having got out of an unacceptable situation by virtue of his symptoms as does the hysteric. In other words, Hypochondriasis is subjective and internalized rather than expressed in socially obvious symptomatology.

Proper diagnosis of Hypochondriasis depends on an accurate physical examination. Psychological treatment may often lead to an improved condition; however, the basic personality is unlikely to change radically. Common organic sickness does not raise a person's score appreciably. The scale detects a difference between the organically sick person and the hypochondriac.

Thirty-two items of the MMPI contribute toward a score for Hypochondriasis. Of these items, only eight measure Hypochondriasis alone; the remaining twenty-four items also measure Hysteria, Depression, or Schizophrenia.

The fact that more items measure both Hysteria and Hypochondriasis than measure the latter alone is a reflection of the considerable hysterical component of Hypochondriasis. That there is, however, at least a slight overlapping between the neurotic variables and Schizophrenia is shown by the occurrence of three items contributing toward scores for Schizophrenia and either Hypochondriasis, Hysteria, or both.

The Depression Scale (D)

A high D score indicates poor morale of the emotional type with a feeling of uselessness and an inability to assume a normal optimism with regard to the future. Feelings of guilt and fear seem to be the basis of depression. However, in many types of mental unrest the individual will project this feeling of guilt and fear onto something else. For example, paranoia may be considered a protective, aggressive action against homosexual urges. In developing phobias, the compulsive patient projects his fear, usually to some socially accepted object such as snakes, high places, fire, and so forth.

For some individuals no projection takes place. The most intense and characteristic reaction to guilt, wherein blame is neither projected nor distorted, is in Depression, by which reaction the individual accepts blame personally. Anxiety features are frequently common in Depression. By comparison with an anxiety state, however, the patient's

uncertainty is not free-floating; it is associated specifically with the systematic, delusional acceptance of personal guilt.

The D scale together with the Hypochondriasis and Hysteria scales will identify the greater proportion of those persons not under medical care who are commonly called neurotic, as well as individuals so abnormal that they need psychiatric attention.

Some high scoring individuals on this Depression scale will change rather rapidly when given reassurance, pep talks, and psychotherapy. Too, improved environment will help to lower the score. However, such individuals who do make a rapid change are likely to remain subject to other attacks. The greater number of depressive individuals will not respond readily to treatment, but their scores will slowly tend to approach the normal level with the passage of time, psychotherapy, improved environment, and so forth.

In the MMPI, sixty items contribute toward a score for Depression. Of these, thirty-seven contribute also toward scores for other MMPI variables.

On a large block of items, Depression is scored together with the variables considered to be neurotic tendencies. There is also for Depression a wide overlap with the more psychotic variables of Schizophrenia, Paranoia, and even Psychasthenia.

The Hysteria Scale (Hy)

Of psychosomatic illness that is socially oriented, the classic form is Hysteria. The term, Hysteria, refers to obvious physical disability for which no conceivable organic basis can be established and which is considered, therefore, to be entirely psychogenic. Hysteria, because it is the most obvious utilization of physical illness as an excuse for incapacity, is the prototype of neurosis.

The Hysteria scale of the MMPI measures the conversion type hysteria symptoms. These symptoms may be general systematic complaints or more specific, such as paralyses, contractures, gastric or intestinal complaints, or cardiac symptoms. Weakness, fainting or convulsions may be characteristic of high scores on this scale. The individual will be more apt to develop these symptoms under stress.

Hysterical cases are more immature psychologically than any other group of maladjusted individuals. Although their symptoms can often be "miraculously" alleviated by some conversion of faith or by appropriate therapy, there is always the likelihood that the problem will reappear if the stress continues or recurs.

Sixty of the items of the MMPI contribute toward a score for Hysteria. Of these, forty-two also contribute toward scores for other variables of psychopathology.

An inspection of these items reveals that in addition to the tendency to dwell upon somatic difficulties, such as

headache, tremulousness, fainting, and an evasiveness about the sight of blood, the Hysteric, as revealed by these items of the MMPI, is remarkably concerned about social matters; he is friendly with one and all, he suspects nobody. He is naive and trusting, open and friendly; yet, like the psychopathic personality, he is concerned about how he is accepted socially.

The Psychopathic Deviate Scale (Pd)

This scale measures the similarity of the subject to a group of persons whose main difficulties lay in their absence of deep emotional response, their inability to profit from experience, and their disregard of social mores. They may behave in a normal fashion for years between outbreaks. The psychopathic deviate is characterized by lying, stealing, use of alcohol, drug addiction, sexual immorality, and various other anti-social behavior. They commit these acts with little thought as to gain for themselves and little worry over possible discovery.

The adult with a psychopathic personality could be likened unto a child who never grew up. Even as adults they are egocentric. Little concerned about the consequences of their impulsive behavior, which often leads to disaster, they are infantile. They may be criminal. Their frequent use of alcohol and their sexual aberration often complicates

the picture. Cleckley⁶ suggests as the criteria of this psychopathic personality the following:

1. Positive superficial impression; no intellectual deterioration.
2. Free from demonstrable irrationality, psychosis, nervousness, neurosis.
3. Unreliable, no sense of social responsibility.
4. Disregard for truth.
5. Never sincerely accepts blame, though perfunctorily is full of self-blame.
6. No sense of shame.
7. Commits fraud, even without a goal.
8. Lacks judgment.
9. Does not learn from experience.
10. Egocentric--an invariable characteristic.
11. Poverty of affect.
12. Lacks insight.
13. Unresponsive to treatment of himself by others.
14. Alcoholic indulgence frequent.
15. Bizarre behavior while drinking.
16. No suicidal drive.
17. Peculiar sex life; weak drive, though often obscene.
18. Adverse heredity.
19. Tendency shown any time; not necessarily in early life.

⁶Hervey Cleckley, The Mask of Sanity: An Attempt to Re-interpret the So-called Psychopathic Personality (St. Louis, Missouri: C. V. Mosby Company, 1941).

20. Lacking in purpose.

2. Psychopath driven to failure, self-destruction.

No therapy is especially effective in improving persons with high Pd scores on the MMPI. Time and careful, intelligent guidance may lead to an adequate adaptation. Institutionalization of the more severe cases is probably no more than a means of protecting society and the offender.

There are fifty items in the MMPI which contribute one point each toward a score for psychopathic deviate. Of these fifty items, thirty-two also contribute toward scores for one or more of the following variables: Hysteria, Hypochondriasis, Psychasthenia, Paranoia, Depression, Hypomania, Masculinity-femininity, and Schizophrenia.

The Interest Scale (Mf)

This scale measures the tendency toward masculinity or femininity of interest pattern. Separate scoring keys are provided for the two sexes on the MMPI; however, in either case, a high T score indicates a deviation of the basic interest pattern in the direction of the opposite sex. All items are scored in the feminine direction. Thus, a male who makes a high numerical score also makes a high T score. A female, on the other hand, who makes a low numerical score makes a high T score.

The authors of the test, Hathaway and McKinley,⁷ found that the average number of feminine answers for normal men was 20 to 21, while women gave an average of 36 to 37 feminine answers. When a male answers as many as thirty or more items in the feminine direction, his score is considered suggestive of a tendency toward femininity. A female is considered as deficient in femininity when her score is 27 or less.

Sixty items in the MMPI yield points toward a score of femininity. Five of the items are scored differently for the sexes. The remaining fifty-five items are scored the same for both sexes, all in the feminine direction.

This scale seems to be more valid for males than for females. However, in any case, homosexual abnormality must not be assumed on the basis of a high score without confirmatory evidence.

The Paranoia Scale (Pa)

The preliminary Paranoia scale was derived by contrasting normal persons with a group of clinic patients who were characterized by suspiciousness, over-sensitivity, and delusions of persecution, with or without expansive egotism. Persons with an excess amount of paranoid suspiciousness are

⁷Starke R. Hathaway and J. Charnley McKinley, The Minnesota Multiphasic Personality Inventory (Minneapolis: University of Minnesota Press, 1943).

common and, in many situations, are not especially handicapped.

A history of the paranoid individual is frequently characterized by tentative (and often disastrous) excursions, during adolescence, in the direction of homosexual experimentation. The paranoid individual is found often to have been hostile in childhood to the father. He usually reacts strongly to his own sex; his reaction is one of definite hate, not neutral. Paranoid individuals are occasionally celibates, but more often they marry and divorce frequently, produce few children, and are often impotent or frigid. Their marital adjustment is typically chaotic.

Examination of the scoring of items of the MMPI reveals that of forty items that contribute toward a score for Paranoia, only fourteen of these score for this variable alone or together with Masculinity-femininity.

Of the remaining items, some items contribute either alone or together with variables of Psychopathic deviate, Hysteria, Schizophrenia, Psychasthenia, and Hypochondriasis.

Although valid scores of 80 and above on this scale are nearly always suggestive of disabling abnormality, the range from 70 to 30 should be checked also by clinical judgment.

The Psychasthenia Scale (Pt)

A group of solutions often encountered and frequently complicated by associated psychosomatic features are the

obsessive-compulsive neuroses, designated in the MMPI as Psychasthenia. This solution to frustration is characterized typically by intense awareness of social values and by the elaboration of intellectualized fears, activities, and ideas that are exaggerated and dominant. These inner elaborations may limit or govern the individual's entire effectiveness.

Developed as means of averting the personal threat of insecurity, frustration, and anxiety, the specific and unreasonable fears known as phobias originate in quite natural fear, but they become fixed and systematized to such an extent that they cannot be ignored. Phobias may be characterized by fear of open places, fear of high places, fear of being shut in spatially, or fear of specific objects, such as blood, dogs, snakes, and so forth.

Just as an unreasonable fear may be central to the patient's personality, so may compulsive acts--acts that are ritualistic attempts to counteract the threat of danger. Typified within the normal range by a passion for punctuality, neatness, and order, such acts may, in extremity, become master of the individual's life adjustment. An urge toward cleanliness, for example, may be characterized by an extreme necessity to wash one's hands over and over again.

The term "obsession" is used to designate an idea that, no matter how unreasonable and exaggerated, is nevertheless so fixed that it becomes a dominant pressure or limitation

upon the patient's daily life. Many of the formalized aspects of society represent socially tolerated and accepted compulsions and obsessions.

