1950

Analysis of the relationship between performance on the Mf scale of the Minnesota multiphasic personality inventory and the Strong vocational interest blank for men

Walter M. Mitchell
The University of Montana

AN ANALYSIS

of

THE RELATIONSHIP BETWEEN PERFORMANCE

on

THE MF SCALE OF THE MINNESOTA MULTIPHASIC

PERSONALITY INVENTORY

and

THE STRONG VOCATIONAL INTEREST BLANK FOR MEN

by

WALTER H. MITCHELL

B.A., Tusculum College, 1942

Presented in partial fulfillment of the
requirement for the degree of
Master of Arts.

Montana State University

1950

Approved:

David S. Brody
Chairman of Board
of Examiners

W. P. Clark
Chairman of Committee
on Graduate Study

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CHAPTER I

INTRODUCTION

In the past two decades much research has been done in the field of interest and personality measurement. This research has been necessitated by an awareness of the need for measuring these aspects of human behavior in order to be better able to make intelligent predictions in counseling and guidance. This idea was expressed by Dewey B. Stuit when he wrote:

> It was the concensus of nearly all those who worked in the selection and classification program of the military services that we had about reached the upper limits of our possible achievements in prediction, working exclusively with measures of the intellectual and motor type. It is also felt that there may be important linkages between intellectual and personality factors which if properly explored, could lead to significant improvement in prediction.[1]

Much progress has been made in practical pencil and paper personality and interest testing; however, some educators and psychologists are very skeptical of such measures. Others take the view which is expressed by John G. Darley as follows:

> Personality and interest tests, broadly conceived, are some of the weapons with which human motivation and the dynamics of personality must be attacked and by which, possibly, they can be reduced to the

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[1] E. G. Williamson, editor, Trends in Student Personnel Work (Minneapolis: University of Minnesota Press, 1949), p. 77.

> level of prediction and control in human behavior. The battle will not stop merely because our weapons are less than perfect.[2]

In examining the literature in counseling and guidance one notes that a great amount of time and effort is being expended in research in the field of interest and personality. With the wide-spread use of empirically standardized tests there has been an increased interest in these areas of measurement. It is felt that this experimental study will be more worthwhile because two empirically standardized tools were used in the collection of data.

I. THE PROBLEM

With the hypothesis that individual personality is made up of interdependent factors operating from within and without the individual, this study has been set up as an exploratory study of the relationship between responses on the Masculinity-Femininity scale of the Minnesota Multiphasic Personality Inventory and the forty-two keys on the Strong Vocational Interest Blank for Men. If personality is the sum of numerous forces which are integrated into a personality pattern one would expect to find a relationship between responses on one structured test and responses on another instrument of the same nature. The whole concept embodies the notion that the interest test responses are related to responses on items of the personality

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[2]Ibid., p.26.

test.

One of Darley's hypotheses is that the origin of occupational types is the by-product of personality types.[3] This kind of study should be able to give evidence to indicate whether or not this hypothesis is tenable. If it is tenable, one should expect to find evidence of the direction of the tendency with regard to the relationship between high and low masculinity-femininity scores and interest responses which are characteristic of occupational groups.

Specifically, the primary purpose of this study was to analyze the scores on the two sets of measures in question and to find if significant differences are indicated between the responses of the high and low groups on the Masculinity-Femininity Key of the Minnesota Multiphasic Personality Inventory and the occupational keys on the Strong Vocational Interest Blank for Men. To do this, the scores of the entering freshman men of 1948 at Montana State University were analyzed.

A second purpose of this study was to find whether there is an observed difference between the profiles of the Strong Vocational Interest Blank for men who are in the

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[3] J. G. Darley, Clinical Aspects and Interpretation of the Strong Vocational Interest Blank, (New York: Psychological Corporation, 1941), p. 56.

highest twenty-seven per cent of the distribution on the Masculinity-Femininity scale of the Minnesota Multiphasic Personality Inventory and those who are in the lowest twenty-seven per cent on this key for the entering freshman men of 1948 at Montana State University.

II. DEFINITIONS

Throughout the report the following abbreviations will be used:

Mf. This symbol will be used for the term, Masculinity-femininity.

MMPI. These letters will be used to denote the Minnesota Multiphasic Personality Inventory.

The Strong. This shortened form will be used instead of The Strong Vocational Interest Blank for Men.

X^2. This will be the symbol used for chi squared.

In order that the reader may better understand the procedure in this study the following terms are defined:

The words, the high group, are used to denote the highest twenty-seven percent in the distribution of 459 scores on the Mf scale of the MMPI.

The words, the low group, are used to denote the lowest twenty-seven percent in the distribution of 459 scores on the Mf scale of the MMPI.

III. IMPORTANCE OF THE SUBJECT

In the literature of interest and personality tests one frequently notes that reference is made to the relationship between interest and personality or personality and interest. Hathaway notes this relationship in his discussion of Mf scores on scales in use and states the following regarding the differences in performance on the scales:

> Whether the observed differences are attributable to nature or nurture is not so important as the fact that the differences exist and probably contribute very materially to vocational and social adjustment.[4]

It has been pointed out that there is some evidence that temperament and endocrine make-up may be related to interest patterns, especially as they affect masculinity-femininity; but the studies in question have been so limited in number and scope that no conclusions can be drawn.[5]

Super[6] further points out that studies by Terman and Miles, Carter and Strong, Yum Strong, Kuder, and Trapler and McCall all agree that men tend to be more interested in activity of a physical nature, mechanical and scientific matters, politics, and selling, while art, music literature,

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[4]Oscar K. Buros, The Third Mental Measurement Yearbook (New Brunswick: Rutgers University Press, 1949), p. 24.

[5]Donald E. Super, Appraising Vocational Fitness, (New York: Harper and Brothers, 1949), p. 405.

[6]Ibid., p. 389.

people, clerical work, teaching, and social work are more characteristic of women. In spite of this assumption, very little has been done to measure the personality factors in men who have interests characteristic of these occupations.

In a discussion of the MMPI, Super[7] points out that

> Occupations which may be appropriate or inappropriate for those who make extreme scores on this inventory cannot as yet be listed, if indeed they ever will be. . . . There are indications that hypomania, hysteria, and femininity may be characteristics which make for success and satisfaction in selling life insurance; that depression and hysterical tendencies may be suggestive of social work for women; and masculinity may make saleswork a suitable outlet (other things being equal) for women. Other possible vocational implications of this inventory need confirmation with larger and more representative groups whose background and working environment must be carefully described for the data to be meaningful.

Since this study was designed as an exploratory study in the field, the effort has been expended to test for one scale on the MMPI as an example of what can be done with the entire series of scales on the MMPI.

Both Darley[8] and Tyler[9] have also pointed out the need for further study in this area of relationship between interest and personality patterns. Both believe that there is a good opportunity for experimentation in this area.

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[7]Ibid., p. 508.

[8]Darley, op. cit., pp. 56-57.

[9]Leona E. Tyler, The Psychology of Human Differences, (New York: Appleton-Century Crafts, Inc., 1949), p. 381.

CHAPTER II

RELATED INFORMATION

In the field of research literature numerous studies have been reported that vaguely relate to this problem; however, very few have been reported that have a direct bearing on the problem. Several studies have been so designed that one or more occupational scales have been compared to personality test profiles; but very few have been reported that have been designed to study occupational profiles and only one "personality" trait.

It would be impossible to go into a complete survey of the entire area. It is felt that some understanding may be gained by sampling the areas of study in the field of personality and interest. The remaining part of this chapter will deal with such a sampling of studies.

Several studies have been made in the area of interest and adjustment. Alteneder[1] found no correlations that exceeded .25 between men's adjustment and interest scores for six occupations and only four that exceeded that for seven women's occupations. No test of significance was reported; so it cannot be determined from the report whether the

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[1]L. E. Alteneder, "The Value of Intelligence, Personality, and Vocational Interest Tests in a Guidance Program," Journal of Educational Psychology, 31:449-459, 1940.

correlations were significant. Berdie[2], using the Minnesota Personality Scale and the Strong, found some interesting relationships between adjustment and interest. The study reported that high school seniors with interests like those of engineers had inferior social adjustment; whereas, those with social welfare interests were better adjusted socially and emotionally. Darley[3], using the Bell Adjustment Inventory, the Minnesota Scale for the Survey of Opinions, and the Strong, found that home and emotional adjustments were not related to any occupational interest pattern. He also found that inferior feelings were somewhat less common in those with welfare interests than in those with technical or no primary interest pattern, and that family attitudes were somewhat better in men with business detail interests than in those with linguistic or no primary interest pattern. Tyler[4] has shown that persons with science interests differ significantly from those with sales interests in the kinds of social adjustments in which they attain satisfaction. The salesmen enjoy big social affairs and a variety of acquaintances, while the science men prefer small groups of intimate friends.

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[2]R. F. Berdie, "Factors Associated with Vocational Interest," Journal of Educational Psychology, 34:257-277, 1943.

[3]Darley, op. cit., p. 63.

[4]Leona E. Tyler "Relationships between Strong Vocational Interest Scores and Other Attitude and Personality Factors," Journal of Applied Psychology, 29:58-67, 1945.

Studies have also been reported in the field of attitudes and interests. These studies have dealt with the characteristic attitudes of individuals who score high on occupational keys. In a study of social attitudes and vocational interests during the depression, Darley[5] found that students with interests like those of YMCA physical directors and personnel managers had the highest morale while those with interests like those of engineers and chemists were lowest on morale. These findings were evidenced from a study made with the Strong and the Minnesota Scale for the Survey of Opinions. The preliminary study led to a more extensive study in which no significant relationship was found between morale scores and types of interests. In the same study, a generalization was made that those with welfare interests were found to be most liberal in attitude and those with business detail least liberal. Sarbin and Berdie[6] made a study of the relationship between interest scores on the Strong and scores on the Allport-Vernon Study of Values, using fifty-two college students as subjects. The only significant finding in this study was that there was a significant positive relationship between scientific interests

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[5]J. G. Darley, "Preliminary Study of the Relationship between Attitude, Adjustment, and Vocational Interest Tests," Journal of Educational Psychology, 29:467-473, 1938.

[6]T. R. Sarbin and R. F. Berdie, "Relation of Measured Interests to the Allport-Vernon Study of Values," Journal of Applied Psychology, 24:287-296, 1940.

and theoretical values, and between welfare interests and religious values.

There have been several studies regarding ability in an occupation and personality test patterns, but these studies have been exploratory in nature and lead to very few clear-cut generalizations. Bills[7] found some degree of relationship between interest and personality test scores and criteria of success in sales among a group of seven hundred insurance salesmen. Carroll[8] found no significant relationship between ability in art and introversion, submissiveness, or emotional stability from data collected on several hundred University of Minnesota students. Dodge[9] found fairly clear-cut indications that there were personality differences between better and poorer clerical workers in four different companies. Duffey and Crissy[10] obtained data on 108 college women and analyzed this data by the method of intercorrelation.

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[7]Marion A. Bills, "Selection of Casualty and Life Insurance Agents," Journal of Applied Psychology, 25:6-10, 1941.

[8]H. A. Carroll, "A Personality Report on the Study of the Relationship between Ability in Art and Certain Personality Traits," School and Society, 36:285-288, 1932.

[9]A. P. Dodge, "What are the Personality Traits of the Successful Clerical Worker?" Journal of Applied Psychology, 24:576-586, 1940.

[10]E. Duffy and W. J. E. Crissy, "Evaluation Interests as Related to Vocational Interest and Academic Achievement," Journal of Abnormal and Social Psychology, 35:226-245, 1940.

They found intercorrelations in the .30's, which were in the expected direction, between academic achievement in school and interest, i. e. those in art with high interest scores tended to place high in academic achievement in that area. Roe[11] found, by a study of the Rorschach and Thematic Apperception tests of artists, that artists were non-aggressive and more "feminine" according to our culture. The explanation was made in the study that it was, perhaps, because of our cultural labeling of feminine traits and our attempts to maintain the stereotyped version of the male. Spraggia[12] found, in comparing art student and non-art student, that the art student tends to be more feminine in his basic interest pattern. This difference was significant at the one per cent level of confidence. Lewis[13] made a study of insurance salesmen and women social workers by comparing the MMPI scores with their respective sex norm group. The insurance salesmen were found to be more depressive, hysterical, psychopathic, feminine, paranoid, and hypomanic. The

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[11]A. Roe, "The Personality of Artists," Educational and Psychological Measurement, 6:401-408, 1946.

[12]Martin Spraggia, "An Investigation of the Personality Traits of Art Students," Educational and Psychological Measurement, 10:285-293. 1950.

[13]J. A. Lewis, "Kuder Preference Record and MMPI Scores for Two Occupational Groups," Journal of Consultant Psychology. 11:194-201. 1947.

differences in the study were slight.

In an area which is more closely related to this thesis study, some significant reports have been made. In one study the relationship of mean scores on the Strong, the Kuder Preference test, the Bell Adjustment Inventory were studied with reference to the Mf scale on the MMPI as a criterion. One of the significant generalizations may be noted in the following:

> Male veterans scoring high on the Mf scale on the Minnesota Multiphasic Personality Inventory exhibit greater objective sensitivity to their environment and an increasing warmth of feeling for others. They are interested in people and language, like reading and music, and dislike activities involving manipulating material objects.[14]

Nance[15] examined 102 prospective teachers, fifty-one men and fifty-one women, with the Strong, the MMPI, and the Guilford Martin Inventory of Factors GAMIN. The results were then compared on the three tests to determine the Mf character of the students. Correlations ranging from .28 to .51 for men, and from .20 to .22 for women on the various scales of the three tests. On all three tests the Mf scores

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[14] W. A. Varvel, "Diagnosis and Evaluation," Psychological Abstracts, 24:5, para 2599, 1950, citing Wm. C. Cottle and Jackson O. Powell, "Relationship of Strong, Kuder, and Bell Inventories with the MMPI Mf Scale as Criterion." Trans. Kans. Acad. Sci., 52, 396-398, 1949.

[15] R. D. Nance, "Masculinity-Femininity in Prospective Teachers," Journal of Educational Research, 42:658-666, 1949.

were higher for the group than the published norms. Among the men students the music students were found to be consistently higher on the Mf. Triggs[16] made a study of temperament traits as measured by the MMPI and vocational interests as measured by the Kuder Preference Record, using thirty-five college men as subjects. Significant relationships reported were between depression and social service ($r = -.34$), depression and clerical ($r = -.36$), psychopathic deviate and mechanical ($r = -.37$), paranoia and computational ($r = -.42$), paranoia and scientific ($r = -.38$), psychasthenia and scientific ($r = -.33$), psychasthenia and musical ($r = .33$), psychasthenia and clerical ($r = .33$), schizoid trends and musical ($r = .39$), and schizoid trends and clerical ($r = .33$).

To summarize the trends in research along the lines of this thesis problem, one might state that the field is so broad that only a boginning has been made. In this beginning some of the results have been contradictory while other studies have indicated a pattern, or trend, as is evidenced by this review. In general, it is quite clear that one cannot, with any great degree of confidence, predict personality from interest measures or interest from personality

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[16] F. O. Triggs, "A Study of the Relationship of Measured Interests to Measured Mechanical Aptitudes, Personality, and Vocabulary," American Psychologist, 2:296 (abstract), 1947.

measures. Some of the studies have pointed to the fact that Mf scales are significantly associated with interest patterns.

CHAPTER III

THE STUDY

The personality test used for this study was the MMPI and the interest test was the Strong. Both of these tests are well-known and widely used in their respective fields of measurement. These tests had been given to entering freshmen at the beginning of Fall Quarter, 1948, at Montana State University. To make the results more meaningful and to suit the purposes of this exploratory study, only the entering freshman men were used. It is quite obvious that results on the Strong would not have been comparable for both men and women, since the women had taken the form for women. After the women had been excluded the total number of cases in the study was 449 men.

I. COLLECTING THE DATA

The results of the measures for each case were included in the case record folder which was on file at the University Counseling Center. The Strong scores were on the "Hankes Report Forms", and the MMPI scores were on the machine-scored answer sheets for the test.

The first part of this study included the clerical task of recording the information taken from these forms. For purposes of convenience a form was made for the collection

of this data.[1] This form has a regular individual Strong profile and a systematic space at the bottom of the sheet for recording the MMPI T-scores. At the beginning of the study it was clear that several methods for making an exploratory study could be utilized so that the scores were taken for all the keys on the MMPI. The MMPI scores were in terms of raw scores; so the manual for the test was used to convert to T-scores.

The data taken for the Strong were the letter-grade scores. Since the results were returned to the University Counseling Center from the scorers on the Hankes Report Forms in terms of letter grades, thus making it impossible to obtain the exact Standard Score because of inaccurate marking, the letter grades were believed to be as accurate as could be obtained. It may, also, be pointed out, in defense of letter grades, that Strong[2] highly recommends their use. To illustrate, he says that there may be no real difference in interest expressed by Standard Scores of 55 and 65 on the clerical scale: both indicate interests like those of clerical workers, and the former may, perhaps, be as representative as the latter.