On tests, obsessive-compulsives reveal themselves rather clearly. Of the items of the MMPI, forty-eight contribute toward a score for Psychasthenia; nineteen of these contribute toward Psychasthenia alone or with Masculinity-femininity. Other items overlap with Psychopathic deviate, Hysteria, Hypochondriasis, and Schizophrenia.

The Schizophrenia Scale (Sc)

The Schizophrenia scale of the MMPI attempts to measure the similarity of an individual's responses to those of patients who are characterized by bizarre and unusual thoughts or behavior. In these patients, there is a splitting of the subjective life from reality so that the observer cannot follow rationally the shifts in mood or behavior.

In an effort to find signs of diagnostic significance, considerable interest has been shown in the differential test results of various categories of psychopathology. One of the most consistent findings in the test performances of schizophrenics is that these patients are heterogeneous. In so far as many performances are concerned, schizophrenics differ as greatly among themselves as they do from norms.

A second consistent finding in the test performances of schizophrenics is unevenness of response. On tests, an

individual patient is likely to give poor responses side by side with responses that, qualitatively, are amazingly good. Psychological test performances require thinking and expression that are logical from the examiner's point of view. The schizophrenic's peculiar logic often distorts his responses in such a way as to render them apparently senseless.

An example of this distorted logic is given by Wechsler⁸ as follows:

A question, "How far is it from New York to Paris," was asked of a schizophrenic patient. The patient's response was something like this: "Well, it takes about a week to get from Paris to New York. There are seven days in a week and twenty-four hours in a day; so multiply 24 by 7 and you get 161 which equals the hours in seven days or one week. Now there are twenty blocks in a mile; so multiply 161 by 20, and this gives you 3,220. The distance from Paris to New York is 3,220 miles." A check will reveal that the arithmetic is not quite accurate. More important than the slight error in multiplication is the way in which this schizophrenic arrived at the almost correct answer.

The Schizophrenic scale of the MMPI distinguishes about 60 per cent of observed cases diagnosed as schizophrenia. The scale does not identify some paranoid types of schizophrenia. A clinician should be very hesitant to apply the diagnostic term "schizophrenia" because of its bad implications.

An examination of the type of items on the Schizophrenia scale of the MMPI will give some idea of the thought pattern of the schizophrenic. Seventy-eight of the MMPI

⁸ David Wechsler, Measurement of Adult Intelligence (Baltimore: The Williams and Wilkins Company, 1944), p. 167.

items contribute toward a score for schizophrenia; of these, forty-eight overlap with other variables in the test.

From an examination of these items, it can be seen that the schizophrenic is concerned about himself. While his social acceptance is a problem--in that he hesitates to become conspicuous socially, or to take an attitude of open friendliness toward the opposite sex, or toward children, or even toward parents--his real concern socially is in regard to his own acceptability. The schizophrenic is preoccupied about his mind, about strange odors, about experiences that he has when alone. Like the hysteric, sex matters worry him. Like the psychopathic personality, his actual sexual adjustment is a problem.

The Hypomania Scale (Ma)

The Hypomania scale measures the personality factor characteristic of persons with marked overproductivity in thought and action. Some of the scale items are mere accentuations of normal responses. A difficulty of the Hypomania scale is to distinguish between a hypomanic and an ambitious normal person. The hypomanic person has usually been in trouble because of undertaking too many activities.

Forty-six items of the MMPI score for Hypomania. Of these, twenty score for Hypomania or Masculinity-femininity.

Other items that contribute toward Hypomania also contribute toward variables of Psychopathic deviate, Hysteria,

Paranoia, Schizophrenia, Hypochondriasis, Psychasthenia, and Depression.

The Bell Adjustment Inventory⁹

The Adjustment Inventory is published in two forms--the Student Form for high school and college students, and the Adult Form. Only the total score of the Student Form was used in this study.

The Student Form of the Adjustment Inventory provides four separate measures of personal and social adjustment.

They are:

1. Home adjustment. Individuals scoring high tend to be unsatisfactorily adjusted to their home surroundings. Low scores indicate satisfactory home adjustment.
2. Health adjustment. High scores indicate unsatisfactory health adjustment; low scores, satisfactory adjustment.
3. Social adjustment. Individuals scoring high tend to be submissive and retiring in their social contacts. Individuals with low scores are aggressive in social contacts.

⁹Hugh M. Bell, Manual for the Adjustment Inventory (Stanford, California: Stanford University Press).

4. Emotional adjustment. Individuals with high scores tend to be unstable emotionally; persons with low scores tend to be emotionally stable.

Subjects indicate their answers to each item by marking the answer spaces on the answer sheet under the "Yes", the "No", or the "?". Subjects use the question mark only when they are certain that the item cannot be answered "Yes" or "No."

Norms for interpretation of individual scores are made more meaningful by the use of certain descriptive designations. Bell uses the following terms: excellent, good, average, unsatisfactory, and very unsatisfactory.

Guilford-Zimmerman Aptitude Survey¹⁰

In the Guilford-Zimmerman Aptitude Survey attempts were made to produce a series of tests, each of which features one primary ability. Seven parts already published cover the most important factors in academic, clerical, and mechanical and other aptitude areas.

Norms are available on a college population for the seven factors measured. The seven factors and their measurements may be described as follows:

¹⁰J. P. Guilford and Wayne S. Zimmerman, "The Guilford-Zimmerman Aptitude Survey," Journal of Applied Psychology, 32 (February, 1948), pp. 24-34.

1. Verbal Comprehension. This ability is important in any activity that requires understanding or meanings of words or verbal concepts. A general vocabulary test, given as a power test, is the best and purest measure of verbal comprehension. The common elements of most vocabulary tests are same-opposites, verbal analogies, and reading comprehensions.
2. General Reasoning. There are several distinct types of reasoning ability, but the one measured by Part II of the Guilford-Zimmerman seems to be common to a larger number of tests than any of the others. Arithmetical reasoning type of problems seem to contribute most of the items on tests of general reasoning. From this, and from other facts, it appears that the key to the factor of general reasoning is the ability to diagnose problems. General reasoning is best measured in a power test with items of appropriate difficulty.
3. Numerical Operations. The ability to do rapid and accurate work with numbers stands apart as a distinct human resource. The fact that the extremely rare person may stand out as a "lightning calculator" and yet possibly be generally low in most other abilities is a dramatic demonstration of the independence of this factor. Numerical operations

seem to be about equally well measured by any of the four fundamental operations--addition, subtraction, multiplication, and division. Since correct answers to types of problems used can be derived by nearly all examinees, given sufficient time, the test should be administered under speed conditions.

4. **Perceptual Speed.** This is the ability to perceive detailed visual objects quickly and accurately. Part IV of the Guilford-Zimmerman Aptitude Survey is composed of short matching tests in which the examinee must note similarities and differences in the forms and details of common objects. Test items for this part of the Survey are quite easy. This is necessary so that answering the test item does not involve other abilities, such as discrimination of size and shape, and perhaps visual acuity and reasoning. Since the items are easy, individual differences are measured largely in terms of speed.
5. **Spatial Relations.** Part V, the authors disclose, was designed to measure primarily an ability to appreciate spatial relations of things with reference to the human body. Awareness of whether one object is to the right or left of another, higher or lower, or nearer or farther away, seems to be the essential nature of this factor. Both proper

interpretation of structures and proper decisions as to how to adjust the body to the layout of machinery depend upon this ability. Spatial relation has been found to be one of the more important factors in learning to pilot an aircraft. In Part V of the Survey, each item shows the prow of a motorboat against a background scene in two similar views. The examinee must report what directions the boat has moved in going from the first to the second of the two pictures. The boat may have turned right or left, may have risen or fallen, and/or may have tilted right or left.

6. Spatial Visualization. This factor seems to involve the process of imagining movements, transformations, or other changes in visual objects. Other tests that attempt to measure spatial visualization seem to depend on static or reproductive visualization, whereas spatial visualization, as measured by the Guilford-Zimmerman Aptitude Survey depends upon a dynamic kind of visualization. Part VI is composed of pictorial items in each of which a familiar three-dimensional object is first shown in a certain position. Brief verbal instructions then call for turning, rotating, and/or tilting the object. The examinee's task is to recognize the object in the new position.

7. Mechanical Experience. The only factor unique to mechanical tests is an acquired knowledge of experience factor. Part VII tests the examinee's knowledge of common tools and mechanical problems, such as occur around the home; of automobile parts, their functions and malfunctions; and of the common trades of carpentry, plumbing, welding, and the like. Not all examinees have had equal opportunity to acquire this kind of knowledge. Girls and women are particularly handicapped. Individual differences in scores made on this test by males have been found to be highly prognostic of subsequent success in undertakings of a mechanical nature.

These seven parts, or areas, of the Guilford-Zimmerman Aptitude Survey cover fairly well the important factors in the three traditional areas of primary abilities--abstract intelligence, clerical aptitude, and mechanical aptitude. The same seven tests may be combined in various ways to measure aptitudes for many other occupational areas.

Parts I and II (Verbal Comprehension and General Reasoning) measure the two leading components of most verbal intelligence tests. Parts III and IV (Numerical Operations and Perceptual Speed) measure leading components of most clerical-aptitude tests. Different kinds of clerical jobs depend to varying degrees upon those two primary abilities. The term "clerical aptitude" is a rough occupational

concept, not conforming to a single, fixed pattern of psychological functions. Parts V, VI, and VII (Spatial Orientation, Spatial Visualization, and Mechanical Knowledge) particularly Part VII, cover the most important abilities required in mechanical pursuits. Like clerical aptitude, the concept of "mechanical aptitude" is variable.

American Council on Education
Psychological Examination

The purpose of the psychological examination of the American Council on Education is to appraise what has been called scholastic aptitude, or general intelligence, with special reference to the requirements of most college curricula. In general, linguistic tests give high correlations with scholarship in the liberal arts colleges than do quantitative tests. However, for the scientific and technical curricula, the quantitative tests may be more significant.

In this investigation, the 1947 edition of the American Council on Education Psychological Examination for College Freshmen was used. The examination consists of six tests that have been used for many years. The order of the tests has been arranged to alternate linguistic and quantitative tests because of the fatigue element. All of the tests have been included in several test experiments with factorial analyses to determine the primary mental abilities. These

studies seemed to justify the grouping of the six tests in two general classes as follows:

Quantitative Tests: (the Q-score)

Arithmetical Reasoning

Number Series

Figure Analogies

Linguistic Tests: (the L-score)

Same-Opposite

Completion

Verbal Analogies

The authors of the test do not recommend that the six separate test scores be used for any counseling, but there seems to be justification for use of the two principal sub-scores as well as the total or gross score in a counseling situation. Results on the ACE are useful in handling those problems in which it is advisable to distinguish a student's mental abilities from his high school preparation and his industry.

As is true with all psychological tests, interpretations of test scores on the ACE should be done with caution. Those who have used psychological tests and who have become convinced of their merits sometimes overestimate the significance of test scores. While test scores do show roughly the mental alertness of the student, scores should not be thought of as measuring mentality with high accuracy. The scores are roughly indicative of the level of the mental

alertness of a student, but scores should not be taken so seriously as to exclude other evidences of intelligence and talent in individual cases. On the other hand, psychological test scores tell much more about mental alertness of individuals than can be ascertained in a personal interview. Generally, the best usefulness of the tests is in combination with other evidences of ability, such as grades in high school and in content examinations that are given uniformly to all students.

The college edition of the ACE is so devised that the test can be given to large groups of individuals at one time. All phases of the test are timed. Complete instructions for administering the test are given in the manual. Norms for the ACE should be interpreted in terms of percentile ranks or of standard scores for a specified group. Norms interpreted in this manner for all age groups, avoid the ambiguities and absurdities of mental ages and intelligence quotients for superior adults.

Procedure Used in the Study

During the year 1949, at Oklahoma Agricultural and Mechanical College, the tests described were administered at the Bureau of Tests and Measurements to the male freshmen students enrolled in the Institute of Technology. Each of the students was enrolled in the regular four year engineering program. From this group of engineering students,

a random sample of 301 subjects was selected. All females were excluded from the study since this investigation deals only with masculinity-femininity of one sex--namely, the male sex.

All scores on each test given were checked and re-checked. Using the Masculinity-femininity index of the Kuder Preference Record, a M-F score was obtained on each subject. Kuder¹¹ states that the approach taken to obtain a Masculinity-femininity score was a method which would produce the greatest differentiation between the two sexes. For this purpose, Fisher's discriminant function was deemed to be most appropriate, having been devised for such a situation. For further information concerning this procedure, the reader is referred to a paper by Travers.¹² Accordingly, weights to be assigned to the scores on each scale were developed for high school students as well as for adults. High scores represent masculine preferences; low scores represent feminine preferences. The weights used in this study were those developed for adults.

To obtain a M-F score on an individual, the raw scores on the various scales of the Kuder Preference Record must be

¹¹Kuder, Examiner's Manual.

¹²R. M. W. Travers, "The Use of a Discriminate Function in the Treatment of Psychological Group Differences," Psychometrika 4 (1939), pp. 25-32.

multiplied by various plus or minus weights. The weights assigned¹³ to the scales are as follows: Mechanical, plus 73; Computational, plus 101; Scientific, minus 16; Persuasive, plus 74; Artistic, minus 74; Literary, minus 13; Musical, minus 44; Social Service, minus 49; and Clerical, minus 114.

After these assigned weights and raw scores have been multiplied, the sum of the positive numbers and the sum of the negative numbers are computed. A constant of plus 8295 is added to the positive numbers. The algebraic total is then computed and divided by 100 and rounded to the nearest whole number. The resulting number is the N-F score of an individual.

All scores were then placed in a distribution according to N-F scores. The mean and standard deviation were computed for the group. The group was statistically divided into three parts--the upper third with 104 cases, the middle third with 96 cases, and the lower third with 101 cases. No further use was made of the middle third.

The two groups to be used--the upper and lower thirds--were subjected to a statistical analysis on the various tests that had been administered to them. The mean, the standard deviation, and standard error of the mean were computed for the total score on the Bell Adjustment Inventory.

¹³Kuder, Examiner's Manual.

the nine scales of the Kuder Preference Record, the twelve scales of the MMPI, and both parts, as well as the total score, on the ACE. The differences of the means the standard error of the difference, and the critical ratios or t-values were obtained for each test or each scale of a test for the two groups. All the statistically obtained data are recorded in tables which are included in the following chapter of this study.

College records were examined to determine what had happened to these subjects. They were divided into the following three groups: (1) those who finished a regular four year college engineering program, (2) those who finished a four year college program other than engineering, and (3) those who dropped out of college. It is not the purpose of this study to investigate the cause or reason for the drop-outs.

This addition of another group reduced the number of cases in each group to the following: (1) 65 finished an engineering program, (2) 41 finished some other college program, and (3) 99 dropped out of college. The same basic statistical procedure was followed on these three groups. The mean, the standard deviation, and the standard error of the mean were computed for each test or each scale of a test for the three groups. The differences of the means, the standard error of the difference, and the t-values were obtained and recorded for comparison between the three groups.

These statistically obtained data were recorded in tables which are included in the next chapter. Comparisons were made to determine differences for the group with masculine interest and the group with feminine interest. Comparisons were made, also, to determine differences for those who finished engineering, those who finished some other college program, and those who dropped out of college.

A comparison was made between the percentage of the group with masculine interest patterns who finished engineering and the group with feminine interest patterns who finished engineering. Too, a comparison was made between the percentage of the group with masculine interest patterns who finished any college program and those in the group with feminine interest patterns who finished any type of college program.

CHAPTER IV

THE FINDINGS AND INTERPRETATIONS

The the evaluation of any obtained difference between two groups, it is necessary to determine the statistical reliability of such a difference. Reliability means, in this case, the degree of consistency among the results obtained on different samplings of the same population. The problem of reliability arises from the fact that in any investigation only a sample of the entire population is employed. As Garrett¹ points out, the "true" mean or the "true" standard deviation of any set of measurements is that value found by taking into account the scores made by all of the members of some defined group (called the population). It is rarely, if ever, possible to measure all of the individuals in a given population; for instance, weigh all the nine-year-old boys in Oklahoma. Hence, one must usually be content to deal with "samples" drawn from the population, and owing to slight differences in the composition of these samples, means and standard deviations may be somewhat larger or somewhat smaller than their corresponding population values.

¹Henry E. Garrett, Statistics in Psychology and Education (New York: Longmans, Green and Company, 1947).

If the sampling were chosen carefully to be representative of the given population, the investigator could generalize to that entire population, and his conclusions would not be far in error. The figures thus obtained, however, will not be identical to those which would have been secured by testing the entire population, nor will the results from successive samplings of the same population coincide perfectly.

For this reason, statistical measures of reliability must be used to furnish a theoretical estimate of the probable limits within which such errors will fall. Formulae are available for computation of the sampling error of all statistical measures, such as averages, mean, differences between means, measures of variability, and correlation coefficients. There are several common measures of reliability, such as the "probable error" and the "standard error." This study uses the standard error.

In addition to knowing the standard error of a mean, it is important that there be some way of estimating the significance of an obtained difference; that is, some way of telling whether two groups are sufficiently different to enable the researcher to say with confidence that regardless of how often other similarly selected samples are compared differences will persist. Furthermore, and equally important, if the obtained difference is not significant, the investigator wants to know, if possible, how nearly it approaches significance.

In order to answer this question a standard error of the difference between two uncorrelated means and a t-value must be computed. A t-value is obtained by dividing the obtained difference between means by the standard error of the difference between means. For further information concerning the exact procedure, the reader is referred to any standard text in statistics, such as Garrett.² After a t-value has been obtained, tables provide the levels of significance.³

By formula, the standard error of an obtained difference depends upon the size of the samplings employed as well as the amount of variability within samplings. It is apparent that the larger the sampling, the more reliably will the results be established. If the sampling were infinitely large, the standard error would be zero, since the entire theoretical population would then have been included.

Consequently, the statistical data presented in this chapter are an estimate of what one would expect to find in other college populations, drawn from agricultural and mechanical colleges of the Southwest, and composed of male freshmen students enrolled in a four year engineering program. This chapter contains a summary of the statistically significant differences that have been found by comparing

²Ibid.

³Ibid.

sample groups on the several tests and scales. Accompanying this survey are the tables containing the statistical data, and also the graphs showing the profile patterns.

The first part of the chapter deals with comparisons of the group with masculine interest versus the group with feminine interest. The last part contains the data and comparisons of the three groups--those who finished an engineering program, those who finished some other college program, and those who dropped out of college.

The Comparison of the Groups on Interest

As has already been mentioned, the data were obtained from the upper and lower thirds, as determined by their M-F scores. The mean M-F score for the entire sample of 301 cases was 91.08 with a standard deviation of 22.87. This figure represents a somewhat higher or more masculine score than for men in general. A score of 80.86⁴ is the average score for men selected at random from many occupations. The average score for mechanical engineers is 105.79. This sample of student engineers with the score of 91.08, while higher than men in general, is lower than that for mechanical engineers.

When the distribution was statistically divided into thirds, the mean for the upper third was 115.42 and the mean

⁴G. Fredric Kuder, Examiner's Manual (Chicago: Science Research Associates, 1949), p. 23.

for the lower third was 65.75. The number of cases in the group with masculine interest was 104 with an average age of 18.72 years, and the group with feminine interest contained 101 cases with an average age of 18.54 years.

Using the Kuder Preference Record as the basis for a M-F score, one would expect the group with masculine interest to have higher interests in the areas of Mechanical, Computational, and Persuasive; conversely, the group with feminine interest would have higher interests in Artistic and Clerical. The remaining scales of Scientific, Literary, Musical, and Social Service may or may not show any significant patterns.

Table I gives the summary of information concerning the results on the Kuder. On the Mechanical scale there is a difference in the means of 17.83 with a t-value of 7.89. This is highly significant at the 1 per cent level. In other words, the group with masculine interest has a significantly higher interest in the mechanical area.

The Computational scale gives a difference between means of 3.58 and a t-value of 2.56. This is hardly significant at the 1 per cent level, but it is significant at the 2 per cent level. Once again, the group with masculine interest has more interest in the Computational area than does the group with feminine interest.

Scale three, the Scientific, places the masculine interest group with a higher score than the feminine interest

group. The difference between the mean is 6.38 with a t-value of 3.22, which is significant at the 1 per cent level. This high level of significance in favor of the group with masculine interest was unexpected since the Scientific scale has a low minus (Femininity) weight.