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[1]See Appendix, p. 85.

[2]E. K. Strong, Vocational Interests for Men and Women, (Palo Alto: Stanford University Press. 1943), p. 67.

After the data for the 449 cases had been collected in terms of T-scores on the MMPI and letter grades on the Strong, it was necessary to analyze the results in order to see if there was a difference between the Strong scores for those who scored high on the scales of the MMPI and those who scored low on the scales. At this point it was decided that one scale of the MMPI could be used as an exploratory study. the Mf scale was chosen for this experiment. Then it was necessary to define the high and low groups on the Mf scale of the MMPI. For purpose of analysis the highest twenty-seven per cent was taken as the limit for the high group, and the lowest twenty-seven per cent as the limit for the low group. This percentage was used because the high and low twenty-seven per cent are usually taken for use in item analysis.

The data then consisted of a high Mf group of 121 cases with T-scores of 65-90, and a low Mf group of 121 cases with T-scores of 35-51. The middle 207 cases were no longer used in the study.

II. ANALYSIS OF DATA

The first step in the actual analysis of the data was to make distributions in terms of letter-grade scores on the Strong for the high and low Mf groups. These distributions were placed on a mimeographed card for conven-

ience in statistical computations.[3]

From these distributions it was a relatively simple matter to obtain median Strong profiles for the high and low Mf groups. This was done by taking each key of the Strong and counting up to the letter in which the mid-score for each group fell.[4] Then each profile was plotted according to letter grade.

For the test of significance between the two distributions for each Strong key, the chi square test was used.

As will be noted in the results of this study, some of the letter-grade categories were combined because they contained such a small number of cases. This combination had to be effected in order not to have some of the theoretical frequencies with less than five cases.

Since the total in each column was balanced with 121 cases, the chi square could be calculated on the mimeographed cards by the following formula:

$$X^2 = \text{Row}\sum\left(\frac{H - ft}{ft}\right)^2 \times 2$$

Then, by summating the entire ft table the value of chi square was found for each Strong key. After these values were known,

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[3]See Appendix, p. 86.

[4]See Chapter IV, Results, p. 20.

the "Table for the Distribution of X^2" was used to check for significance.[5]

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[5]Palmer O. Johnson Statistical Methods in Research, (New York: Prentice-Hall, Inc., 1949), p. 361.

CHAPTER IV

RESULTS

In checking the results of this study it must be noted that a high Mf score does not necessarily indicate homosexuality. Because one group belongs to the high Mf group is certainly no indication of homosexual tendencies. These indicators may only mean that we are dealing with a group of men who are more like women in their interests than they are like men, according to our culture norms One must always take cultural factors into consideration in any interpretation of Mf scores. It is, however, not the purpose of this report to interpret the meaning of scores, but instead to test for the tendency for interest groups to score high or low on the Mf scale.

I. PROFILE RESULTS

In Table I, a summary of letter-grade scores on the keys of the strong for the high and low Mf groups on the MMPI, a profile of the median letter grades is given for each group on the Mf. As may be noted, differences are minimized because of the fact that, in some instances, so many cases were in Category C on the Strong. There may have been some real difference; but this would not show on the profile, since the median scores of both fall in a low category.

In grouping the occupations in a manner similar to that of Darley,[1] a pattern of occupations with differences can be grouped. In the first group, which may be called Biological Science, even though the keys for artist and psychologist are included, it may be noted that there is only one profile difference: that is for the artist key on which the high Mf group scores higher.

In the mathematics and physical science keys there are two differences. These differences are the engineer and chemist keys with the low Mf group having a higher median letter grade.

The low Mf group has a higher median letter grade on the key for production manager. In the so-called Technical group, which includes farmer, aviator, carpenter, printer, et cetera, the low Mf group is consistently higher on the letter-grade scale than is the high Mf group.

In the group that may be referred to as the Handling People group, there are three differences, with the high Mf group scoring higher letter grades on the personnel director key, the YMCA secretary key, and the social science high school teacher key.

On the musician key there is one letter grade difference with the high Mf group scoring higher on the key.

In the Office Occupations group there is a difference in two keys. The low Mf group both make one letter grade

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[1]Darley, op. cit., p. 210.

higher on the Strong key for accountant and purchasing agent.

On the three Sales keys there is a difference on two of the keys. The high Mf group on the real estate salesman and life insurance salesman is one letter grade higher on the Strong key.

The high Mf group is one letter grade higher on the three Linguistic keys.

There was no profile difference on the president-manufacturing concern.

The median Standard Scores for the high and low groups show very little difference on the interest maturity scale or the occupational level scale. As one would expect there is a considerable difference on the Strong masculinity-femininity scale for the high and low Mf groups on the MMPI.

TABLE I

SUMMARY OF LETTER-GRADE SCORES ON THE KEYS OF THE STRONG FOR THE HIGH AND LOW MF GROUPS ON THE MMPI

	Key	High Group	Low Group
I	Artist	C/	C
	Psychologist	C	C
	Architect	C	C
	Physician	C/	C/
	Osteopath	B-	B-
	Dentist	C/	C/
II	Mathematician	C	C
	Physicist	C	C
	Engineer	C	B-
	Chemist	C	C/
III	Production Manager	C/	B
IV	Farmer	B	B/
	Aviator	B-	B/
	Carpenter	C	B
	Printer	B	B/
	Math.-Phys. Sci. Teacher	B-	B/
	Policeman	B-	B
	Forest Service Man	C	B-
V	YMCA Phys. Director	B-	B-
	Personnel Director	C	C/
	Public Administrator	B-	B-
	YMCA Secretary	C	C/
	Soc. Sci. High School Teacher	B-	B
	City School Superintendent	C	C
	Minister	C	C
VI	Musician	B-	B
VII	C. P. A.	C	C
VIII	Accountant	C/	B-
	Office Man	B	B
	Purchasing Agent	B-	B
	Banker	B-	B-
	Mortician	B-	B-
IX	Sales Manager	B-	B-
	Real Estate Salesman	B	B/
	Life Insurance Salesman	C/	B-
X	Advertising Man	C/	B-
	Lawyer	C/	B-
	Author-Journalist	C/	B-
XI	President - Manufacturing Concern	C/	C/
	Interest Maturity	51.3	50.8
	Occupational Level	50.4	48.0
	Masculinity-Femininity	43.5	52.2

II. STRONG KEY RESULTS

In the pages which follow a summary is given for each of the Strong keys. The results are given in table form so that the reader will be able to note the tendency the high and low Mf groups have with regard to the Strong letter-grade scores since chi square does not show the tendency of the scores.

In cases where it has been necessary to combine letter grades for the purpose of computation, the raw distribution will be given and then the chi square table.

It may be noted that there is a tendency for the high Mf group to have higher scores on the Strong artist key. This is evidenced by the fact that all the letter grades for the high Mf group have more cases except letter grade C. This tendency is not highly significant since it is significant at the ten per cent level of confidence.

There is a tendency for the high Mf group to score higher on the Strong Letter grades on the psychologist key, but this is, again, not a highly significant difference. This scale may not be representative of psychologists as a group. Kredt,[1] on the basis of a study, found that the

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[1]Philip H. Kredt "Vocational Interests of Psychologists," Journal of Applied Psychology, 33:482-488, 1949.

TABLE II

ARTIST KEY

RAW DATA

Strong Letter Grade	High Mf Group	Low Mf Group
A	5	0
B+	9	7
B	14	8
B-	17	11
C+	20	19
C	56	76
Total	121	121

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A and B+	14	10.5	7	21
B	14	11.0	8	22
B-	17	14.0	11	28
C+	20	18.5	19	39
C	56	66.0	76	132
Total	121		121	242

$X^2 = 8.530$

Significant between 10% and 5% level of confidence.

TABLE III

PSYCHOLOGIST KEY

RAW DATA

Strong Letter Grade	High Mf Group	Low Mf Group
A	3	1
B/	3	0
B	4	1
B-	6	6
C/	13	8
C	92	105
Total	121	121

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A, B/, and B	10	6.0	2	12
B-	6	6.0	6	12
C/	13	10.5	8	21
C	92	98.5	105	197
Total	121		121	242

$X^2 = 7.382$

Significant between 10% and 5% level of confidence.

1938 psychologist key was not satisfactory. A new key has been developed on the basis of a study of experimental, clinical, guidance, and industrial psychologists.

It is easy to see in Table IV, results for the architect key, that there is practically no difference between the high Mf group and low Mf group that would not occur by chance alone. A very small difference is observable in which the high Mf group has a few more cases in the high Strong letter grades than does the low Mf group, but this could occur from chance.