TABLE 1

THE COMPARISON OF THE GROUP WITH MASCULINE INTEREST
AND THE GROUP WITH FEMININE INTEREST ON THE
KUDER PREFERENCE RECORD

Scale	Masculine Group N = 104		Feminine Group N = 101		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
Mec.	99.19	13.19	81.36	18.64	7.89
Com.	39.31	8.82	35.73	11.01	2.56
Sci.	71.51	12.04	65.13	16.02	3.22
Per.	79.52	15.13	62.28	16.93	7.70
Art.	47.53	11.35	54.45	16.04	3.55
Lit.	40.48	13.03	43.86	16.23	1.64
Mus.	14.89	7.68	18.35	9.45	2.86
Soc.	57.23	14.20	65.22	17.88	3.54
Cle.	46.22	11.14	54.54	12.46	5.04

The Persuasive scale gives a difference between means of 17.24 with the group with masculine interest the higher. It has a highly significant t-value of 7.70, which is at the 1 per cent level.

The Artistic scale gives a difference between means of 6.92 with the group with feminine interest having the higher

A STUDY OF MASCULINITY-FEMININITY OF
MALE FRESHMEN ENGINEERING STUDENTS

By

JOSEPH G. ROYE

Bachelor of Arts
Northeastern State College
Tahlequah, Oklahoma
1940

Master of Science
Oklahoma Agricultural and Mechanical College
Stillwater, Oklahoma
1948

Submitted to the faculty of the Graduate School of
the Oklahoma Agricultural and Mechanical College
in partial fulfillment of the requirements
for the degree of
DOCTOR OF EDUCATION
1954

interest. The t-value of 3.55 is significant at the 1 per cent level.

The Literary scale gives the group with feminine interest a slightly higher mean score. The difference between the means is 3.38. The t-value is 1.64, which is not statistically significant. This was to be expected since this scale has the smallest weighted factor. Since the scale carries a negative weight, the fact that the difference is toward the group with feminine interest was to be expected.

The Musical scale gives the group with feminine interest the higher mean score. The difference between means is 3.46 with a t-value of 2.86, which is significant at the 1 per cent level.

The group with feminine interest has a higher mean score on the Social Service scale. The difference between the means is 7.99 with a t-value of 3.54, which is significant at the 1 per cent level.

The Clerical scale gives the group with feminine interest a higher mean score. The mean difference is 8.32 with a t-value of 5.04, which is highly significant at the 1 per cent level.

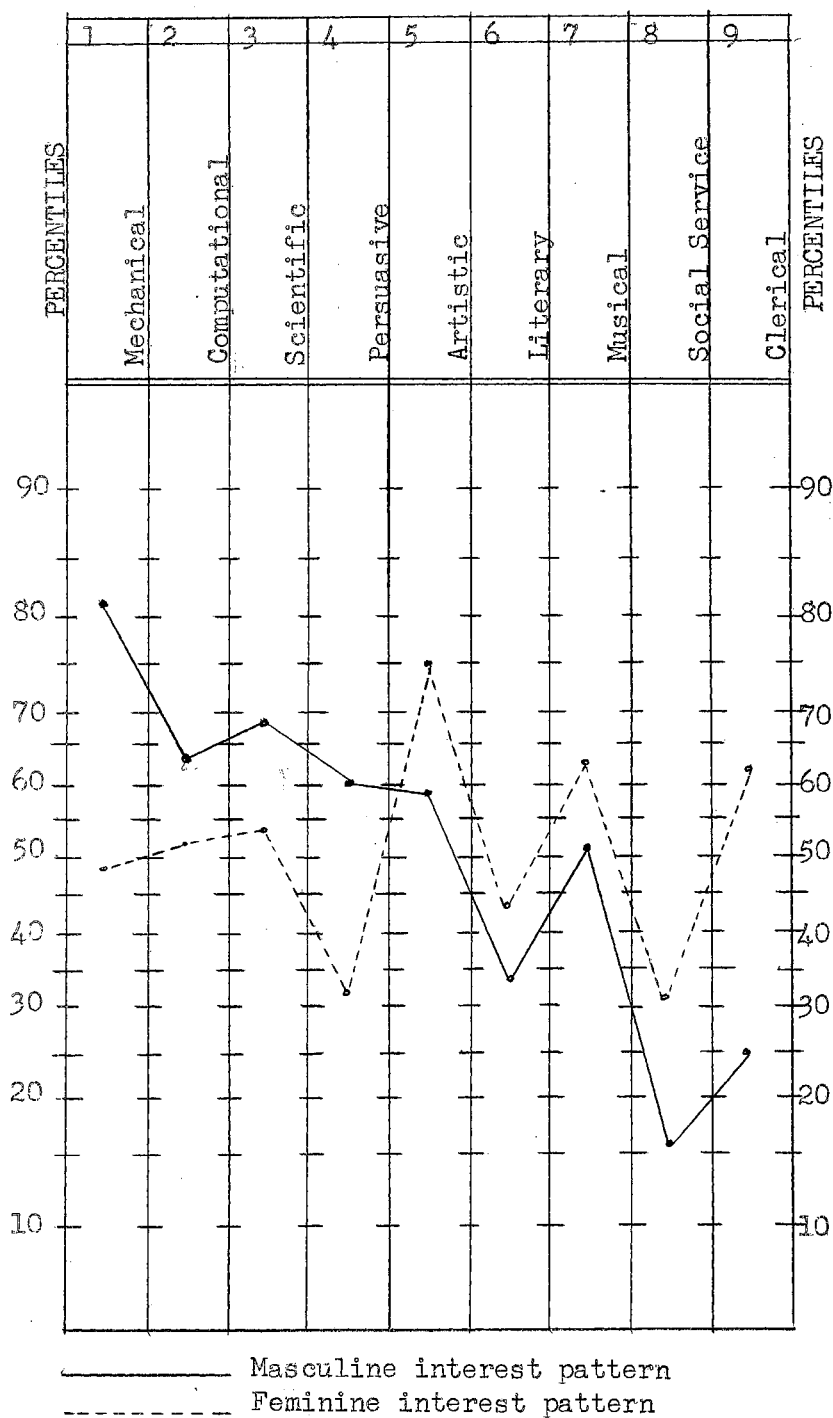
The general pattern of interests of the two groups was nearly as expected. The group with masculine interest had significantly higher scores in the areas of Mechanical, Computational, Scientific, and Persuasive. The group with feminine interest had significantly higher scores in Artistic,

Musical, Social Service, and Clerical areas. In the area of Literary there was no significant difference. Graph I gives a profile of the two groups.

The Comparison of the Group with Masculine Interest
and the Group with Feminine Interest
on Scholastic Aptitude

Most investigations in the past have not shown any consistent significant differences in mental ability or scholastic aptitude between the sexes. In the lower age levels those differences in scholastic achievement that have been noted tend to favor the female. This could be due either to cultural factors or to the rate of maturation. Since there are little or no differences in scholastic aptitudes between the sexes, no such differences should be expected between the group with masculine interest and the group with feminine interest. Such were the results of this investigation.

Table 2 gives the results of the data on the ACE. The Q-score of the Ace places the group with masculine interest with a slightly higher average score. The mean difference is 1.22. The t-value is .88, which is not significant. Since the Q-score is made up of Arithmetical Reasoning, Number Series, and Figure Analogies (see Chapter III, page 53), any differences could be expected to be in favor of the group with masculine interest.



Graph 1. Profiles of the mean percentiles on the areas of the Kuder Preference Record for comparison of the masculine and feminine groups.

TABLE 2

THE COMPARISON OF THE GROUP WITH MASCULINE INTEREST
AND THE GROUP WITH FEMININE INTEREST ON THE ACE

Scale	Masculine Group N = 104		Feminine Group N = 101		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
Q-score	44.01	9.62	42.79	10.15	0.88
L-score	58.56	12.47	60.17	16.14	0.80
Total	102.57	20.38	102.96	23.61	0.13

The group with feminine interest made a higher score on the L-score (See Chapter III, page 53) of the ACE. Here again the mean difference was slight, being 1.61. The t-value was .80. For the total score on the ACE, the mean difference was only .39 with the group with feminine interest having the higher mean. The t-value was .13.

Since on neither the Q-score, the L-score, or the Total score of the ACE are the t-values statistically significant, the inference can be made that the two groups are equal in scholastic aptitude. What differences do occur in scholastic aptitude can be attributed to sampling error.

Carrying this point further, the assumption can be postulated that any differences between the group with masculine interest and the group with feminine interest in personality traits, interests, and aptitudes are not due to intellectual factors.

The Comparison of the Group with Masculine Interest
and the Group with Feminine Interest
on Specific Aptitudes

The specific aptitudes discussed in this section are those which are measured by the Guilford-Zimmerman Aptitude Survey. Table 3 contains data for comparison between the groups. It is further shown in Table 3 that there were no significant differences in Verbal Comprehension, General Reasoning, Numerical Operations, Perceptual Speed, and Spatial Orientation. There were significant differences in Spatial Visualization and Mechanical Knowledge.

However, even in those areas in which there were no statistically significant differences, the results are suggestive. The group with feminine interest had a higher score in Verbal Comprehension with a mean difference of 2.26 and a t-value of 1.51; in Perceptual Speed with a mean difference of 1.94 and a t-value of 1.39; and in Spatial Orientation with a mean difference of 1.95 and a t-value of 1.44.

On the other hand, the group with masculine interest had a higher score in General Reasoning and Numerical Operations. The mean difference in General Reasoning was only .82, but the t-value was 1.12. The mean difference in Numerical Operations was 2.29 and the t-value was .88.

Of the two scales of the Guilford-Zimmerman Aptitude Survey that were significant, one favored the group with masculine interest and one favored the group with feminine

interest. The group with Feminine interest scored higher in Spatial Visualization as the mean difference was 4.17 and the t-value was 2.25. This t-value of 2.25 is significant at the 5 per cent level. The group with masculine interest had the higher score on Mechanical Knowledge. The mean difference was 3.91 and the t-value was 3.01, which is significant at the 1 per cent level of confidence.