By inspection of Table V, results for the physician key, one can see that there is practically no difference in the distribution for the two Mf groups. In all the rows there are very small differences between the high or low Mf distribution and the theoretical frequency distribution.

In Table VI, the osteopath key, values of X^2 of this size would, in the long run, be found in as many as ninety per cent of all random samples; hence, there is no significant difference between the two distributions. By examination of the table, it is clear that there is a tendency for the scores to be equally distributed in each distribution.

From the distributions in Table VII, the dentist key, it seems that there is a very slight tendency for the low Mf group to score higher on the Strong; however, this had no significance when the data was subjected to the chi square

TABLE IV

ARCHITECT KEY

RAW DATA

Strong Letter Grade	High Mf Group	Low Mf Group
A	3	1
B/	7	7
B	15	9
B-	15	13
C/	18	27
C	63	64
Total	121	121

CHI SQUARE

Strong Letter Grade	High Mf Score	ft	Low Mf Group	Total
A and B/	10	9.0	8	18
B	15	12.0	9	24
B-	15	14.0	13	28
C/	18	22.5	27	45
C	63	63.5	64	127
Total	121		121	242

$X^2 = 3.672$

Significant at 70% level of confidence.

TABLE V

PHYSICIAN KEY

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	11	9.5	8	19
B/	9	8.5	8	17
B	16	16.5	17	33
B-	19	19.5	20	39
C/	18	17.5	17	35
C	48	49.5	51	99
Total	121		121	242

$X^2 = .706$

Significant at 99% level of confidence.

TABLE VI

OSTEOPATH KEY

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	18	15.0	12	30
B/	10	10.5	11	21
B	18	20.0	22	40
B-	26	24.0	22	48
C/	13	13.5	14	27
C	36	38.0	40	76
Total	121		121	242

$X^2 = 2.230$

Significant at 90% level of confidence.

TABLE VII

DENTIST KEY

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	7	7.5	8	15
B/	8	10.5	13	21
B	18	18.5	19	37
B-	22	19.0	16	38
C/	17	21.5	26	43
C	49	44.0	39	88
Total	121		121	242

$X^2 = 5.252$

Significant at 50% level of confidence.

test. It may be noted that this was the first one of the keys to show any tendency for the low Mf group to score higher than the high Mf group.

In Table VIII the mathematician key there seems to be a slight tendency for the high Mf group to score higher on the Strong; however, this tendency is too slight to be of any significance.

The tendency in Table IX, the physicist key, for few scores to be grouped in the high letter grades may be noted. There is no tendency for either Mf group to be higher on this key.

As noted in Table X, the engineer key, this is the first key to be significant with a high degree of confidence. It is also evidenced from an observation of the distribution that there is a definite difference between the high and low Mf group. The low Mf group has a much larger percentage of cases in all categories except letter grade C. From this sample of male college students those students responding on the MMPI so as to obtain a low Mf score also have the definite tendency, in the long run, to respond on the Strong so as to obtain a higher letter grade on the Strong.

From observation of Table XI, the chemist key, it seems there is a tendency for the low Mf group to score higher on this Strong key. This tendency is not sufficiently significant to be of particular note and is only a tendency. It may

TABLE VIII

MATHEMATICIAN KEY

RAW DATA

Strong Letter Grade	High Mf Group	Low Mf Group
A	1	0
B/	2	1
B	5	4
B-	9	7
C/	21	12
C	83	97
Total	121	121

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A, B/, and B	8	6.5	5	13
B-	9	8.0	7	16
C/	21	16.5	12	33
C	83	90.0	97	180
Total	121		121	242

$X^2 = 4.484$

Significant at 30% level of confidence.

TABLE IX

PHYSICIST KEY

RAW DATA

Strong Letter Grade	High Mf Group	Low Mf Group
A	0	0
B/	4	4
B	3	2
B-	9	11
C/	8	10
C	97	94
Total	121	121

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A B/, and B	7	6.5	6	13
B-	9	10.0	11	20
C/	8	9.0	10	18
C	97	95.5	94	191
Total	121		121	242

$X^2 = .546$

Significant at 95% level of confidence.

TABLE X

ENGINEER KEY

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	7	9.5	12	19
B/	6	10.5	15	21
B	14	16.0	18	32
B-	17	21.0	25	42
C/	9	14.0	19	28
C	68	50.0	32	100
Total	121		121	242

$X^2 = 23.730$

Significant at .1% level of Confidence.

TABLE XI

CHEMIST KEY

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	8	10.0	12	20
B/	9	10.5	12	21
B	10	11.5	13	23
B-	12	15.0	18	30
C/	16	18.0	20	36
C	66	56.0	46	112
Total	121		121	242

$X^2 = 6.836$

Significant at 30% level of Confidence.

be noted that the low Mf group has a median letter grade of C+ while that of the high group is C.

From an observation of the two distributions in Table XII, the production manager key, it is easily seen that the low Mf distribution is very much higher on the Strong letter grades. The chi square test is significant at a lower level than the one-tenth of one per cent level of confidence. A study of the distributions makes it clear that those responding so as to obtain a low Mf score on the MMPI also respond so as to obtain higher scores on this key. It may be noted that the two highest letter grades, the C and C+, contain sixty-eight cases in the high Mf distribution while the lowest two letter grades contain only twenty-six cases in the low Mf distribution. This ratio is about the same in the other direction for the highest Strong letter grades.

Since the farmer key in Table XIII belongs to the so-called Technical group, one would expect the low Mf group frequency distribution to contain more high letter grade scores. On the high Mf group it may be observed that the number of cases is spread over the range from A to C with more cases at the top. This is true for the low Mf group also, but the top categories contain many more in proportion to the lower categories.

On the aviator key in Table XIV the difference between the two distributions is even greater than that for

TABLE XII

PRODUCTION MANAGER KEY

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	6	9.5	13	19
B/	11	16.0	21	32
B	15	24.0	33	48
B-	21	24.5	28	49
C/	30	25.0	20	50
C	38	22.0	6	44
Total	121		121	242

$X^2 = 38.726$

Significant at .1% level of confidence.

TABLE XIII

FARMER KEY

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	27	43.5	60	87
B/	18	19.5	21	39
B	22	20.0	18	40
B-	20	15.5	11	31
C/	19	13.5	8	27
C	15	9.0	3	18
Total	121		121	242

$X^2 = 28.242$

Significant at the .1% level of confidence.

TABLE XIV

AVIATOR KEY

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	23	37.0	51	74
B+	10	18.0	26	36
B	22	17.0	12	34
B-	18	17.0	16	34
C+	22	14.0	6	28
C	26	18.0	10	36
Total	121		121	242

$X^2 = 37.020$

Significant at the .1% level of confidence.

farmer. At the ends of the distributions the same observation may be made as was made for farmer, but on this key the distributions are close together only on the B and B- key; whereas, on the farmer key they were closer on three keys. the B/, B, and B-.

These two distributions in Table XV, the carpenter key, are nearest to equal in the B- and C/ categories. It is interesting to note how the low Mf distribution is spread over all the categories, while the high Mf group has half of the number of cases in the C category. This key is significant with a high degree of confidence with the low Mf group placing many more cases in the upper letter grades of the Strong key.

Although the printer key in Table XVI is included in the Technical group, the letter-grade scores are fairly evenly distributed in the two Mf groups. These distributions were not in agreement with the other keys in this group. which all tend to have a larger number of cases in the higher letter grades for the low Mf group. According to this finding, it would seem that this key may be out of place in this technical group. It is interesting to note that the cases are largely distributed in the B- category and higher. The responses of this sampling that make for high or low scores on this key are not related to any significant degree to the responses that make for high or low Mf scores on the MMPI.

TABLE XV

CARPENTER KEY

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	8	12.0	16	24
B/	9	16.0	23	32
B	10	17.0	24	34
B-	14	14.0	14	28
C/	18	17.0	16	34
C	62	45.0	28	90
Total	121		121	242

$X^2 = 27.518$

Significant at .1% level of confidence.

TABLE XVI

PRINTER KEY

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	29	32.5	36	65
B/	27	28.0	29	56
B	26	24.0	22	48
B-	29	25.0	21	50
C/	6	6.0	6	12
C	4	5.5	7	11
Total	121		121	242

$X^2 = 3.258$

Significant at the 70% level of confidence

The tendency in Table XVII, that of mathematics and physical science teacher, is for the low Mf group to place more cases in the upper Strong letter grades; however, this tendency is not as marked as has been evidenced on some of the other keys in the Technical or Men-in-General group. This tendency is most noticeable by the small number of C ratings for the low Mf group. It may be noticed that it is not a highly significant difference when subjected to the chi square test.

The same tendency is noted in the policeman key in Table XVIII as has been characteristic of this group. There is the marked tendency for the highest two categories to have a larger number of cases in the low Mf distribution while the lowest two categories have the larger number of cases in the high Mf distribution.—The middle two categories, B and B-, are practically the same with regard to percentage of cases. In less than one per cent of cases would a difference this great be obtained by drawing samples from the population.

As is indicated by the chi square test in Table XIX, the forest service man key, these two distributions are not from the same population. The difference is as great as the difference for the keys for aviator and production manager. This difference is evidenced by the fact that seventy-nine cases are in category B- or higher in the low Mf distribution, while only thirty-five cases are in these categories

TABLE XVII

MATHEMATICS AND PHYSICAL SCIENCE TEACHER

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	17	20.5	24	41
B/	18	20.0	22	40
B	21	24.0	27	48
B-	24	23.5	23	47
C/	17	17.0	17	34
C	24	16.0	8	32
Total	121		121	242

$X^2 = 10.368$

Significant between 10% and 5% level of confidence.

TABLE XVIII

POLICEMAN

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	12	18.0	24	36
B/	21	27.0	33	54
B	23	23.0	23	46
B-	17	19.0	21	38
C/	33	23.0	13	46
C	15	11.0	7	22
Total	121		121	242

$X^2 = 18.694$

Significant at the 1% level of confidence.

TABLE XIX

FOREST SERVICE MAN KEY

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	9	15.0	21	30
B/	2	7.5	13	15
B	12	17.5	23	35
B-	12	17.0	22	34
C/	16	15.0	14	30
C	70	49.0	28	98
Total	121		121	242

$X^2 = 37.400$

Significant at .1% level of confidence.

on the high Mf distribution. There can be very little doubt regarding the Mf interest pattern for this Strong key.

The chi square test in Table XX, the YMCA physical director, would indicate there is some significance beyond chance; however, the trend cannot be interpreted. The extreme ends of the distribution, letter grade A and C, do show some small difference with the high Mf group tending to have higher Strong scores; but this does not hold up in the middle of the distribution. In the B/ and B category the low Mf group has a larger percentage than the high Mf group.

In Table XXI, the personnel director key, there is a tendency for the highest three letter grades to have more cases from the high Mf group, while the lowest three letter grades have more cases from the low Mf group. This difference is only significant at between the 10% and 5% level of confidence.

There is practically no difference in Table XXII, the public administrator key, between these two distributions. It may be noted that the extreme end categories, A and C, both have a greater number of cases from the high Mf group, while categories B/, B, B-, and C/ have more cases from the low Mf group.

In Table XXIII, the YMCA secretary key, there is a consistent, significant difference between the distributions. The high Mf group have the greater number of cases in the

TABLE XX

YMCA PHYSICAL DIRECTOR

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	13	9.0	5	18
B/	10	11.5	13	23
B	16	21.0	26	42
B-	27	23.0	19	46
C/	22	20.0	18	40
C	33	36.5	40	73
Total	121		121	242

X^2 = 8.792

Significant at 20% level of confidence.

TABLE XXI

PERSONNEL DIRECTOR

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	7	5.5	4	11
B/	16	10.5	5	21
B	15	12.5	10	25
B-	19	20.5	22	41
C/	12	16.0	20	32
C	52	56.0	60	112
Total	121		121	242

X^2 = 10.373

Significant between the 10% and 5% level of confidence.

TABLE XXII

PUBLIC ADMINISTRATOR

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	9	6.0	3	12
B/	10	10.5	11	21
B	22	24.0	26	48
B-	29	31.0	33	62
C/	20	23.0	26	46
C	31	26.5	22	53
Total	121		121	242

$X^2 = 5.950$

Significant at 50% level of confidence.

TABLE XXIII

YMCA SECRETARY

RAW DATA

Strong Letter Grade	High Mf Group	Low Mf Group
A	7	1
B/	7	0
B	18	7
B-	15	13
C/	15	28
C	59	72
Total	121	121

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A and B/	14	7.5	1	15
B	18	12.5	7	25
B-	15	14.0	13	28
C/	15	21.5	28	43
C	59	65.5	72	131
Total	121		121	242

$X^2 = 21.468$

Significant at .1% level of confidence.

four highest letter grades, while the low Mf group have the greater number in the C and C/ categories.

The distributions in Table XXIV, the social science high school teacher key, are different from the others. The high Mf group contains forty-five cases in the A and B/ categories, while the low Mf group has only twenty-one cases in these categories. This is the chief difference in the two groups. The difference for these two categories is accounted for in the A category. It may be noted that the low Mf group has more cases in the bottom four letter grades. This entire table might be summarized by stating that the primary difference between the high and low Mf groups is that the high group has many more A ratings on the Strong. This one difference is accountable for the largest part, 14.286, of the chi square significance.

The distributions in Table XXV, the city school superintendent key, are marked by the large percentage of scores in category C. It was because of this fact that no difference was evidenced by the median profile study. The significant difference is brought about because only twenty-two cases are above C in the low Mf group, while there are fifty-one cases in the high Mf group. Like the other social service occupations, the direction of significance is for the high Mf group to be significantly higher on this Strong key.

The distributions in the minister key in Table XXVI

TABLE XXIV

SOCIAL SCIENCE HIGH SCHOOL TEACHER

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	24	14.0	4	28
B/	21	19.0	17	38
B	20	22.5	25	45
B-	10	14.0	18	28
C/	22	25.5	29	51
C	24	26.0	28	52
Total	121		121	242

$X^2 = 18.818$

Significant at 1% level of confidence.

TABLE XXV

CITY SCHOOL SUPERINTENDENT

RAW DATA

Strong Letter Grade	High Mf Group	Low Mf Group
A	3	1
B/	2	2
B	12	3
B-	13	5
C/	21	11
C	70	99
Total	121	121

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A, B/, and B	17	11.5	6	23
B-	13	9.0	5	18
C/	21	16.0	11	32
C	70	84.5	99	169
Total	121		121	242

$X^2 = 16.918$

Significant at .1% level of confidence.

are marked by the small number of cases in the high ends. Even in the high Mf group there are only six cases in the combined categories of A and B/. The real difference occurs in the B, B-, C/, and C letter grades. Like the psychologist, the mathematician, and physicist keys, there are relatively few cases beyond category C. The high Mf group has a significantly larger number of cases in the higher letter grades than does the low Mf group.

Again in Table XXVII, the musician key, it may be observed that the ends of the distributions are significantly different for the two groups. Those scoring high on the Mf scale of the MMPI also tend to score significantly higher on the Strong musician key than do those who score low on the Mf scale of the MMPI. This difference is greatest in the Strong A rating where there are three times as many from the high Mf group as there are from the low Mf group. According to our cultural stereotyped version of the profession, one would expect to get this difference on the significance test.

In Table XXVIII, the C. P. A. key, the significant difference that shows the high Mf group to be higher on the Strong key does not show in the extreme upper ends of the distributions. It is only in the B, B-, and C categories that this difference is demonstrated, since both groups have very few cases at the upper ends of the distributions.

TABLE XXVI

MINISTER

RAW DATA

Strong Letter Grade	High Mf Group	Low Mf Group
A	4	0
B/	2	1
B	13	1
B-	16	6
C/	14	5
C	72	108
Total	121	121

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A, B/, and B	19	10.5	2	21
B-	16	11.0	6	22
C/	14	9.5	5	19
C	72	90.0	108	180
Total	121		121	242

$X^2 = 29.772$

Significant at .1% level of confidence.

TABLE XXVII

MUSICIAN

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	30	20.0	10	40
B/	19	15.5	12	31
B	23	22.0	21	44
B-	18	21.0	24	42
C/	17	20.0	23	40
C	14	22.5	31	45
Total	121		121	242

$X^2 = 19.850$

Significant at 1% level of confidence.

TABLE XXVIII

C. P. A.

RAW DATA

Strong Letter Grade	High Mf Group	Low Mf Group
A	2	3
B/	2	2
B	14	2
B-	17	8
C/	25	22
C	61	84
Total	121	121

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A, B/, and B	18	12.5	7	25
B-	17	12.5	8	25
C/	25	23.5	22	47
C	61	72.5	84	145
Total	121		121	242

$X^2 = 11.920$

Significant at 1% level of confidence.

Of the three business detail occupations C. P. A., accountant, and office man, this is the only one with a significant difference. Since this test shows the tendency for the high Mf group to score higher on the key this difference may be explained by the fact that the C. P. A. is a more highly professional occupation. This explanation would coincide with the findings regarding the occupational level keys.