TABLE 3

THE COMPARISONS OF THE GROUP WITH MASCULINE INTEREST
AND THE GROUP WITH FEMININE INTEREST ON THE
GUILFORD-ZIMMERMAN APTITUDE SURVEY

Scale	Masculine Group N = 104		Feminine Group N = 101		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
Verbal Comprehension	21.88	9.11	24.14	12.02	1.51
General Reasoning	12.84	4.83	12.02	5.63	1.12
Numerical Operations	57.92	18.28	55.63	18.73	0.88
Perceptual Speed	43.46	10.20	45.40	9.78	1.39
Spatial Relations	20.14	9.94	22.09	9.45	1.44
Spatial Visualization	27.88	12.80	32.05	13.76	2.25
Mechanical Knowledge	33.46	8.52	29.55	10.03	3.01

While the differences on some of the specific aptitudes were not as clear-cut as might have been desired, they did indicate trends. The data point out that those students in the group with masculine interest appeared to be better in Mechanical Knowledge and tended to do somewhat better in General Reasoning and Numerical Operations than did those in the group with feminine interest.

The group with feminine interest scored higher in Spatial Visualization and tended to do better in Verbal Comprehension, Perceptual Speed, and Spatial Orientation than did the group with masculine interest.

These results on the various scales of the Guilford-Zimmerman Aptitude Survey for the two groups, masculine interest and feminine interest, coincide fairly closely with the scales of the ACE. On the ACE, the group with masculine interest did better on Arithmetical Reasoning, Number Series, and Figure Analogies. On the Guilford-Zimmerman Aptitude Survey, the group with masculine interest tended to rate higher in Mechanical Knowledge, General Reasoning, and Numerical Operations. The group with feminine interest scored higher on Same-Opposite, Completion, and Verbal Analogies on the ACE. On the Guilford-Zimmerman Aptitude Survey, the group with feminine interest did better on Spatial Visualization, Verbal Comprehension, Perceptual Speed, and Spatial Orientation.

The Comparison of the Group with Masculine Interest
and the Group with Feminine Interest
on Psychological Adjustment

The instruments that were used in this study to evaluate psychological adjustment were the Bell Adjustment Inventory and the MMPI. Only the Total score was employed on the Bell. However, each scale of the MMPI was statistically treated and comparisons were made on each scale.

If femininity in the male is a sign that he has not fully accepted the social position of the male, there should be some evidence that this non-acceptance has led to frustrations and maladjustment. This lack of adjustment to the socially required sex role should have some effect on the individual's personality. Some manifestation of poor adjustments should be reflected on the individual's responses to a test of personality. Furthermore, the assumption would be that males who are predominantly feminine in interest will be less well adjusted than males who are predominantly masculine in interest.

The results of this investigation indicate that those in the group with masculine interest are generally better adjusted than those in the group with feminine interest. Tables 4 and 5 contain the data on which this statement is based. Graph 2 contains the profiles of the two groups on the MMPI.

TABLE 4

THE COMPARISON OF THE GROUP WITH MASCULINE INTEREST
AND THE GROUP WITH FEMININE INTEREST ON THE
BELL ADJUSTMENT INVENTORY

Scale	Masculine Group N = 104		Feminine Group N = 101		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
Total Adjustment	30.56	13.98	37.14	15.38	3.21

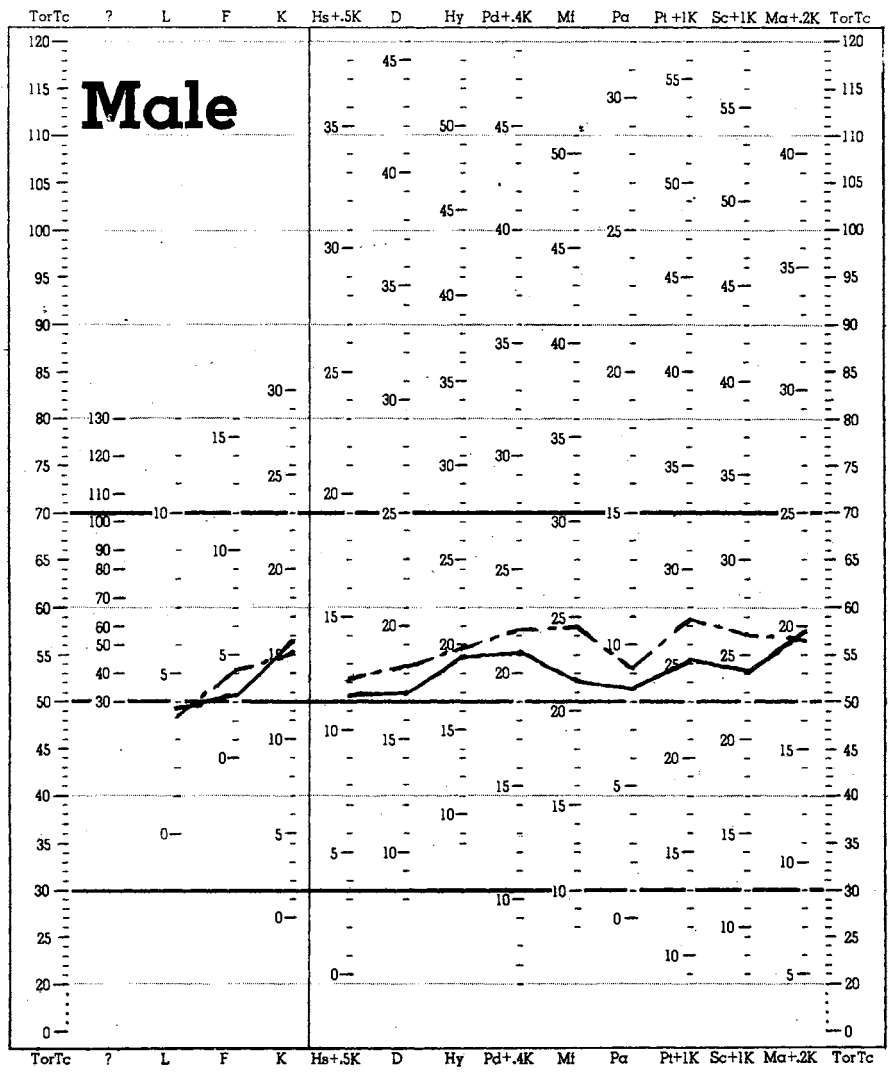
TABLE 5

THE COMPARISON OF THE GROUP WITH MASCULINE INTEREST
AND THE GROUP WITH FEMININE INTEREST ON THE
MINNESOTA MULTIPHASIC PERSONALITY INVENTORY

Scale	Masculine Group N = 104		Feminine Group N = 101		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
L	49.73	8.14	49.26	7.52	0.43
F	50.49	5.25	53.16	6.53	3.22
K	56.62	8.35	55.16	8.29	1.26
Hs	50.82	7.48	52.20	8.48	1.23
D	50.81	8.78	53.88	11.27	2.18
Hy	54.97	7.45	55.59	8.08	0.57
Pd	55.15	8.80	57.39	9.60	1.74
Mf	52.35	7.48	57.61	9.00	4.53
Pa	51.30	7.76	53.65	8.58	2.06
Pt	54.71	8.57	58.72	10.58	2.97
Sc	53.35	8.13	57.00	9.89	2.87
Ma	57.38	9.10	56.38	9.32	0.78

The Minnesota Multiphasic Personality Inventory

Starke R. Hathaway and J. Chamley McKinley



_____ Masculine interest pattern
 - - - - - Feminine interest pattern

Graph 2. Profiles of the mean T Scores on the various scales of the Minnesota Multiphasic Personality Inventory for comparison of the masculine and feminine groups.

Total score on the Bell Adjustment Inventory gives the masculine group an average score of 30.56. The average score of the group with feminine interest is 6.58 points higher at 37.14, and the t-value is 3.21. The t-value is at the 1 per cent level of confidence. Since a lower score on the Bell indicates better adjustment of the individual concerned, the conclusions can be drawn that those in the group with masculine interest are better adjusted as a group than are those in the group with feminine interest.

The results of the MMPI bear out this conclusion. Of the nine areas of personality measured by the MMPI, the group with feminine interest had a significantly higher score than did the group with masculine interest on five areas. The higher the score on the MMPI, the more maladjusted the individual. Of the remaining three areas, the group with feminine interest had a higher score in two of the areas, and the group with masculine interest had the higher score in the remaining area. None of these three had a statistically significant difference.

Of the three validating scales, the group with masculine interest had a higher score on two of the scales and the group with feminine interest had a higher score on the other scale.

The group with feminine interest tended more toward the abnormal than did the group with masculine interest. The t-value for the Depression scale was 2.18, and for Paranoia

the t-value was 2.06. Both of these t-values are significant at the 5 per cent level of confidence. The t-value for Psychasthenia was 2.97 and for Schizophrenia 2.87. Each of these t-values are significant at the 1 per cent level of confidence. The Interest scale had a t-value of 4.53 with the group with feminine interest scoring higher.

There was a difference between the group with masculine interest and the group with feminine interest in psychological adjustment. The group with feminine interest was characterized by depression, suspiciousness, compulsions and phobias, day-dreaming, rationalization, and a general lack of adjustment.

There did not appear to be any real difference between the two groups on the scales of Hypochondriasis, Hysteria, and Hypomania. Even on these three scales, the group with feminine interest had the higher score on both Hypochondriasis and Hysteria while the group with masculine interest was somewhat higher on Hypomania. Of the three validating scales, only one, the F-scale, showed a statistically significant difference. Here, again, the group with feminine interest had a higher score.

Comparison of Number of Students in the Group with
Masculine Interest and the Group with Feminine
Interest Who Finished an Engineering Program,
Who Finished any Four Year College Program,
and Who Dropped Out of College

A survey of official college records was made in order to ascertain whether or not the individuals used in this study finished college. The records were examined further to discover what degrees were obtained by those individuals who finished college.

From the group with masculine interest, one hundred and four cases, forty-five finished engineering, sixteen finished some other college program, and forty-three dropped out of college. The percentages show that 43.27 per cent finished engineering, 15.78 per cent finished some other college program, and 41.35 per cent dropped out of college. Of the group with masculine interest, sixty-one, or 58.65 per cent, finished some four year college program.

In the group with feminine interest, one hundred and one cases, twenty finished engineering, twenty-five finished some other college program, and fifty-six dropped out of college. The percentages are as follows: 19.80 per cent finished engineering, 24.75 per cent finished some other college program, and 55.45 per cent dropped out of college. Of this group with feminine interest, forty-five, or 44.55 per cent, finished some four year college program.

T-values were computed between the group with masculine interest and the group with feminine interest for the following comparisons:

1. The per cent who finished engineering.
2. The per cent who finished any college program.
3. The per cent who dropped out of college.

In a comparison of the group with masculine interest and the group with feminine interest, the data reveal that a significantly larger percentage of the group with masculine interest finished engineering. The t-value is 3.74, which is significant at the 1 per cent level of confidence. Moreover, a larger percentage of the group with masculine interest finished any college program. The t-value for this comparison is 2.04, which is significant at the 5 per cent level of confidence. Of course, the reverse is true of this last statement. A greater percentage of the group with feminine interest dropped out of college. The same t-value of 2.04 applies here.

The Comparisons of Students Who Finished Engineering,
Students Who Finished Some Other College Program,
and Students Who Dropped Out of College

Official college records were examined in order to ascertain the types of degrees, if any, obtained by the individuals used in this study. This examination of the records revealed that of the two hundred and five subjects used in the study, sixty-five received degrees in an

engineering program, forty-one received degrees in some other college program, and ninety-nine failed to finish any type of college program.

Comparisons were made between these three groups on the factors of interests, abilities, and personality. Due to the decrease in the number of subjects in each group, few statistically significant differences were found. In fact, an analysis of personality scores on the MMPI and the Bell indicates that there are no differences in personality adjustment. Tables 6, 7, and 8 contain the pertinent data on the Bell Adjustment Inventory. Tables 9, 10, and 11 and Graph 3 contain the pertinent data on the MMPI.

There are some statistically significant differences in abilities as measured by the ACE and the Guilford-Zimmerman Aptitude Survey. On the Q-score of the ACE, both those students who received degrees in engineering and those who received degrees in some other college program were significantly superior to those students who did not receive college degrees. The t-score in both comparisons was significant at the 5 per cent level of confidence. There was no difference on the Q-score between those students who finished engineering and those students who finished some other college program.

The L-score gave only one significant difference in revealing that engineers are significantly superior to those students who dropped out of college. The same fact is true

TABLE 6

A COMPARISON ON THE BELL ADJUSTMENT INVENTORY OF STUDENTS WHO FINISHED AN ENGINEERING PROGRAM AND THOSE STUDENTS WHO FINISHED SOME OTHER COLLEGE PROGRAM

Scale	Finished Engineering		Finished Some Other Program		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
Total Adjustment	33.65	15.97	32.71	14.74	0.31

TABLE 7

A COMPARISON ON THE BELL ADJUSTMENT INVENTORY OF STUDENTS WHO FINISHED AN ENGINEERING PROGRAM AND THOSE STUDENTS WHO DROPPED OUT OF COLLEGE

Scale	Finished Engineering		Dropped Out of College		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
Total Adjustment	33.65	15.97	34.35	14.51	0.29

TABLE 8

A COMPARISON ON THE BELL ADJUSTMENT INVENTORY OF STUDENTS WHO FINISHED SOME OTHER COLLEGE PROGRAM AND THOSE STUDENTS WHO DROPPED OUT OF COLLEGE

Scale	Finished Some Other Program		Dropped Out of College		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
Total Adjustment	32.71	14.74	34.35	14.51	0.60

TABLE 9

A COMPARISON ON THE MINNESOTA MULTIPHASIC PERSONALITY
INVENTORY OF THOSE WHO FINISHED AN ENGINEERING
PROGRAM AND THOSE WHO FINISHED SOME
OTHER COLLEGE PROGRAM

Scale	Finished Engineering N = 65		Finished Some Other Program N = 41		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
L	50.82	8.59	49.83	7.59	0.62
F	50.82	4.48	52.54	6.87	1.41
K	57.35	8.37	56.24	7.98	0.68
Hs	52.08	6.59	52.63	7.58	0.38
D	50.58	9.23	54.27	10.77	1.80
Hy	56.11	6.58	56.00	8.17	0.07
Pd	56.45	7.87	55.85	8.55	0.36
Mf	54.57	8.78	56.83	8.23	1.33
Pa	52.65	8.36	52.17	6.92	0.32
Pt	55.72	8.13	57.68	8.92	1.13
Sc	54.25	8.71	56.95	8.88	1.53
Ma	57.60	8.73	55.20	9.41	1.30

TABLE 10

A COMPARISON ON THE MINNESOTA MULTIPHASIC PERSONALITY
INVENTORY OF THOSE WHO FINISHED AN ENGINEERING
PROGRAM AND THOSE WHO DROPPED OUT OF COLLEGE

Scale	Finished Engineering N = 65		Dropped Out of College N = 99		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
L	50.82	8.59	48.49	7.27	1.81
F	50.82	4.48	52.15	6.51	1.55
K	57.35	8.37	54.80	8.33	1.90
Hs	52.08	6.59	50.65	8.90	1.18
D	50.58	9.23	52.66	10.38	1.34
Hy	56.11	6.58	54.43	8.22	1.45
Pd	56.45	7.87	56.29	10.34	0.11
Mf	54.57	8.78	54.40	8.68	0.12
Fa	52.65	8.36	52.45	8.69	0.15
Pt	55.72	8.13	56.91	11.05	1.06
Sc	54.25	8.71	54.99	9.59	0.51
Ma	57.60	8.73	57.12	9.37	0.33

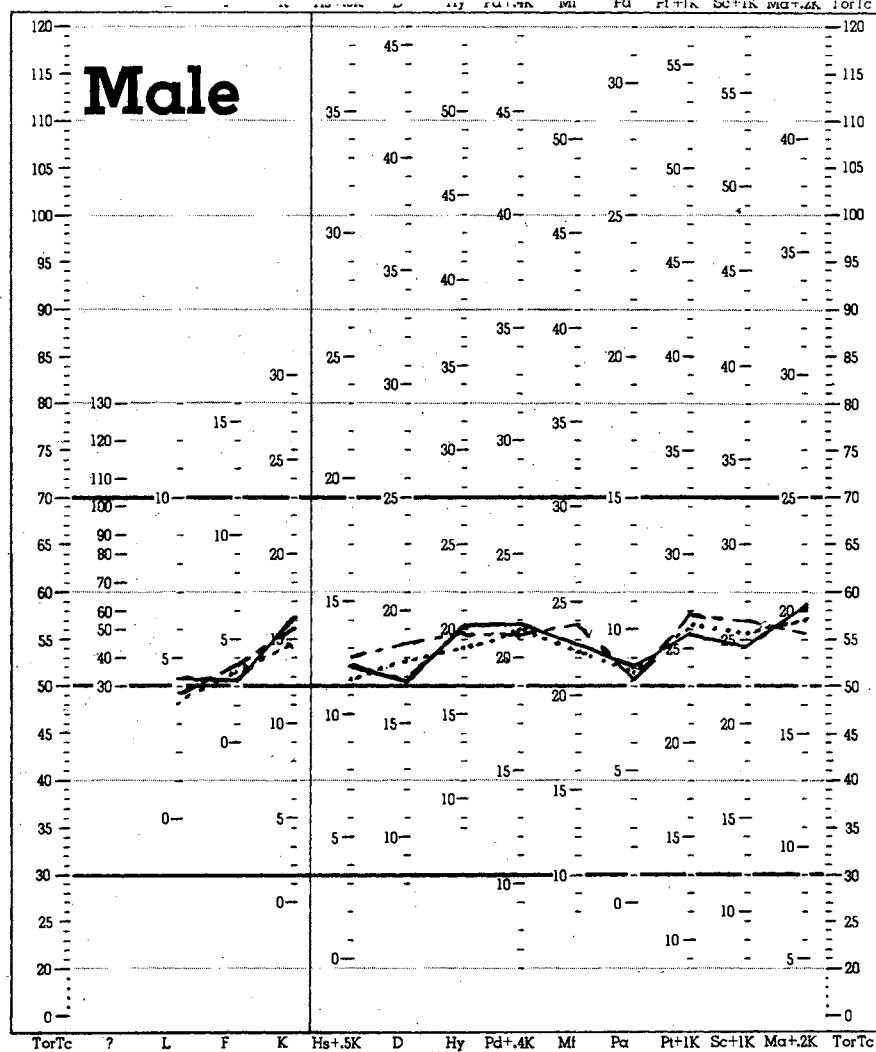
TABLE 11

A COMPARISON ON THE MINNESOTA MULTIPHASIC PERSONALITY
INVENTORY OF THOSE WHO FINISHED SOME
OTHER COLLEGE PROGRAM AND THOSE
WHO DROPPED OUT OF COLLEGE

Scale	Finished Some Other Program		Dropped Out of College		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
L	49.83	7.59	48.49	7.27	0.96
F	52.54	6.87	52.15	6.51	0.31
K	56.24	7.98	54.80	8.33	0.95
Hs	52.63	7.58	50.65	8.90	1.32
D	54.27	10.77	52.66	10.38	0.81
Hy	56.00	8.17	54.43	8.22	1.03
Pd	55.85	8.55	56.29	10.34	0.26
Mf	56.83	8.23	54.40	8.68	1.55
Pa	52.17	6.92	52.45	8.69	0.20
Pt	57.68	8.92	56.91	11.05	0.43
Sc	56.95	8.88	54.99	9.59	1.15
Ma	55.20	9.41	57.12	9.37	1.09

The Minnesota Multiphasic Personality Inventory

Starke R. Hathaway and J. Charnley McKinley



_____ Those finishing engineering
 - - - - - Those finishing some other program
 Those dropping out of college

Graph 3. Profiles of the mean T scores on the various scales of the Minnesota Multiphasic Personality Inventory for comparison of those students who finished an engineering program, those students who finished some other college program, and those students who dropped out of college.

for the Total score of the ACE. The only significant difference for the Total score was that those students who received degrees in engineering were superior to those students who dropped out of college. Tables 12, 13, and 14 summarize the data on the ACE.