Unlike the C. P. A. key, there seems to be a tendency in the distributions in Table XXIX, the accountant key, for the low Mf group to score higher on the Strong letter grades, except in category B. This tendency is not significant beyond the 30% level, since the initial difference is not great enough to cause a larger difference in the low ends of the scale. It is interesting to compare these distributions with those on the C. P. A. key.

The distributions in the office man key, Table XXX, are not significantly different. Even if there had been a significant chi square, the interpretation would have been difficult since there is no regular pattern. The low group has more A ratings it is true, but the high group has more B/ and B. The other categories are in the same way related. There are more B- ratings on the low group, but less on the C/ and C categories.

The purchasing agent key in Table XXXI shows a

TABLE XXIX

ACCOUNTANT

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	11	12.5	14	25
B/	5	9.5	14	19
B	18	14.0	10	28
B-	22	22.5	23	45
C/	25	25.0	25	50
C	40	37.5	35	75
Total	121		121	242

$X^2 = 7.266$

Significant at 30% level of confidence.

TABLE XXX

OFFICE MAN

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	25	28.5	32	57
B/	28	23.0	18	46
B	18	17.0	16	34
B-	21	26.5	32	53
C/	15	14.0	13	28
C	14	12.0	10	24
Total	121		121	242

$X^2 = 6.244$

Significant at 30% level of confidence.

significant difference between the groups with a fairly clear-cut pattern for the low Mf group to contain more high ratings and less low ratings on the Strong.

In Table XXXII there is no significant difference in the two groups on the banker key. The low Mf group has more cases in the A category; however, the B/ has more cases in the high Mf group. The very small difference shown in chi square, which may be chance, could not be interpreted as true difference in a definite direction.

Although the chi square test in Table XXXIII, the mortician key, gives results that are significant, these results cannot be interpreted in terms of the tendency for either Mf group to be high or low on the key. The greatest single row total that aided in making chi square significant was the B/ category. If this tendency is then checked, it may be noted that it does not change the low end of the distribution enough to make a consistent difference. If A and B/ were combined, it would seem there would be a trend noted; however, again, this tendency does not influence the low end enough for interpretation. Distributions somewhat similar to these two distributions were found in the Strong keys for banker and office man.

In Table XXXIV, the sales manager key, there is no significant difference between the two Mf groups. The only observable difference that could be noted is in the C and C/

TABLE XXXI

PURCHASING AGENT

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	10	14.5	19	29
B/	8	12.5	17	25
B	25	26.0	27	52
B-	23	27.5	32	55
C/	33	28.0	23	56
C	22	12.5	3	25
Total	121		121	242

$X^2 = 23.808$

Significant at .1% level of confidence.

TABLE XXXII

BANKER

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	6	9.5	13	19
B/	18	14.5	11	29
B	21	23.0	25	46
B-	26	26.0	26	52
C/	26	26.5	27	53
C	24	21.5	10	43
Total	121		121	242

$X^2 = 5.116$

Significant at 50% level of confidence.

TABLE XXXIII

MORTICIAN

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	13	15.0	17	30
B+	25	17.0	9	34
B	18	22.0	26	44
B-	25	25.5	26	51
C+	25	30.0	35	60
C	15	11.5	8	23
Total	121		121	242

$X^2 = 13.330$

Significant between 5% and 2% level of confidence.

TABLE XXXIV

SALES MANAGER

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	8	7.0	6	14
B+	16	16.5	17	33
B	23	24.0	25	48
B-	19	19.0	19	38
C+	21	24.5	28	49
C	34	30.0	26	60
Total	121		121	242

$X^2 = 2.466$

Significant at 30% level of confidence.

categories. This alone could not make for significance, unless it influenced the top categories. If these two distributions were plotted, they would show much the same form on the frequency graph.

The direction of significance is difficult to determine in the study shown in Table XXXV, the real estate salesman key. There are more A ratings in the high Mf group, but, at the same time, there are more B/ ratings in the low Mf group. Combining these categories one would find very little difference between the distributions. Also, the low ends of the distributions actually show little difference when B, C/, and C are combined. Graphs of these distributions would be very similar, even though there is a significance between the ten per cent and five per cent level. One must conclude that the differences are not significant.

On the life insurance salesman key in Table XXXVI one may easily observe a distinct difference between the two distributions. The high Mf group has more cases in both the A and B/ categories and also has less cases in the low end of the distribution. Here it may well be concluded that the tendency is significant and that the tendency is marked in the direction of the high Mf group scoring higher on the Strong key.

Here in Table XXXVII, the advertising man key, the

TABLE XXXV

REAL ESTATE SALESMAN

RAW DATA

Strong Letter Grade	High Mf Group	Low Mf Group
A	39	27
B/	23	29
B	27	29
B-	20	31
C/	10	5
C	2	0
Total	121	121

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	39	33.0	27	66
B/	23	26.0	29	52
B	27	28.0	29	56
B-	20	25.5	31	51
C/ and C	12	8.5	5	17
Total	121		121	242

$X^2 = 8.200$

Significant between 10% and 5% level of confidence.

TABLE XXXVI

LIFE INSURANCE SALESMAN

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	24	16.0	8	32
B/	16	14.0	12	28
B	17	19.0	21	38
B-	24	19.5	15	39
C/	21	22.5	24	45
C	19	30.0	41	60
Total	121		121	242

$X^2 = 19.336$

Significant at 1% level of confidence.

trend is readily observable. The individuals making responses that cause high Mf scores on the MMPI also make Strong responses that tend to be significantly higher on the Strong advertising man key. This tendency is carried through by the high Mf group placing more scores in categories A, B/, and B, and fewer scores in B-, C/, and C.

The significant tendency is the same in Table XXXVIII, the lawyer key, as for advertising man since the high Mf group contains more of the top four letter grades and less of the lowest two letter grades on the key.

The same significant trend is evidenced in Table XXIX, the author-journalist key, as for the keys for advertising man and lawyer. These three keys are all three occupations that may be interpreted to be linguistic in nature; hence this is an expected significant difference.

In the president - manufacturing concern key, Table XL, there is no significant difference on these two distributions either from the standpoint of the chi square test or from observation. What difference does exist is chance.

There is no significant difference between the two distributions in Table XLI, the interest maturity key.

Since Strong Standard Scores were available on these last three keys, t tests were made for the significance of differences between means. When the distributions for this key were subjected to the t test. there was no signifi-

TABLE XXXVII

ADVERTISING MAN

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A	18	10.0	2	20
B/	17	10.5	4	21
B	24	19.0	14	38
B-	24	27.5	31	55
C/	21	29.0	37	58
C	17	25.0	33	50
Total	121		121	242

$X^2 = 33.904$

Significant at .1% level of confidence.

TABLE XXXVIII

LAWYER

RAW DATA

Strong Letter Grade	High Mf Group	Low Mf Group
A	6	3
B/	19	7
B	22	13
B-	29	23
C/	20	21
C	25	54
Total	121	121

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A and B/	25	17.5	10	35
B	22	17.5	13	35
B-	29	26.0	23	52
C/	20	20.5	21	41
C	25	39.5	54	79
Total	121		121	242

$X^2 = 20.104$

Significant at .1% level of confidence.

TABLE XXXIX

AUTHOR - JOURNALIST

RAW DATA

Strong Letter Grade	High Mf Group	Low Mf Group
A	7	2
B/	16	8
B	24	14
B-	33	19
C/	23	35
C	18	43
Total	121	121

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A and B/	23	16.5	10	33
B	24	19.0	14	38
B-	33	26.0	19	52
C/	23	29.0	35	58
C	18	30.5	43	61
Total	121		121	242

$X^2 = 24.252$

Significant at .1% level of confidence.

TABLE XL

PRESIDENT - MANUFACTURING CONCERN

RAW DATA

Strong Letter Grade	High Mf Group	Low Mf Group
A	1	6
B/	11	3
B	9	18
B-	34	28
C/	33	36
C	33	30
Total	121	121

CHI SQUARE

Strong Letter Grade	High Mf Group	ft	Low Mf Group	Total
A and B/	12	10.5	9	21
B	9	13.5	18	27
B-	34	31.0	28	62
C/	33	34.5	36	69
C	33	31.5	30	63
Total	121		121	242

$X^2 = 4.280$

Significant at 70% level of confidence.

TABLE XLI

INTEREST MATURITY

RAW DATA

Standard Scores	High Mf Group	Low Mf Group
62-67	6	2
56-61	24	17
50-55	39	48
44-49	31	36
38-43	15	12
32-37	6	6
Total	121	121

CHI SQUARE

Standard Scores	High Mf Group	ft	Low Mf Group	Total
62-67 56-61	30	24.5	19	49
50-55	39	43.5	48	87
44-49	31	33.5	36	67
38-43	15	13.5	12	27
32-37	6	6.0	6	12
Total	121		121	242

$x^2 = 4.110$

Significant at 50% level of confidence.

cant difference between the means.