TABLE 12

A COMPARISON ON THE ACE OF THOSE WHO FINISHED AN ENGINEERING PROGRAM AND THOSE WHO FINISHED SOME OTHER COLLEGE PROGRAM

Scale	<u>Finished Engineering</u> N = 65		<u>Finished Some Other Program</u> N = 41		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
Q-score	45.85	9.55	45.90	9.72	0.03
L-score	62.11	14.49	59.73	15.33	0.79
Total Score	107.95	21.77	105.63	22.90	0.51

TABLE 13

A COMPARISON ON THE ACE OF THOSE WHO FINISHED AN ENGINEERING PROGRAM AND THOSE WHO DROPPED OUT OF COLLEGE

Scale	<u>Finished Engineering</u> N = 65		<u>Dropped Out of College</u> N = 99		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
Q-score	45.85	9.55	40.78	9.52	2.01
L-score	62.11	14.49	57.38	13.66	2.09
Total Score	107.95	21.77	98.16	20.85	2.86

TABLE 14

A COMPARISON ON THE AGE OF THOSE WHO FINISHED SOME
OTHER COLLEGE PROGRAM AND THOSE WHO
DROPPED OUT OF COLLEGE

Scale	Finished Some Other Program N = 41		Dropped Out of College N = 99		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
Q-score	45.90	9.76	40.78	9.52	2.83
L-score	59.73	15.33	57.38	13.66	0.84
Total Score	105.63	22.90	98.16	20.85	1.79

The Guilford-Zimmerman Aptitude Survey results gave a dearth of significant differences, also. Tables 15, 16, and 17 contain the data on the Guilford-Zimmerman. On Part I (Verbal Comprehension) and Part VI (Spatial Visualization) there were no significant differences between any of the three groups. On Part II (General Reasoning), those students who finished engineering were superior to those students who dropped out of college. These differences were significant at the 5 per cent and 1 per cent level of confidence, respectively. Those students who finished some other college program were superior to those students who dropped out of college on Part II. The t-value was 2.16, which is significant at the 5 per cent level of confidence.

Part IV (Perceptual Speed), gave only one significant difference in showing that those students who finished some other college program were superior to those students who

did not finish any college program. The t-value for this difference was 1.96, which is significant at the 5 per cent level of confidence.

TABLE 15

A COMPARISON ON THE GUILFORD-ZIMMERMAN APTITUDE SURVEY OF THOSE WHO FINISHED AN ENGINEERING PROGRAM AND THOSE WHO FINISHED SOME OTHER COLLEGE PROGRAM

Scale	Finished Engineering N = 65		Finished Some Other Program N = 41		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
Ver. Comp.	24.02	10.33	22.59	8.96	0.75
Gen. Reas.	14.71	4.44	12.83	5.00	1.96
Num. Oper.	58.11	17.43	57.32	16.10	0.24
Per. Speed	45.60	10.32	46.39	9.73	0.40
Spat. Rel.	24.03	10.33	21.46	8.40	1.39
Spat. Visu.	31.91	14.37	28.88	12.26	1.15
Mech. Know.	33.66	8.72	29.80	9.39	2.10

TABLE 16

A COMPARISON ON THE GUILFORD-ZIMMERMAN APTITUDE
 SURVEY OF THOSE WHO FINISHED AN ENGINEERING
 PROGRAM AND THOSE WHO DROPPED
 OUT OF COLLEGE

Scale	Finished Engineering N = 65		Dropped Out of College N = 99		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
Ver. Comp.	24.02	10.33	22.49	11.53	0.88
Gen. Reas.	14.71	4.44	10.78	5.26	5.15
Num. Oper.	58.11	17.43	55.72	20.05	0.81
Per. Speed	45.60	10.32	42.82	9.72	1.73
Spat. Rel.	24.03	10.33	19.03	9.35	3.14
Spat. Visu.	31.91	14.37	29.08	13.14	1.27
Mech. Know.	33.66	8.72	30.86	9.80	1.92

TABLE 17

A COMPARISON OF THE GUILFORD-ZIMMERMAN APTITUDE
 SURVEY OF THOSE WHO FINISHED SOME OTHER
 COLLEGE PROGRAM AND THOSE WHO
 DROPPED OUT OF COLLEGE

Scale	Finished Some Other Program N = 41		Dropped Out of College N = 99		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
Ver. Comp.	22.59	8.96	22.49	11.53	0.06
Gen. Reas.	12.83	5.00	10.78	5.26	2.16
Num. Oper.	57.32	16.10	55.72	20.05	0.49
Per. Speed	46.39	9.73	42.82	9.72	1.96
Spat. Rel.	21.46	8.40	19.03	9.35	1.49
Spat. Visu.	28.88	12.26	29.08	13.14	0.09
Mech. Know.	29.80	9.39	30.86	9.80	0.60

Part V (Spatial Relations), revealed those students who received degrees in engineering to be superior to those students who received no degrees. With a t-value of 3.14, this difference is significant at the 1 per cent level of confidence. No other differences are significant on Part V.

Those students who received degrees in engineering are statistically superior to those students who received degrees for some other college programs, as shown on Part VII (Mechanical Knowledge). The t-value is 2.10, which is significant at the 5 per cent level. No other differences on Part VII were significant.

From the above data and examination of the appropriate tables, it may be assumed that those students who received degrees in engineering are superior to those students who dropped out of college in the following abilities: quantitative (Q-score), linguistic (L-score), and Total score, as measured by the ACE; General Reasoning and Spatial Relations, as measured by the Guilford-Zimmerman Aptitude Survey.

Students who received degrees in engineering are superior to those students who received degrees in some other college program in General Reasoning and Mechanical Knowledge. On the other hand, those students who received degrees in some other college programs showed superiority to those students who dropped out of college in quantitative tests (Q-score) on the ACE and in General Reasoning and Perceptual Speed, as measured by the Aptitude Survey.

In none of the comparisons made in this study were those students who dropped out of college superior to either of the other two groups. Furthermore, in no comparison were those students who received degrees in some other college program statistically superior to those students who received degrees in engineering.

There were few significant differences in the interest patterns between the three groups. Those students who finished an engineering program had a significantly higher interest in things mechanical than either those who finished some other college program or those who dropped out of college. The only other significant difference was in the interest area of scientific, where those students who finished an engineering program had more interest in the scientific area than those students who dropped out of college. In no other areas of interest were there any significant differences in pattern. Tables 18, 19 and 20 give the significant data on the Kuder Preference Record. Graph 4 gives a profile for each group on the Kuder.

TABLE 18

A COMPARISON ON THE KUDER PREFERENCE RECORD OF THOSE
WHO FINISHED AN ENGINEERING PROGRAM AND THOSE
WHO FINISHED SOME OTHER COLLEGE PROGRAM

Scale	Finished Engineering N = 65		Finished Some Other Program N = 41		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
Mec.	95.92	13.76	86.27	21.17	2.57
Com.	38.29	8.71	36.51	10.16	0.92
Sci.	71.89	13.42	67.41	13.60	1.65
Per.	72.06	17.09	73.39	19.46	0.36
Art.	51.80	11.85	51.17	14.67	0.23
Lit.	40.43	16.15	41.46	13.07	0.36
Mus.	15.08	8.06	16.83	8.70	1.03
Soc.	58.14	17.04	61.80	15.12	1.15
Cle.	47.85	12.35	51.34	9.85	1.59

TABLE 19

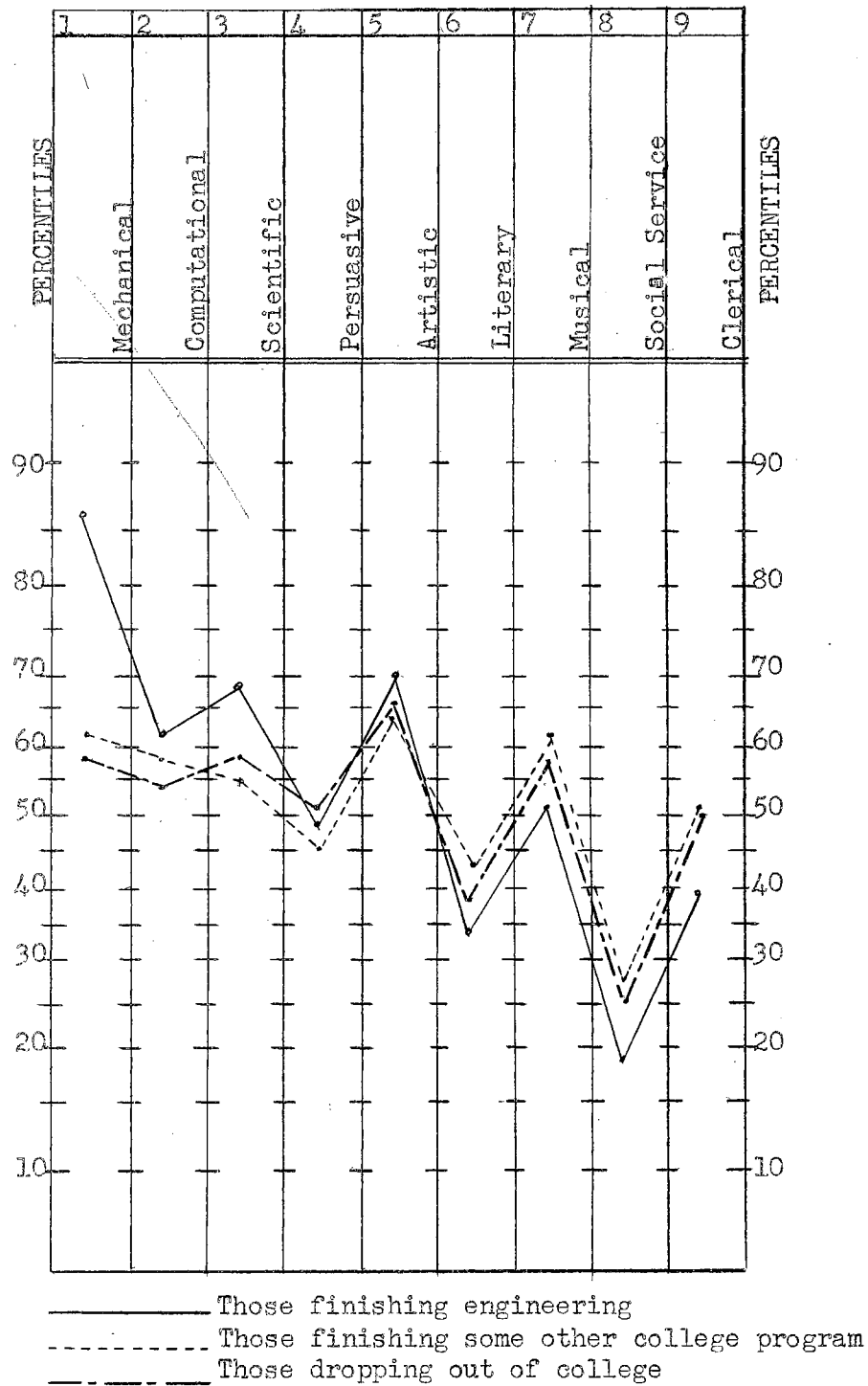
A COMPARISON ON THE KUDER PREFERENCE RECORD OF THOSE
WHO FINISHED AN ENGINEERING PROGRAM AND THOSE
WHO DROPPED OUT OF COLLEGE

Scale	Finished Engineering N = 65		Dropped Out of College N = 99		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
Mec.	95.92	13.76	88.49	19.01	2.90
Com.	38.29	8.71	37.48	10.89	0.53
Sci.	71.89	13.42	66.44	15.10	2.42
Per.	72.06	17.09	69.36	18.23	0.96
Art.	51.80	11.85	50.27	15.51	0.72
Lit.	40.43	16.15	43.56	14.39	1.27
Mus.	15.08	8.06	17.49	9.11	1.77
Soc.	58.14	17.04	62.89	16.64	1.77
Cle.	47.85	12.35	51.53	13.36	1.80

TABLE 20

A COMPARISON ON THE KUDER PREFERENCE RECORD OF THOSE
WHO FINISHED SOME OTHER COLLEGE PROGRAM AND
THOSE WHO DROPPED OUT OF COLLEGE

Scale	Finished Some Other Program N = 41		Dropped Out of College N = 99		t-value for Difference between Means
	Mean	S.D.	Mean	S.D.	
Mec.	86.27	21.17	88.49	19.01	0.58
Com.	36.51	10.16	37.48	10.89	0.50
Sci.	67.41	13.60	66.44	15.10	0.37
Per.	73.39	19.46	69.36	18.23	1.16
Art.	51.17	14.67	50.27	15.51	0.32
Lit.	41.46	13.07	43.56	14.39	0.83
Mus.	16.83	8.70	17.49	9.11	0.40
Soc.	61.80	15.12	62.89	16.64	0.37
Cle.	51.34	9.85	51.53	13.36	0.09



Graph 4. Profiles of the mean percentiles on the areas of the Kuder Preference Record for comparison of those students who finished an engineering program, those students who finished some other college program, and those students who dropped out of college.

CHAPTER V

GENERAL SUMMARY

During recent years, the interest-ability-personality pattern approach has been employed as a technique in the search for a better understanding of individual differences as related to various vocations and college training programs. Considerable research has been carried on with respect to differences between the sexes; however, there have been few studies directed toward differences between members of the same sex. It is obvious that much research needs to be added, not only for the practical purposes of selection and guidance, but also to supplement the current scientific understanding of human behavior.

This study dealt with the factors of interests, abilities, and personality as they relate to masculinity-femininity of only one sex--namely, the male. In addition, this study considered the factors of interests, abilities, and personality as they relate to the type of college program undertaken and the degree to which the program was completed. Data for this study were secured by use of the following instruments: Kuder Preference Record, Form B; American Council on Education Psychological Examination, 1947 college edition; Bell Adjustment Inventory, college

form; Guilford-Zimmerman Aptitude Survey; and the Minnesota Multiphasic Personality Inventory.

Summary of Results

Comparison of the Group with Masculine Interest and the Group with Feminine Interest

The results of this study in regard to the inter-relationships between the group with masculine interest and the group with feminine interest are summarized as follows:

1. The group with feminine interest tended to be slightly superior to the group with masculine interest in verbal comprehension; however, the difference was statistically inconclusive.
2. In perceptual speed, the group with feminine interest had the higher average score; however, the difference between means was not statistically significant.
3. The group with feminine interest was slightly superior to the group with masculine interest in spatial relations. The results were not significant.
4. The group with feminine interest was statistically superior to the group with masculine interest in spatial visualization.

5. The group with masculine interest appeared slightly superior in numerical operations, but the difference was not statistically significant.
6. In mechanical knowledge, the group with masculine interest was significantly superior to the group with feminine interest.
7. The group with masculine interest tended to be better adjusted psychologically than the group with feminine interest. Total adjustment on the Bell was statistically significant in favor of the group with masculine interest. On the MMPI, the group with masculine interest obtained a significantly lower (better adjusted) score on these scales: Depression, Masculinity-femininity, Paranoia, Psychasthenia, and Schizophrenia. On no scale of the MMPI was the group with feminine interest statistically better adjusted than the group with masculine interest.
8. The group with masculine interest had a statistically greater interest in the areas of Mechanical, Computational, Scientific, and Persuasive while the group with feminine interest had a statistically greater interest in the areas of Artistic, Musical, Social Service, and Clerical. There was no difference between the groups in the area of Literary interest.

9. No significant differences between the groups existed in general reasoning; however, the group with masculine interest tended to be somewhat superior.
10. There were no statistically significant differences in scholastic aptitude between the group with masculine interest and the group with feminine interest.
11. A statistically significant larger number of students who were predominantly masculine in interest finished an engineering program than did those students who were predominantly feminine in interest.
12. A statistically significant larger number of students who were predominantly masculine in interest finished any type of college program than did those students who were predominantly feminine in interest.
13. A statistically significant larger number of male students who were predominantly feminine in interest dropped out of college than did those students who were predominantly masculine in interest.

Comparisons between Groups
Based on College Program

The findings in this study concerning the comparisons between groups based on college program as as follows:

1. No real difference in verbal comprehension existed between those students who finished an engineering program, those who finished some other college program, and those who dropped out of college.
2. A significant difference existed in general reasoning, as those students who finished an engineering program were superior to those students who finished some other college program and to those students who dropped out of college. Too, those students who finished some other college program were superior to those students who dropped out of college.
3. No real difference existed between the groups in numerical operations.
4. No real difference existed in perceptual speed between those students who finished an engineering program and those students who finished some other college program. Also, no real difference existed in perceptual speed between those students who finished an engineering program and those students who dropped out of college. However, there was a significant difference in favor of those students who finished some other college program over those students who dropped out of college in perceptual speed.
5. The only significant difference in spatial orientation was the superiority of those students who

finished an engineering program over those students who dropped out of college.

6. There was no real difference between the groups in spatial visualization.
7. Those students who finished an engineering program were superior to those students who finished some other college program in mechanical knowledge.
8. There was no real difference in personality adjustment between the groups.
9. There was a statistically significant difference in scholastic aptitude between those students who finished an engineering program and those students who dropped out of college in favor of those students who finished an engineering program.
10. In only two areas of interest were there significant differences found. Those students who finished an engineering program showed more interest in things mechanical than did either those who finished some other college program or those who dropped out of college. Also, the students who finished an engineering program had more interest in things scientific than did those students who dropped out of college.

In all other areas of interest measured in this study there were no significant differences between the groups.

General Conclusions

Due to the natural limitations of such a study, the writer believes that caution should be used in presentation of conclusions. There are, however, general conclusions which seem justified from the findings of this study. They are as follows:

1. There are definite differences in interest patterns between males who are predominantly masculine in interest from those males who are predominantly feminine in interest. Members of the masculine group are interested in areas of mechanical, computational, scientific, and persuasive, whereas students in the group with feminine interest are interested in the areas of artistic, musical, social service, and clerical.
2. Males who are predominantly masculine in interest appear to be better adjusted psychologically than those males who are predominantly feminine in interest.
3. There are no differences in scholastic aptitude between those predominantly masculine in interest and those predominantly feminine in interest.
4. Males who are predominantly masculine in interest have more mechanical knowledge than males who are predominantly feminine in interest while males who are predominantly feminine in interest have better

spatial visualization than males predominantly masculine in interest.

5. More males who are predominantly masculine in interest are more likely to finish any college program than males who are predominantly feminine in interest.
6. There is no relationship between type of college program completed and personality adjustment among the subjects of this study.
7. Those male students who finish an engineering program have a somewhat superior scholastic aptitude over those students who drop out of college.
8. There is no definite difference in interest patterns between those students who finish an engineering program, those who finish some other college program, and those who drop out of college.
9. The social concept of masculinity-femininity can and should be used in the selection of a college training program for a future occupation.

Suggestions for Future Study

Further research with larger masculine and feminine interest groups is recommended to verify the findings of this study. A desirable feature of this further research might be the selection for study of students who are in training in various college programs, such as education,

ministry, law, engineering, commerce, and agriculture. Some specific masculinity-femininity test could be used as the basis for classifying an individual as masculine in interest or feminine in interest. Other tests of interest, ability, and personality, as well as a test of general mental ability, might be included in these investigations.

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VITA

Joseph G. Roye
candidate for the degree of
Doctor of Education

Thesis: A STUDY OF MASCULINITY-FEMININITY OF
MALE FRESHMEN ENGINEERING STUDENTS

Major: Psychology

Biographical:

Born: The writer was born near Houlka, Mississippi, September 5, 1915, the son of Jack S. and Lena Winter Roye.

Undergraduate Study: He attended grade school at Tamaha, Oklahoma, and graduated from the Stigler High School, Stigler, Oklahoma, in 1937. In the spring of 1937 he matriculated at Northeastern State College, Tahlequah, Oklahoma, from which he received the Bachelor of Arts degree, with a major in Mathematics, in May, 1940.

Graduate Study: In June, 1947, he entered the Graduate School of the Oklahoma Agricultural and Mechanical College from which he received the Master of Science degree, with a major in Psychology, in 1948. He attended George Peabody College, Nashville, Tennessee, during the summer term of 1951. He also attended the summer term of 1952 at Tulsa University. Requirements for the Doctor of Education degree were completed in December, 1953.

Experiences: After completing the Bachelor's degree in 1940 the writer entered the armed forces and was released from active duty in April, 1946. At the present time he has a reserve commission as Major in the Medical Service Corps, United States Army. Since 1949 he has been employed at various colleges as Counseling Psychologist.

THESIS TITLE: A STUDY OF MASCULINITY-FEMININITY OF
MALE FRESHMEN ENGINEERING STUDENTS

AUTHOR: Joseph G. Foye

THESIS ADVISER: Dr. Harry K. Brobst

The content and form have been checked and approved by the author and thesis adviser. The Graduate School Office assumes no responsibility for errors either in form or content. The copies are sent to the bindery just as they are approved by the author and faculty adviser.

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