The tendency for the high Mf group to score higher on the Strong occupational level, Table XLII, may be noted from the chi square test and the examination of the distributions. When the test of the significance of difference between means was made this same conclusion was reached.

High Mf Group	Low Mf Group
Mean = 50.45	Mean = 48.51
σ = 6.27	σ = 7.34
σ_M = 0.573	σ_M = 0.670

σ_{Diff} = 0.88
t = 2.20

Significant at five per cent level of confidence.

Since the high score on the Mf key of the MMPI has a meaning similar to a low score on the Mf key on the Strong, one would expect to get a significant difference between the two Mf groups on the MMPI, as noted in Table XLIII, the masculinity-femininity key. The direction of the tendency should be for the low Mf group on the MMPI to be higher on the Standard Scores on the Strong for this key. The chi square test verifies these expected results: the two keys must be measuring similar aspects of personality.

The approximate results were obtained on the test of differences between means.

High Mf Group	Low Mf Group
Mean = 45.66	Mean = 55.33
σ = 9.85	σ = 8.12
σ_M = 0.90	σ_M = 0.74

TABLE XLII

OCCUPATIONAL LEVEL

RAW DATA

Standard Scores	High Mf Group	Low Mf Group
65-70	1	3
59-64	9	7
53-58	30	13
47-52	47	45
41-46	26	40
35-40	8	13
Total	121	121

CHI SQUARE

Standard Scores	High Mf Group	ft	Low Mf Group	Total
64-70	10	10.0	10	20
53-58	30	21.5	13	43
47-52	47	46.0	45	92
41-46	26	33.0	40	66
35-40	8	10.5	13	21
Total	121		121	242

$X^2 = 10.924$

Significant between the 5% and 2% level of confidence.

TABLE XLIII

MASCULINITY - FEMININITY

RAW DATA

Standard Scores	High Mf Group	Low Mf Group
70-79	0	3
60-69	7	29
50-59	33	62
40-49	50	23
30-39	24	4
20-29	6	0
10-19	1	0
Total	121	121

CHI SQUARE

Standard Scores	High Mf Group	ft	Low Mf Group	Total
70-79 60-69	7	19.5	32	39
50-59	33	47.5	62	95
40-49	50	36.5	23	73
30-39 20-29 10-19	0	0	0	0
Total	121		121	242

$X^2 = 55.692$

Significant at .1% level of confidence.

$$\sigma_{Diff} = 1.165$$
$$t = 8.30$$

Significant at the .1% level of confidence.

III. SUMMARY OF RESULTS

The median Strong profiles of these two groups have shown that there is a difference in performance between the high and low Mf groups in this study. The artist key showed a one-letter grade difference, but this was not highly significant when subjected to the chi square test. There was a two-letter grades difference between the performance of the groups on the engineer key and a one-letter grade difference on the chemist. When subjected to the chi square test the difference for the engineer key was significant at the one-tenth-of-one percent level of confidence, but the chemist key was not significant. The two-letter grades difference, with the low Mf group scoring high, was significant for the production manager key. In the technical occupations, which include farmer, aviator, carpenter, printer, mathematics and physical science teacher, policeman, and forest service man, there was a median profile difference of at least one letter grade on all the keys. This difference was highly significant in all cases except the printer and mathematics and physical science teacher. In the social service keys, which include YMCA physical director, personnel director, public administrator, YMCA secretary, and social science high school

teacher keys. The chi square test for these three keys showed the differences to be highly significant on the YMCA secretary and social science high school teacher keys. The high Mf group showed a higher rating on the musician key, which was significant. In the business detail group there were profile differences on the accountant key and purchasing agent with the low Mf group scoring higher. The difference of the groups on the accountant key was not significant, but the difference on the purchasing agent key was significant. There were differences on the real estate salesman key and life insurance salesman key. The latter was significant with a tendency for the high Mf group to score high on the key, but the differences in performance on the real estate salesman key could not be interpreted. In the linguistic keys, advertising man, lawyer, and author-journalist, the profile differences, with the high group scoring high on the keys, were all highly significant. There was no difference on the president - manufacturing concern key. On the three other keys interest maturity, occupational level, and masculinity-femininity the only great difference on the median standard scores was on the masculinity-femininity key.

On the chi square tests there were eighteen out of thirty-nine occupational keys that showed highly significant differences of performance on the two Mf groups. These differences were all at the one-tenth-of-one percent or the one

per cent level of confidence. These keys may be grouped as follows:

Those keys with tendency for low Mf group to score high on the Strong key.

Engineer	.1%	level	of	confidence
Production Manager	.1%	"	"	"
Farmer	.1%	"	"	"
Aviator	.1%	"	"	"
Carpenter	.1%	"	"	"
Policeman	1%	"	"	"
Forest Service Man	.1%	"	"	"
Purchasing Agent	.1%	"	"	"

Those with tendency for high Mf group to score low on the Strong key.

YMCA Secretary	.1%	level	of	confidence
Soc. Sci. HS Teacher	1%	"	"	"
City School Supt.	.1%	"	"	"
Minister	.1%	"	"	"
Musician	1%	"	"	"
C. P. A.	1%	"	"	"
Life Ins. Salesman	1%	"	"	"
Advertising Man	.1%	"	"	"
Lawyer	.1%	"	"	"
Author-Journalist	.1%	"	"	"

There were also some keys which showed some significance, but the significance was not as great as the differences on the above eighteen scales. These may be summarized as follows:

> Mortician - Significant between five per cent and two per cent level of confidence but differences could not be interpreted.
>
> Mathematics and Physical Science Teacher - Significant between the ten per cent and five per cent level with tendency for low Mf group to score higher.
>
> Artist, Psychologist, and Personnel Director - Significant between ten per cent and five per cent level

of confidence with a tendency for the high Mf group to score higher.

On the maturity level key there was no significant difference between the high and low Mf groups when subjected to the chi square and t tests.

On the occupational level key there was a significant difference between the performance of the two groups by the chi square and t tests. On the chi square test this was a difference that was between the five per cent and the two per cent level of confidence. On the t test for the significance of difference between means, the difference was significant at the five per cent level of confidence.

On the masculinity-femininity key the difference was significant at the one-tenth-of-one per cent level of confidence on both tests. The tendency was for the high Mf group to score low on the masculinity-femininity key of the Strong.

CHAPTER V

SUMMARY AND CONCLUSIONS

I. SUMMARY OF THE STUDY

This study has been designed as an exploratory study to test the relationship between the high and low Mf scores on the MMPI and the forty-two keys on the Strong Vocational Interest Blank for Men. To do this, scores were taken on 449 entering freshman men at Montana State University in the Fall Quarter of 1948. Of these 449 cases only 242 cases were used in the study. The twenty-seven per cent, or 121 cases, scoring highest on the Mf key of the MMPI were regarded as the high Mf group, and twenty-seven per cent, or 121 cases, scoring lowest on the Mf key of the MMPI were regarded as the low Mf group.

Median letter-grade profiles were plotted for the thirty-nine occupational keys of the Strong for each Mf group. Standard Score profiles were plotted for the three special scales of the Strong for each Mf group. Chi square tables were made and chi squares were computed in order to find if there was a significant difference in performance between the two Mf groups on the forty-two Strong keys. Since Standard Scores were available on the three special Strong keys, the *t* test of the significance of difference between means was made on each of them.

This exploratory technique was used to find whether

there was a significant difference in the performance on the Strong keys between the two Mf groups on the MMPI in order to test the possibility of using the method for further study of the relationship between performances on interest tests and personality tests.

II. LIMITATIONS OF THE STUDY

Since this study was made on a select group, college freshmen, the findings may only apply to such groups. No broad generalizations can be made and applied to larger and less-select samplings. Since this was an exploratory study, this sampling was not a serious problem in the interpretation of results.

The technique of the study may be questioned, since only the ends of the distributions on the Mf scale of the MMPI were used. This technique is justifiable on the grounds that the examination of differences on such scales is logically made by examining the high and low ends of the distribution as in the case of item analysis. If this study were to be duplicated, the suggestion might be made that the distribution on the Mf scale be broken into the four quartiles so that each row in the chi square tables would contain four cells.

Another difficulty may be pointed out regarding the use of Strong letter grades rather than Standard Scores, since

there may be relatively large Standard Score differences within the letter-grade scores. This choice of letter-grade scores was made for two reasons. In the first instance, this was an exploratory study and only a limited amount of time could be devoted to it. With this limitation, letter-grade scores were easier to use and would fit the design of the chi square test. Secondly, since the Strong answer sheets were sent away to be scored and the results were returned on the "Hankes Report Form", it was not possible to get an exact Standard Score for the keys. With this limitation, only a relative score could have been obtained, if the Standard Scores had been used.

With all these limitations, it is felt that this technique has been successful in pointing out differences between the ends of the Mf key on the MMPI.

III. CONCLUSIONS

There are several conclusions that can be drawn from this study. The following generalizations are felt to be warranted:

(1) The technique of this study could be used to study the relationship between other interest and personality measures. This same method might well be duplicated, using the other clinical keys on the MMPI.

(2) There are significant differences in the performance on some of the Strong keys between the high and low Mf

groups on the MMPI for this sample of college freshmen. Of the thirty-nine occupational keys, there are eighteen keys that show a significant difference at the one per cent level of confidence or better.

(3) Those keys on which significance has been shown tend to follow a kind of pattern for each of the Mf groups. The keys on which the low Mf group scored significantly higher may be classified into three groups:

(a) Occupations involving technical knowledge, i.e., aviator, carpenter engineer, et cetera.

(b) Occupations that may be classified as "outdoor occupations." i.e., forest service man, farmer, aviator, and engineer.

(c) Occupations in which the members are working primarily with male associations and are in competition with the male group, i.e., production manager, and purchasing agent.

The keys on which the high Mf groups scored significantly higher may be classified into three groups:

(a) Occupations that are culturally grouped together on the basis of their so-called highly cultivated sensitivity to beauty and form, i.e., musician and artist.

(b) Occupations which are classified as social-influencing occupations, i.e., YMCA secretary, minister, city school superintendent, et cetera.

(c) Occupations that are highly linguistic in nature, i.e., lawyer, advertising man, author-journalist, et cetera.

(4) On this sample of college students there is a difference between the high and low Mf group in relation to the occupational level as measured on the Strong key, and it

is evidenced by the chi square test of significance. The high Mf group was significantly higher on the occupational level key on the chi square test and on the *t* test of significance of difference between means. This same difference may be subjectively claimed on the basis of an examination of the keys on which each Mf group scored significantly higher.

IV. NEED FOR FURTHER STUDY

Since the beginning hypothesis was made that personality was made up of a number of factors acting from within and without the individual, other factors should be "measured" to determine their relationship to interest patterns. This could be done by using a technique similar to the technique used in this study and testing the significance of difference on other MMPI scales.

Another study should be made by studying the personality "trait" patterns of groups with specific vocational choices. The MMPI profiles could be obtained for those who have expressed definite choices and are working toward those goals. This same kind of study could be made by a study of "measured" interests and expressed interests.

Work should be done to determine whether there is a significant difference between the high and the low personality "trait" patterns and the validity scale on the MMPI. The L, ?, K, and F keys of the MMPI could be studied for high and

low groups on either the Strong or MMPI keys.

As has been indicated in earlier chapters of this thesis, the study of the relationship between interest and personality measures is in its early stages. Much more must be done before the measures can be used to a maximum in vocational selection.

BIBLIOGRAPHY

A. BOOKS

Buras, Oscar K., The Third Mental Measurement Yearbook. New Brunswick: Rutgers University Press, 1949.

Darley, J. G., Clinical Aspects and Interpretation of the Strong Vocational Interest Blank. New York: Psychological Corporation, 1941.

Hathaway, S. R., and J. C. McKinley, Manual for the Minnesota Multiphasic Personality Inventory. New York: Psychological Corporation, 1945.

Johnson, Palmer O., Statistical Methods in Educational Research. New York: Prentice-Hall, Inc., 1949.

Linquist, E. F., Statistical Analysis in Educational Research. New York: Houghton Mifflin Co., 1940.

Strong, E. K., Jr., Vocational Interests of Men and Women. Palo Alto: Stanford University Press, 1943.

Super, Donald E., Appraising Vocational Fitness. New York: Harper and Brothers, 1949.

Terman, L. M., and C. C. Miles, Sex and Personality. New York: McGraw-Hill, 1936.

Tyler, Leona E., The Psychology of Human Differences. New York: Appleton-Century Crafts, Inc., 1949.

Williamson, E. G., editor, Trends in Student Personnel Work. Menneapolis: University of Minnesota Press, 1949.

B. PERIODICAL ARTICLES

Altenéder, L. E., "The Value of Intelligence, Personality, and Vocational Interest Tests in a Guidance Program," Journal of Educational Psychology, 31:449-459, 1940.

Berdie, R. F., "Factors Associated with Vocational Interest," Journal of Educational Psychology, 34:257-277, 1943.

Bills, Marion A., "Selection of Casuality and Life Insurance Agents," Journal of Applied Psychology, 25:6-10, 1941.

Carroll, H. A., "A Personality Report on the Study of the Relationship between Ability in Art and Certain Personality Traits," School and Society, 36:285-288, 1932.

Darley, J. G., "Preliminary Study of the Relationship between Attitudes, Adjustment, and Vocational Interest Tests," Journal of Educational Psychology, 29:467-473, 1938.

Dodge, A. F., "What Are the Personality Traits of the Successful Clerical Worker?" Journal of Applied Psychology, 24:576-586, 1940.

Duffy, E., and W. J. E. Crissy, "Evaluative Interests as Related to Vocational Interest and Academic Achievement," Journal of Abnormal and Social Psychology, 35:226-245, 1940.

Hathaway, S. R., and J. C. McKinley, "A Multiphasic Personality Schedule (Minnesota): I. Construction of the Schedule," Journal of Psychology, X249-254, 1940.

Kredt, Philip H., "Vocational Interests of Psychologists," Journal of Applied Psychology, 33:482-488, 1949.

Lewis, Don, and C. J. Burke, "The Use and Misuse of the Chi Square Test," Psychological Bulletin, XLVI-6 1949, 433-489.

Lewis, J. A., "Kuder Preference Record and MMPI Scores for Two Occupational Groups," Journal of Consultant Psychology, 11:194-201, 1947.

Nance, R. D., "Masculinity-Femininity in Prospective Teachers," Journal of Educational Research, 42:658-666, 1949.

Roe, A., "The Personality of Artists," Educational and Psychological Measurement, 6:401-408, 1946.

Sarbin, T. R., and R. F. Berdie, "Relation of Measured Interests to the Allport-Vernon Study of Values," Journal of Applied Psychology, 24:287-296, 1940.

Spraggia, Martin, "An Investigation of the Personality Traits of Art Students," Educational and Psychological Measurement, 10:285-293, 1950.

Triggs, F. O., "A Study of the Relationship of Measured Interests to Measured Mechanical Aptitudes, Personality, and Vocabulary." American Psychologist, 2:296 (abstract) 1947.

Tyler, Leona E., "Relationships between Strong Vocational Interest Scores and Other Attitudes and Personality Factors," Journal of Applied Psychology, 29:58-67, 1945.

Varvel, W. A., "Diagnosis and Evaluation," Psychological Abstracts, 24:5, para 2599, 1950, citing Cottle, Wm. C., and Powell, Jackson O., "Relationship of Strong Kuder, and Bell Inventories with the MMPI M-F Scale as Criterion," Trans. Kans. Acad. Sci., 52:396-398, 1949.

APPENDIX

Work Sheet for Data on the Strong Vocational Interest Blank for Men

I.	Artist	
	Psychologist	
	Architect	
	Physician	
	Osteopath	
	Dentist	
II.	Mathematician	
	Physicist	
	Engineer	
	Chemist	
III.	Production Manager	
IV.	Farmer	
	Aviator	
	Carpenter	
	Printer	
	Math-Phys Sci Teacher	
	Policeman	
	Forest Service Man	
V.	YMCA Phys Director	
	Personnel Director	
	Public Administrator	
	YMCA Secretary	
	Soc Sci HS Teacher	
	City School Superintendent	
	Minister	
VI.	Musician	
VII	CPA	
VIII.	Accountant	
	Office Man	
	Purchasing Agent	
	Banker	
	Mortician	
IX.	Sales Manager	
	Real Estate Salesman	
	Life Insurance Salesman	
X.	Advertising Man	
	Lawyer	
	Author-Journalist	
XI.	Pres. - Mfg. Concern	

Interest Maturity_____
Occupational Level_____
Masculinity-Femininity_____

Mf - MMPI_____

Mimeographed Card for Computing Chi Squares

	H	L	T
A			
B+			
B			
B-			
C+			
C			
T	121	121	242

Key_____

x^2 = 2( ) ÷ 2( ) ÷

2( ) ÷ 2( ) ÷

2( ) ÷ 2( ) = _____

Significant at: