A COMPARATIVE STUDY OF THE PERSONALITY FACTORS ASSOCIATED WITH TWO DIFFERENT OPERATIONAL DEFINITIONS OF DISCREPANT ACHIEVEMENT

Thesis for the Degree of Ed. D.
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ABSTRACT

A COMPARATIVE STUDY OF THE PERSONALITY FACTORS ASSOCIATED WITH TWO DIFFERENT OPERATIONAL DEFINITIONS OF DISCREPANT ACHIEVEMENT

by Richard Bland Smith

The purpose of this study was to investigate the personality factors of under- and over-achieving samples of eleventh grade students selected by two different operational techniques. With the exception of the operational definition of discrepant achievers used, this thesis is a replication of an earlier study done by Taylor. The present study involves a comparative investigation of the personality characteristics of individuals isolated as discrepant achievers in this and Taylor's study.

In the present study a personality instrument was constructed from items which previous research had found to differentiate between under- and over-achieving students. It was found that 16 female and 27 male items significantly discriminated between under- and over-achievers after cross validation. The items found to discriminate between discrepant achievers in this study were compared with the discriminating items isolated by Taylor. The chi square test was performed to determine the significance of the overlap of items in the two studies. The resulting chi square value failed to reach the .05 level of significance. It was

concluded that the items found to discriminate between discrepant achievers in the two studies did not overlap to an extent greater than would have been expected by chance alone.

The discriminating items in the present study were factor analyzed, and the resulting factors compared with the factors isolated by Taylor. Six male and five female factors were located. Taylor isolated seven male and six female factors. Four male and four female factors in the two studies were hypothesized as being related. The related male factors dealtwith themes of anxiety, compulsivity, conformity excitation, and authority relations. The related female factors were concerned with fantasy, excitation, organizational need, and activity planning.

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CHAPTER I

THE PROBLEM

Purpose of the Study

Research studies in the area of academic motivation contain many conflicting results. It is hypothesized that these contradictory findings stem from the different ways of operationally defining over- and under-achievement. The effect different operational definitions of under- and over-achievement have on the results of motivation studies have not been adequately examined. In a recent paper which compared the techniques used in selecting under- and over-achievers, Farquhar noted seven techniques representing four methodological categories which have been used to select discrepant achievers.[1] It was further demonstrated that the different operational definitions of over- and under-achievers resulted in the selection of relatively different individuals. It is the purpose of this study to investigate the effect two different operational procedures have on personality item discriminations and subsequent factor structure.

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[1]William Farquhar, "The Comparison of Techniques Used in Selecting Under and Over-Achievers" (paper read at APGA, Denver, Colorado, 1961).

Need for the Study

The need for the study is basically derived from the lack of standardization of the operational procedures used in identifying discrepant achievers. This lack of standardization may have been the cause of inconsistent and uninterpretable research findings in the area, and appears to have led to the selection of as many different samples as there are operational techniques.[1] The characteristics of these different samples have not been adequately examined. It is the intent of this study to investigate the responses to a personality test of two samples drawn from the same population, but selected by different operational procedures.

Theory

Human behavior theory is conceived of by Farquhar[2] as functioning at the levels of focusing, predicting, and integrating. The focusing level is concerned with the process of (1) eliminating seemingly plausible but irrelevant variables, (2) the directing of attention to relevant variables. In this stage the many nebulous theories and unrelated findings provide the basic tenets which are explored. The second, or predictive level of behavior theory, comes after previous studies and theorizing have provided convincing

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[1] Ibid.

[2] William W. Farquhar, A Comprehensive Study of the Motivational Factors Underlying Achievement of Eleventh Grade High School Students, Research Project No. 8361 (8458) in cooperation with the U. S. Office of Education, Washington, D. C.

evidence that the direction of the alternative hypothesis can be specified. Integrating, the third level of behavior theory, is concerned with the development of an interlocking system of laws and constructs.

In this study attention has been focused on (1) the comparison of samples selected from the same population by two different operational procedures and (2) the isolating and comparison of traits related to academic motivation.

Summary of Classification Techniques

Farquhar[1] proposed that the many techniques for locating discrepant achievers be grouped into four general classifications. The first of these was by Central Tendency Splits. In this method, under- and over-achievement is determined by dichotomizing a distribution of combined aptitude and achievement measures. The method used by Shaw and McCuen is typical.[2] Here, under-achievers were determined to be those individuals who scored in the top 25 per cent in verbal ability based on the Pintner General Ability Test: Verbal Series, and who had an earned grade point average below the class mean. The method of selecting over-achievers was not identified in the article, but it was confirmed by Farquhar

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[1]Farquhar, "The Comparison of Techniques Used in Selecting Under and Over-Achievers," op. cit.

[2]M. C. Shaw and J. T. McCuen, "The Outset of Academic Under-achievement in Bright Children," Journal of Educational Psychology, Vol. 51 (1960), pp. 103-108.

in personal correspondence with Shaw that over-achievers would be found by reversing the procedure. The Shaw-McCuen procedure is graphically presented in Figure 1.1.

The second technique involved arbitrary partitions with the middle group eliminated. Here, discrepant achievers are determined by contrasting the extremes in achievement-aptitude distributions, and by eliminating a middle group. The arbitrary partitions with the middle-group eliminated-technique, with some slight modifications, was used by Shaw and Brown,[1] Shaw and Grubb,[2] Drews and Teahan,[3] Brookover,[4] Frinkel,[5] and Winberg.[6]

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[1]M. C. Shaw and D. J. Brown, "Scholastic Under-Achievement of Bright College Students," Personnel and Guidance Journal, Vol. 36 (1957), pp. 195-199.

[2]M. C. Shaw and J. Grubb, "Hostility and Able High School Under-achievers," Journal of Counseling Psychology, Vol. 5 (1958), pp. 263-266.

[3]Elizabeth M. Drews and J. E. Teahan, "Parental Attitudes and Academic Achievement," Journal of Clinical Psychology, Vol. 13 (1957), pp. 328-332.

[4]Wilbur Brookover, "Identification of Self-Images and Significant Others for Junior High School Students and Exploration of the Relationship of Self-Image to Achievement in School Subjects," Cooperative Research Project, U. S. Office of Education and Michigan State University, 1959.

[5]E. Frinkel, "A Comparative Study of Achieving and Under-achieving High School Boys of High Intellectual Ability," Journal of Educational Research, Vol. 53 (1960), pp. 172-180.

[6]Wilma A. Winberg, "Some Personality Traits of Collegiate Under-achievers," Proceedings of the Iowa Academy of Science, Vol. 54 (1947), pp. 267-270.

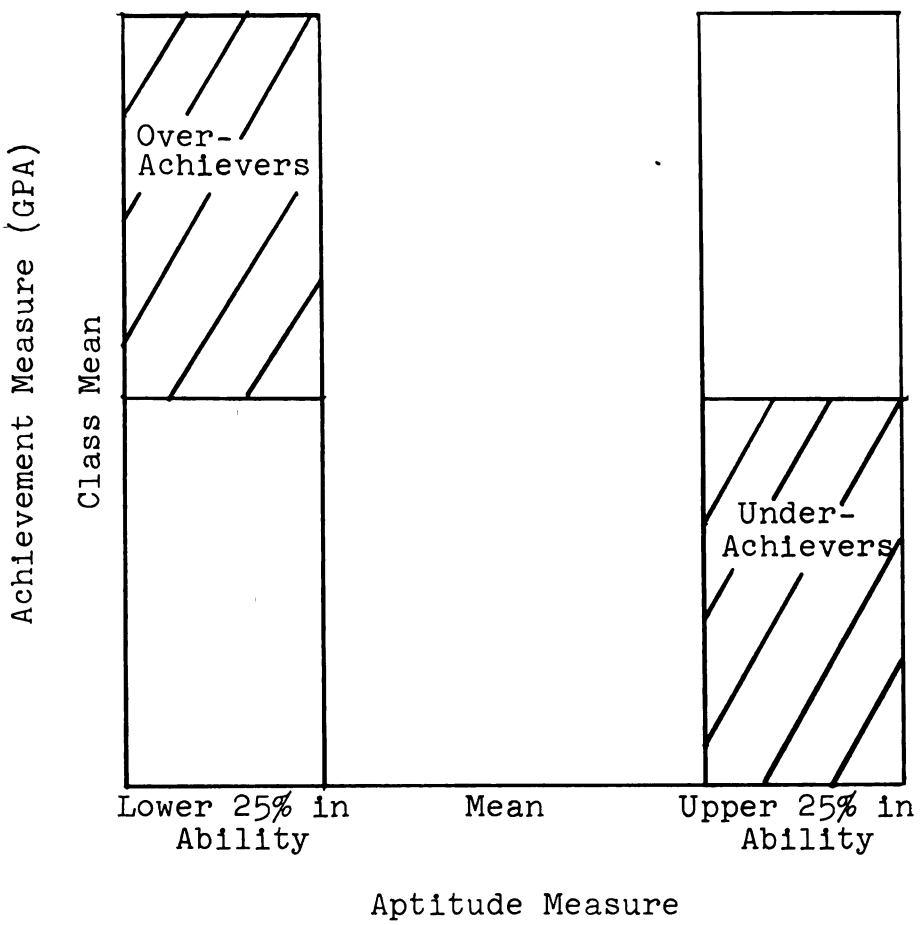

Figure 1.1. Graphic Presentation of Shaw and McCuen's Technique for Selecting Under- and Over-Achievers (Extended).[1]

[1]William W. Farquhar, "The Comparison of Techniques Used in Selecting Under- and Over-Achievers" (paper read at APGA Convention, Denver, Colorado, March 1961, mimeographed).

Winberg's study is typical of the group and consisted of acquiring the cumulative grade-point averages, American Council on Education (ACE) total scores and designating under-achievers, over-achievers, and normals as follows: (1) under-achievers were designated as those individuals who had ACE total scores at or above 100, but whose GPA's were below 2.00; (2) over-achievers, were identified as individuals having ACE's totals of 120 and below, but whose GPA was above 2.60; (3) normals were designated as individuals with ACE totals of 130 or above, and a GPA of 2.60 or above. Winberg's method is graphically illustrated in Figure 1.2.

The third method of classification proposed by Farquhar was concerned with relative discrepancy splits. In this method grade-point average and aptitude predictors were ranked independently, and over- and under-achievement was determined by the discrepancy between the two ranks. Studies conducted using this technique include McQuary and Truax,[1] Diener,[2] Mitchell,[3] Baymur and Paterson,[4] and Duff and

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[1]J. J. McQuary and W. E. Truax, "An Under-Achievement Scale," Journal of Educational Research, Vol. 48 (1955), pp. 393-399.

[2]C. L. Diener, "Similarities Between Over-Achieving and Under-Achieving Students," Personnel and Guidance Journal, (1960), pp. 396-400.

[3]James V. Mitchell, "Good Setting Behavior as Function of Self-Acceptance, Over- and Under-Achievement and Related Personality Variances," Journal of Educational Psychology, Vol. 50 (1959), pp. 93-104.

[4]F. B. Baymur and C. H. Paterson, "A Comparison of Three Methods of Assisting Under-Achieving High School Students," Journal of Counseling Psychology, Vol. 7 (1960), pp. 83-89.

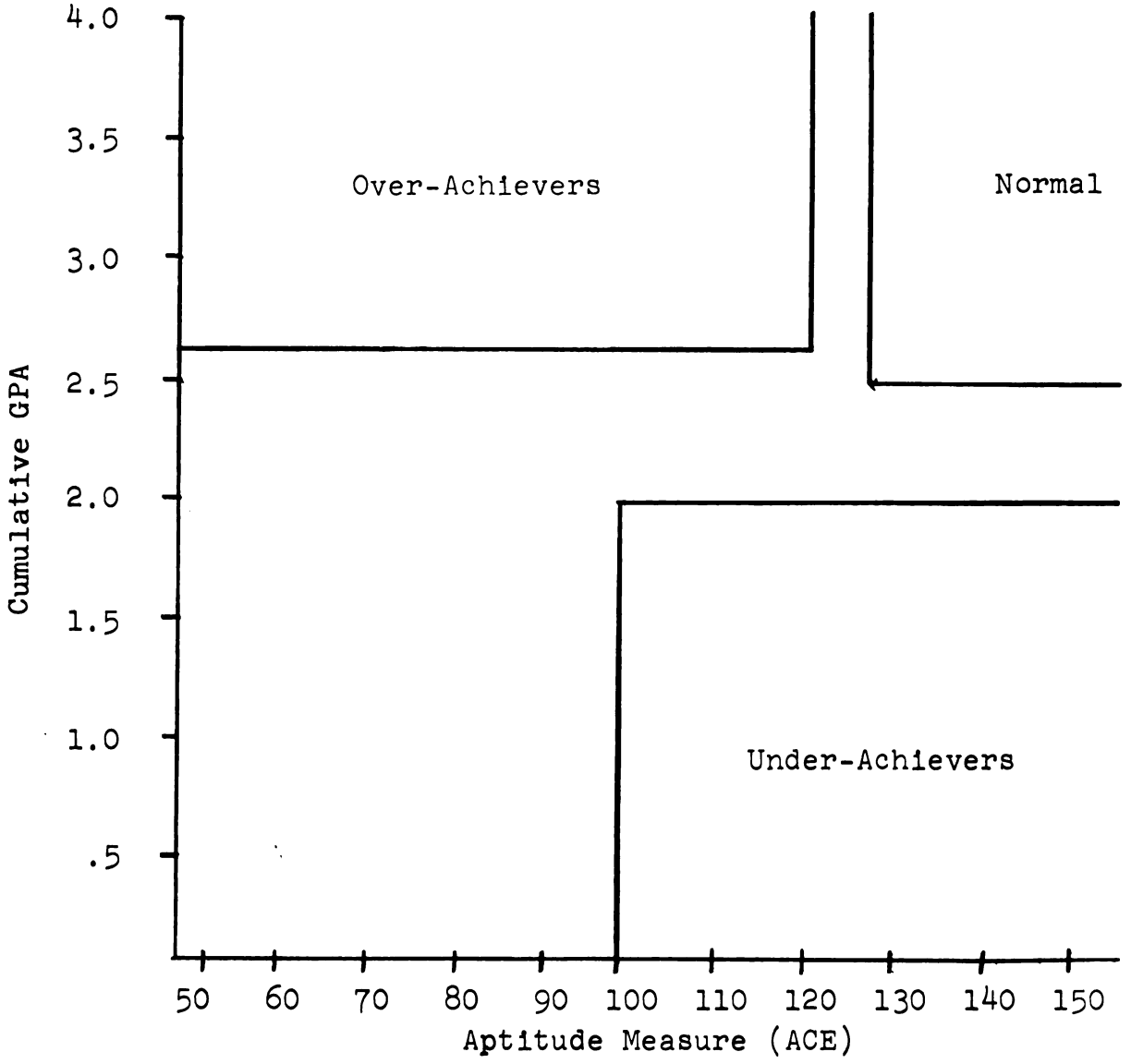

Figure 1.2. Graphic Presentation of Winberg's Arbitrary Partitioning Technique of Selecting Under- and Over-Achievers.[1]

[1]William W. Farquhar, "The Comparison of Techniques Used in Selecting Under- and Over-Achievers" (paper presented at APGA Convention, Denver, Colorado, March 1961, mimeographed).

Siegel.[1] Diener's approach, which illustrates this method, involved converting aptitude and GPA measures into "T" scores and defining the discrepant groups on the basis of plus and minus 15 "T" score units. Because of the varied locations of these discrepant achievers in the scattergram no way was found of illustrating this method graphically.

The fourth method of selecting discrepant achievers entailed the construction of a regression line. Over- and under-achievers are designated as those individuals whose aptitude and achievement scores fall a certain degree above or below the regression line. The regression method is the only selection procedure which precisely determines the relationship between the aptitude and achievement measures. For this reason, this study is primarily concerned with operational procedures which employ regression equations to predict achievement from aptitude measures. Twelve studies have used techniques of selection which would be classified under the regression model. Among these are Gerberich,[2] Malloy,[3]

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[1]O. L. Duff and L. Siegel, "Biographical Factors Associated with Academic Over and Under-Achievement," Journal of Educational Psychology, Vol. 51 (1960), pp. 43-46.

[2]R. Gerberich, "Factors Related to the College Achievement of High-Aptitude Students Who Fail Expectation and Low-Aptitude Students Who Exceed Expectation," Journal of Educational Psychology, Vol. 32 (1941), pp. 253-265.

[3]J. Malloy, "An Investigation of Scholastic Over and Under-Achievement Among Female College Freshmen," Journal of Counseling Psychology, Vol. 1 (1954), pp. 260-263.

Fischer,[1] Owens and Johnson,[2] Burgess,[3] Gebhart and Hoyt,[4] Krug,[5] Jenson,[6] Lum,[7] Merrill and Murphy,[8] DuBois,[9] and Farquhar.[10]

Farquhar's two-stage regression technique is illustrative of the fourth procedure.

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[1]R. P. Fischer, "The Role of Frustration in Academic Under-Achievement: An Experimental Investigation," Journal of the American Association of College Registrars, Vol. 18 (1943), pp. 227-238.

[2]W. A. Owen and Wilma C. Johnson, "Some Measured Personality Traits of Collegiate Under-Achievers," Journal of Educational Psychology, Vol. 40 (1949), pp. 41-46.

[3]E. Burgess, "Personality Factors of Over and Under-Achievers in Engineering," Journal of Educational Psychology, (1956), pp. 89-99.

[4]G. G. Gebhart and D. T. Hoyt, "Personality Needs of Under and Over-Achieving Freshmen," Journal of Applied Psychology, Vol. 42 (1958), pp. 125-128.

[5]R. E. Krug, "Over and Under-Achievement and the Edwards PPS," Journal of Applied Psychology, (1959), pp. 133-136.

[6]Vern H. Jensen, "Influences of Personality Traits on Academic Success," Personnel and Guidance Journal, Vol. 36 (1958), pp. 497-500.

[7]M. Lum, "A Comparison of Under and Over-Achieving Female College Students," Journal of Educational Psychology, Vol. 51 (1960), pp. 109-114.

[8]R. M. Merrill and D. T. Murphy, "Personality Factors and Academic Achievement in College," Journal of Counseling Psychology, Vol. 6 (1959), pp. 207-209.

[9]P. H. DuBois, "On the Statistics of Ratios," The American Psychologist, Vol. 3 (1948), pp. 309.

[10]Farquhar, A Comprehensive Study of the Motivational Factors Underlying Achievement of Eleventh Grade High School Students, op. cit.

Stage I.--The first stage was devised to add stability by eliminating individuals with inconsistent aptitude scores. This stage consists of constructing a regression line from two aptitude measures: the California Test of Mental Maturity-Language (CTMM-L) and Differential Aptitude Test--Verbal Reasoning (DAT--VR). Two parallel lines were then drawn above and below the regression line at a distance equal to one standard error of estimate. Those individuals falling outside of these lines on the scattergram were then excluded from the study on the premise that their aptitude scores were unreliable.

Stage II.--The aptitude predictor which correlated highest with the achievement criterion was used to build a regression line predicting achievement. The standard error of estimate was used to establish limits. Under-achievers were defined as individuals whose actual grade-point averages fell at least one standard error of estimate below the regression line prediction of achievement. Similarly, over-achievers were designated as those individuals whose grade-point average fell one standard error of estimate above the regression line. A graphical representation of the two stage regression model is reproduced from the Farquhar study in Figures 1.3 and 1.4.[1]

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[1] Ibid. (with permission of the author).

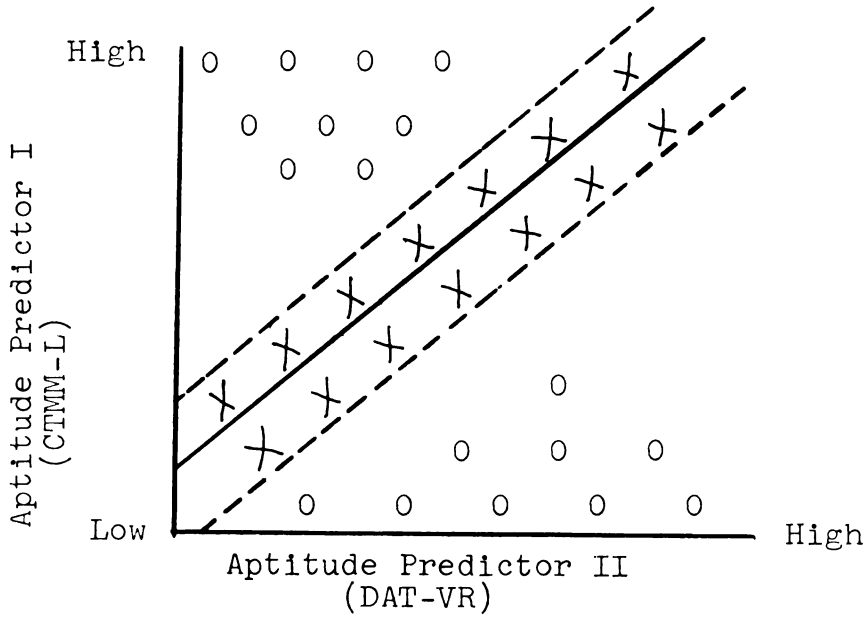

Figure 1.3. First Stage of the Two Stage Regression Model. Method of Selecting Individuals Who Have Stable Estimated Aptitude.

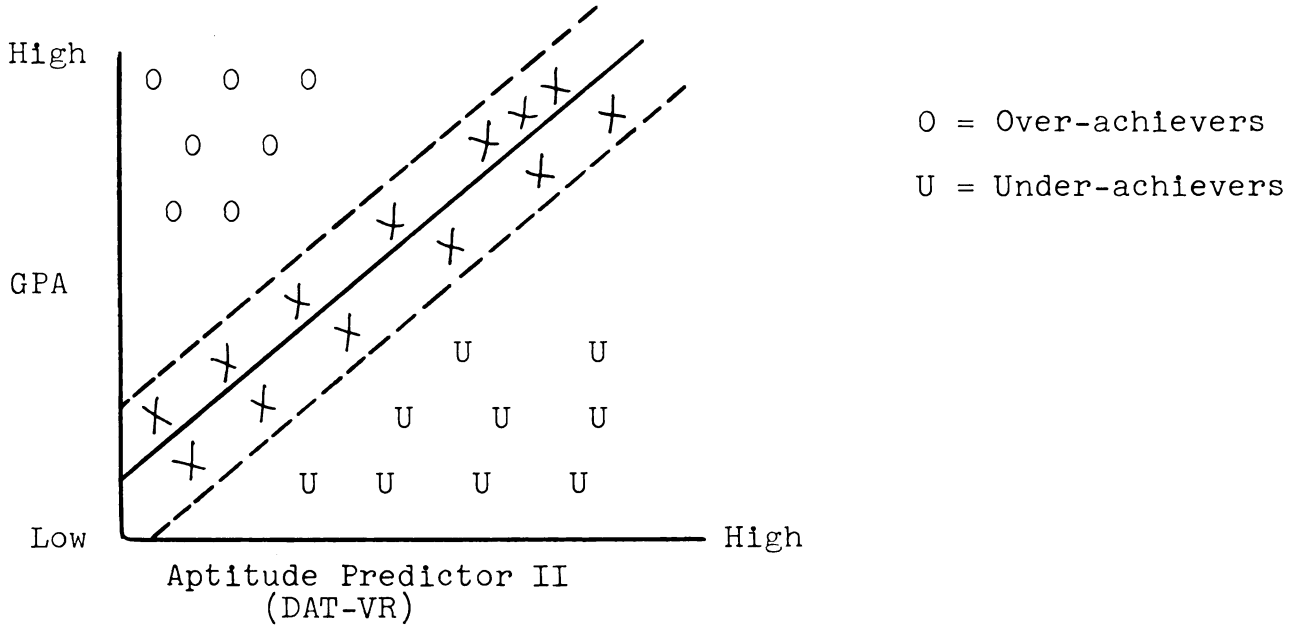

Figure 1.4. Second Stage of the Two Stage Regression Model. Methods of Selecting Under- and Over-Achievers.

The Nature of the Study

In the present study a different method of defining under- and over-achievers was used, but otherwise Taylor's[1] attempt to devise a personality measure for discrepant achievers was replicated. More specifically, discrepant achievers were identified from Farquhar's data using Krug's regression technique. Thereafter, a comparison was made with Taylor's findings. Taylor used data from the Farquhar project (which employed the two-stage regression model) to develop a personality measure of discrepant achievement.

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[1]Ronald G. Taylor, "Personality Factors Associated with Eleventh Grade Male and Female Discrepant Achievements" (unpublished Doctoral thesis, Michigan State University, East Lansing, Michigan, 1962).

CHAPTER II

DESIGN AND METHODOLOGY

The design and methodology used, with the exception of sample selection procedures, is the same as Taylor's.[1] The nature of the design will be discussed under five general headings: (1) instrumentation, (2) sample selection, (3) hypotheses, (4) item analysis procedures, and (5) factor analytic procedures.

Instrumentation

Taylor selected personality items which had been previously shown to differentiate between under- and over-achieving students from scales developed by Altus,[2] Gough,[3] and McQuary and Truax.[4] The initial pool of items consisted of 125 "Yes," "No" items, and is referred to as the Human Trait Inventory[5] (hereafter referred to as the HTI). However,

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[1] Ibid., p. 4.

[2] William D. Altus, "A College Achiever and Non-Achiever Scale for the MMPI," Journal of Applied Psychology, Vol. 32 (1948), pp. 385-397.

[3] H. G. Gough, "The Construction of a Personality Scale to Predict Scholastic Achievements," Journal of Applied Psychology, Vol. 37 (1953), pp. 361-366.

[4] McQuary and Traux, op. cit., pp. 393-399.

[5] A copy of the Human Trait Inventory may be found in Appendix A.

to avoid the possibility of threatening high school students with a "Yes," "No" response, the statements were altered so that they could be answered (never, sometimes, usually, always). This approach resulted in 31 gramatically ambiguous items which were dropped. The remaining 94 items were then administered to the sample, and those items found to best discriminate between under- and over-achievers were selected for the personality scale.

In the present study another sample was drawn from the same population of eleventh grade students used by Taylor. Under- and over-achievers were located by Krug's technique. Human Trait Inventory items which best discriminated between over- and under-achievers were used to form the personality scale.

Sample Selection Based on Krug's Technique

Krug's Technique consists of the following four steps:[1]

1. Correlating the verbal section of the Differential Aptitude Test with the grade-point average of those courses in each school that require homework, predictions were made of GPA.
2. The distribution of predicted GPAs for each school was divided into three groups (high, average, low) using arbitrary cutting points to equate the size of the groups.

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[1]Krug, op. cit., pp. 133-136.

3. Discrepant achievers were determined by contrasting actual and predicted GPAs in each of the three ability groups.
4. Fifteen per cent of the most discrepant individuals for each achievement classification (unders and overs) for each ability level were selected. The fifteen per cent is an arbitrary figure selected because it yields a percentage of under- and over-achievers similar to the per cent of discrepant achievers found using the two-stage regression model.

This procedure is graphically illustrated in Figure 2.1.

Proportional samples of discrepant achievers from the Farquhar data were collected from nine high schools in eight Michigan cities.[1] Using Krug's procedure, 144 male and 138 female discrepant achievers were selected. These individuals were then randomly assigned by ability levels to male and female validation and cross-validation groups as shown in Table 2.1.

TABLE 2.1

SAMPLE SIZE FOR VALIDATION AND CROSS-VALIDATION CLASSIFICATION

Item	Under-Achievers	Over-Achievers
Males -- Validating	36	35
Cross-validating	36	35
Total	72	70
Females--Validating	33	36
Cross-validating	33	36
Total	66	72

[1]Farquhar, A Comprehensive Study of the Motivational Factors Underlying Achievement of Eleventh Grade High School Students, op. cit.

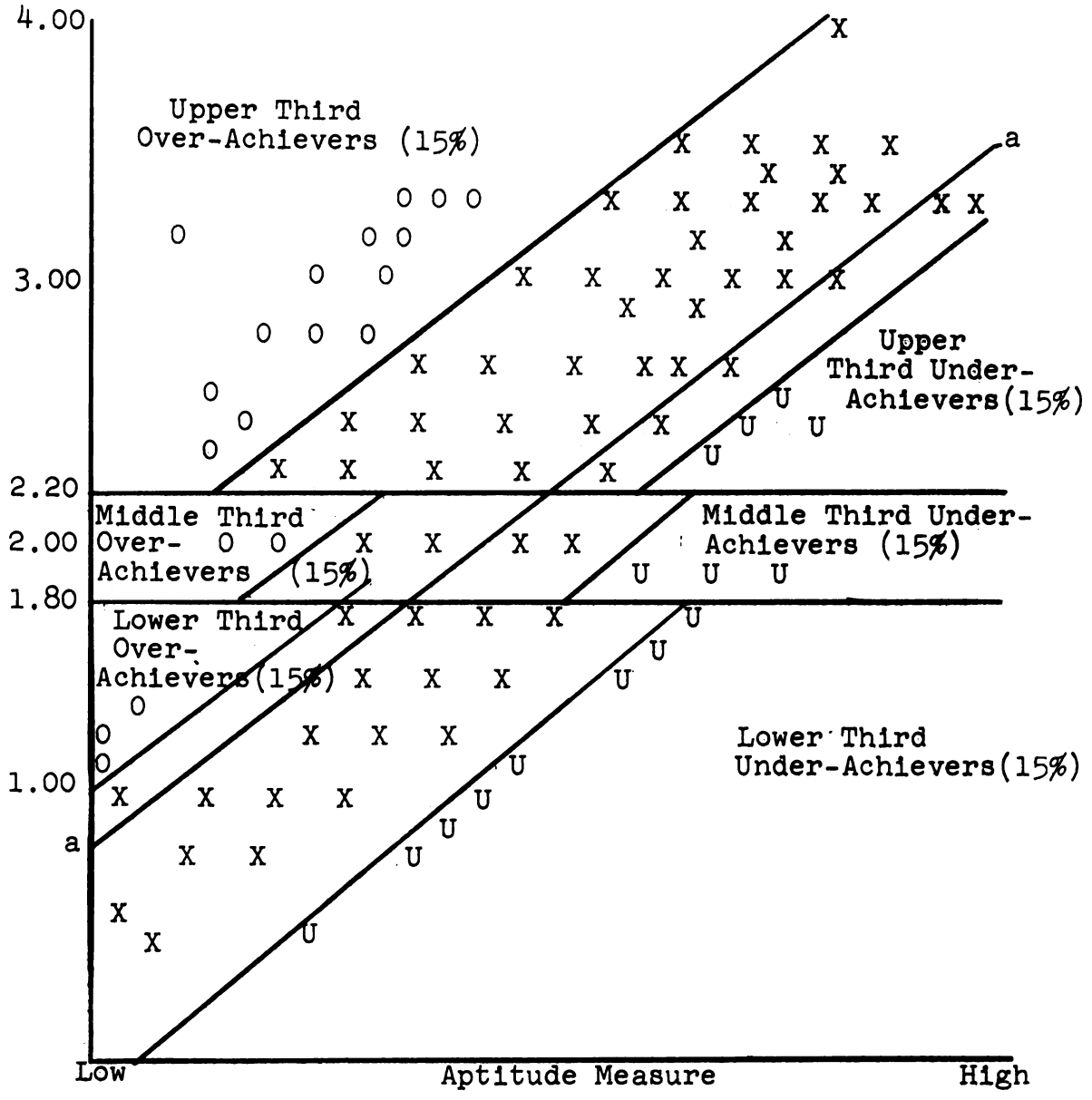

Figure 2.1. Graphic Presentation of Krug's Method of Selecting Under- and Over-Achievers.

X = Normal Achievers; 0 = Over-Achievers; U = Under-Achievers.

a = Regression Line

Hypotheses

Five research hypotheses are investigated in this study. These hypotheses are as follows:

Research Hypothesis I:

The method of selecting over- and under-achievers designated by Krug will yield different individuals from those selected by the two stage regression model.

Research Hypothesis II:

The Human Trait Inventory contains items which will differentiate between under- and over-achieving students defined by Krug's technique.

Research Hypothesis III:

The items found to discriminate between under- and over-achievers will be dependent upon the operational definition of under- and over-achievement used.

Research Hypothesis IV:

Factor analysis of item intercorrelations will yield interpretable factors which will meet Thurston's criteria for a simple structure.

Research Hypothesis V:

Conceptionally, empirically extracted factors will differ between Krug's and Farquhar's operationalizing procedures.

Item Analysis Procedure

Chi-square tests of significance were used to select those HTI items which discriminated between under- and

over-achievers for both the validation and cross-validation samples.

The response continuum of the HTI (never, sometimes, usually, always) was dichotomized to facilitate item analysis. Items were then directionally keyed. Items keyed in the direction of alternatives assumed to characterize the over-achiever became "1" and the under-achiever response became "0." Frequencies for every response were obtained and entered into a 2 x 2 contingency table to determine the chi-square values.[1]

The level of significance was set by Farquhar and his associates at .20 (two-tail test) for validation of the items, and .10 for cross-validation (one-tail test). Those personality items which differentiated between under- and over-achievers at the .20 level of significance were used in validation in order to insure the selection of those items that discriminate. The level (.10) was used in cross-validation of those items in order to minimize the acceptance of items when they should have been rejected. Items which discriminated in the same direction, and met the significance levels established for both the validation and cross-validation groups were selected for use in the personality instrument.

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[1]This analysis was accomplished by a high speed electronic computer (MISTIC) at Michigan State University, by punching the observed frequencies for the chi-square on computer tape and analyzing it with the K6M program.

Factor Analytic Procedures

Prior to factor analysis it was necessary to construct two inter-item correlation matricies (one for each sex). The entire sample of each sex was used in constructing their respective response matrix. When the over- and under-achieving males from both the validation and cross-validation groups were combined with their responses ("1" or "0") to the 23 items, a 23 x 142 matrix (23 items and 142 individuals) was formed. A similar procedure was followed for females, and produced a 16 x 138 matrix (16 items and 138 individuals).

Cattell defends the use of the product-moment coefficient by stating,

> Neither the product moment nor the principles of factor analysis assume or require a normal distribution. . . . As Thurstone points out (126), the nature of the factors . . . is remarkably immune to distorted distributions or crude coefficients.[1]

These matricies were placed on a high speed computer and item intercorrelations computed.[2] The correlation matricies were then analyzed by the Principal Axis Factor Extraction and Quartimax Rotation method.

The principal axis method of factor analysis was used because it extracts all of the variance presented by a matrix of intercorrelations,[3] whereas other methods leave residual variance.[4]

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[1]Raymond B. Cattell, Factor Analysis (New York: Harper Brothers, 1952), pp. 238.

[2]This analysis was accomplished on a high speed computer (MISTIC at Michigan State University, the K-11 program.

[3]Cattell, op. cit., pp. 129-149. [4]Ibid.

Assumptions

The mathematics of the principal axis solution involves the assumption that the total variance demonstrated by the intercorrelations can be divided into independent sets.[1] These independent sets of variance represent the number of factors necessary to account for a matrix of intercorrelations.[2] It is not required that either the correlations or the population from which these correlations are extracted be normally distributed.

Rotation of the Factors

The purpose of rotating factors is to arrive at a simple structure which Thurstone has said is the most widely practicable criterion for finding a uniquely meaningful position.[3] Cattell states that:

> According to this axiom if we have several alternative hypotheses, each fitting equally the given facts, we should decide among them by taking that which is the simplest, i.e., that which requires fewest conditions and least bolstering by supplementary hypothesis.
>
> In terms of factor analysis, Thurstone argued, this means that any one test (in this case any one item) should have the simplest possible factor constitution. . . . This means in terms of the factor matrix that every test (item) should have some zeros in it, i.e., that some factors should not load it and that every factor should have some zeros in its column, i.e., that not all test (items) should be affected by it.

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[1] Ibid., p. 39.

[2] Ibid., pp. 129-149.

[3] Ibid., p. 67, citing L. L. Thurstone.

> In a factor analytic solution rotated to simple structure there is actually a double application of the simplicity or parsimony principle. First we have represented many variables by a few common factors and secondly we have distributed these factors to give the simplest explanation for that number of factors.[1]

Neuhaus and Wrigley devised the quartimax method of rotation in order to achieve the desired orthogonal simple structure.[2] The selection of a method of rotation is subjective and will vary with the biases of the researcher. However, the quartimax method of rotation does seem to meet Thurstone's criteria and was used here.

Summary

Farquhar's Human Trait Inventory consisted of 125 personality items which had previously been shown to discriminate between under- and over-achieving students. This instrument was administered by Farquhar to 4,200 eleventh grade students. In this thesis a sample of male and female over- and under-achievers was randomly selected from the 4,200 eleventh grade students. The sample was then randomly divided into validation and cross-validation groups for each sex. Items were selected that discriminated between male and female under- and over-achievers after cross-validation. Twenty-three male and sixteen female items found to be most discriminating were factor analyzed by the principle axis method, and rotated in an attempt to isolate the personality factors of discrepant achievers.

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[1] Ibid., pp. 67-68.

[2] J. O. Neuhaus and Charles Wrigley, "The Quartimax Method, An Analytical Approach to Orthogonal Simple Structure," British Journal of Statistical Psychology, Vol 7 (1954), pp. 89-91.

CHAPTER III

ANALYSIS OF DATA

In this chapter an analysis and interpretation of the data are made.

Item Analysis Results

Criterion for Selection

In order to diminish the probability of items being selected by chance, validation and cross-validation groups were established within each sex. To meet the criterion established, the items must: (1) discriminate between over- and under-achievers in the validation group at the .20 level of significance; (2) discriminate between over- and under-achievers in the cross-validation group at the .10 level of significance; and (3) items must discriminate in the same direction within both the validation and cross-validation groups.

The following null hypothesis was tested:

Null Hypothesis I: There is no significant difference in the proportion of choice alternatives for under- and over-achievers.

Item Analysis Results

From the original items, 16 of the female and 27 of the male items met the criterion for selection. Of the items found to discriminate between under- and over-achievers, eight were common to both sexes.

Reliability Estimates

Hoyt's method of reliability was used to determine the internal consistency of the 16 female and 23 male factored items.[1] Estimates of the reliability for the under-achievers, over-achievers, a combined over and under sample, a random sample of the general population, and a sample of normals for each sex are presented in Table 3.1. The reliability of the 23 male factored items was then projected to give an estimate of reliability of the entire 27 item scale.[2] The estimates are dependent upon the number of items in the scale. The uncorrected reliability estimates range between .57 and .71 and thus have a reliability of less than .80.

It should be noted that the combined group reliabilities are most relevant to the factor analytic process. This is because both the validation and cross-validation groups were combined for factor analysis. As would be expected,

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[1]Cyril J. Hoyt, "Test Reliability Estimated by Analysis of Variance," Psychometrika, Vol. 6 (1941), pp. 153-160.

[2]J. P. Guilford, Fundamental Statistics in Psychology and Education (New York: McGraw-Hill Book Company, 1956), p. 452.

because of the smaller number of items, the combined over- and under-achieving female reliabilities are lower than those of the combined males.

TABLE 3.1

RELIABILITY ESTIMATES OF THE FACTORED ITEMS AND TOTAL SCALE

		Reliability Estimates	
Males	N	Factored Items (23)	Total Scale[a] (27)
General[b]	66	.71	.74
Over	70	.64	.69
Under	72	.64	.69
Normals[c]	50	.69	.72
Combined Over-Under-achievers	142	.70	.74
Females	N	Factored Items (16)	Total Scale (16)
General[b]	66	.62	.62
Over	72	.60	.60
Under	66	.59	.59
Normals[c]	50	.60	.60
Combined Over-Under-achievers	138	.64	.64

[a]Spearman-Brown Formula.

[b]Random sample from total population of 4200.

[c]Over- and under-achievers excluded, random sample from general population.

Validity estimates were determined by correlating the total HTI score derived by Krug's method with grade point average for 200 male and 200 females separately. These coefficients were .35 for males and .46 for females, and

though low, are significantly different from zero at the .01 level of significance.

Factor Analysis Results

The item intercorrelations for the most discriminating items for each sex are shown in Tables 3.2 and 3.3. These intercorrelations were factor analyzed to determine if they would yield interpretable factors.

The principal axis method normally extracts as many factors as there are items or variables. Thus the HTI (male) produced 23 factors and the HTI (female) 16. However, to be considered a factor the sum of the squares (eigen values) had to exceed 1.00. Seven male and five female factors satisfied this criterion. The rounded, unrotated loadings for those factors at or near 1.00 for male and female over- and under-achievers are presented in Tables 3.4 and 3.5.

A further criterion was added demanding that each factor have at least two items loading highest on it across rows. If the criterion was not met, the factor was considered uninterpretable. The factor was then dropped, and another quartimax rotation performed. This was continued until there remained six male and five female factors which met the criterion of having eigen values (sum of squares) of 1.00 or greater, and at least two items loading highest on it across the rows. This required that the male and the female factors be rotated once.

TABLE 3.2

ITEM INTERCORRELATIONS OF TWENTY-THREE THE HUMAN TRAIT INVENTORY SCALE.* VALUES ARE POSITIVE UNLESS

	11	16	27	37	44	50	54	56	60	62	63
11	1.00	02	33	10	16	-08	02	15	20	-03	11
16		1.00	06	18	13	14	29	24	13	08	13
27			1.00	07	10	-08	20	03	16	09	24
37				1.00	14	23	46	21	04	32	24
44					1.00	02	16	13	20	23	08
50						1.00	26	10	05	13	16
54							1.00	18	28	37	32
56								1.00	14	11	13
60									1.00	15	08
62										1.00	22
63											1.00
66											
68											
70											
74											
75											
76											
77											
89											
101											
113											
122											
124											

*Item numbers correspond to the numbers of the items on

MALE ITEMS USED IN FACTOR ANALYSIS OF
(DECIMALS ARE OMITTED AND THE
OTHERWISE INDICATED.) N=142

66	68	70	74	75	76	77	89	101	113	122	124
00	13	01	-00	14	-00	03	34	04	-21	16	-02
20	29	13	28	14	15	01	19	26	-02	05	13
01	14	10	17	47	19	16	19	31	-07	22	29
38	37	32	19	04	24	35	07	36	-08	06	26
12	24	22	02	08	15	10	-10	07	-02	-10	01
18	10	15	01	00	16	29	-02	24	12	-09	27
47	32	23	27	26	21	12	08	43	-00	09	35
17	20	29	10	07	19	24	-02	19	-01	-10	06
26	17	08	18	23	15	11	17	15	-08	02	16
23	34	21	07	13	06	29	07	29	-11	00	20
34	18	26	08	14	08	32	05	37	-01	13	24
1.00	40	24	28	21	25	30	08	50	07	03	30
	1.00	35	32	26	11	29	05	42	-17	16	13
		1.00	25	18	31	39	11	35	02	08	15
			1.00	38	23	15	21	23	-07	17	-02
				1.00	20	11	34	32	-12	26	18
					1.00	24	05	28	11	03	22
						1.00	21	39	01	10	05
							1.00	16	-15	19	06
								1.00	00	06	35
									1.00	-20	05
										1.00	-03
											1.00

the Human Trait Inventory in Appendix A.

TABLE 3.3

ITEM INTERCORRELATIONS OF SIXTEEN FEMALE ITEMS USED IN FACTOR ANALYSIS OF THE HUMAN TRAIT INVENTORY SCALE.* (DECIMALS ARE OMITTED AND THE VALUES ARE POSITIVE UNLESS OTHERWISE INDICATED.) N = 138

	29	39	54	57	60	62	66	69	74	75	84	89	90	102	104	110
29	1.00	01	03	47	20	13	45	14	15	13	10	13	04	24	32	21
39		1.00	01	01	05	13	20	14	05	07	06	08	13	14	21	-03
54			1.00	32	11	13	30	30	14	10	14	20	03	23	36	06
57				1.00	16	13	37	10	09	05	14	-04	-12	08	30	01
60					1.00	12	09	-16	48	26	21	14	13	10	14	26
62						1.00	25	18	10	19	17	11	24	16	08	03
66							1.00	33	-06	-02	12	03	-00	24	38	-06
69								1.00	05	06	24	10	17	23	20	-07
74									1.00	27	24	22	21	21	18	21
75										1.00	38	29	11	-01	-01	17
84											1.00	19	21	00	08	22
89												1.00	18	16	04	56
90													1.00	09	11	29
102														1.00	33	01
104															1.00	02
110																1.00

*Item numbers correspond to the numbers of the items on the Human Trait Inventory in Appendix A.

TABLE 3.4

ROUNDED, UNROTATED LOADINGS FOR THE SEVEN MALE FACTORS OF THE HUMAN TRAIT INVENTORY. (VALUES ARE POSITIVE UNLESS OTHERWISE INDICATED, AND THE DECIMALS ARE OMITTED.)

Item No.*	Factors							Communality (h^2)
	1	2	3	4	5	6	7	
11	17	46	42	-37	11	23	31	71
16	42	01	02	33	23	-25	41	57
27	40	52	-15	-38	11	28	-16	71
37	60	-24	12	-03	-24	-11	10	51
44	27	-13	57	-17	32	06	-30	64
50	32	-44	-24	-06	-05	03	35	48
54	66	-10	-14	-13	16	-37	05	65
56	37	-17	34	15	21	28	41	59
60	37	20	16	-12	49	-15	06	48
62	46	-16	23	-18	-28	-22	-28	53
63	50	-05	-09	-33	-29	12	08	51
66	65	-19	-12	02	04	-21	-07	52
68	62	-03	33	13	-10	-24	-17	61
70	55	-13	15	24	-14	38	-17	59
74	46	27	-07	56	11	-14	-18	68
75	48	57	-25	08	10	03	-16	66
76	44	-10	-17	16	33	39	-16	54
77	54	-17	10	13	-36	43	05	66
89	28	50	-17	23	-14	06	24	49
101	72	-07	-19	-05	-10	02	-04	57
113	-08	-42	-40	06	32	30	-15	56
122	16	53	-12	03	-32	-02	02	43
124	45	-14	-41	-46	14	-10	07	64
Sum of Squares	4.94	2.08	1.48	1.33	1.26	1.20	1.01	

*Item numbers correspond to the numbers of the items on the Human Trait Inventory in Appendix A.

TABLE 3.5

ROUNDED, UNROTATED LOADINGS FOR SIX FEMALE FACTORS OF THE HUMAN TRAIT INVENTORY. (VALUES ARE POSITIVE UNLESS OTHERWISE INDICATED, AND THE DECIMALS ARE OMITTED.)

Item[a] No.	Factors						Communality(h^2)
	1	2	3	4	5	6	
29	63	-23	-29	-08	24	22	65
39	25	-26	36	-21	-13	56	79
54	58	-25	-08	-01	22	-30	83
57	49	-37	-43	22	21	20	69
60	43	40	-48	01	-33	06	69
62	41	-00	31	29	-32	34	61
66	56	-49	-01	09	02	12	57
69	40	-32	56	21	13	-35	76
74	47	42	-30	-06	-40	-21	70
75	38	45	05	42	05	12	50
84	45	33	13	55	09	-21	68
89	43	48	23	-33	42	-00	75
90	32	35	47	-12	-31	08	56
102	46	-21	11	-41	-30	-31	62
104	55	-34	-09	-25	-17	-15	54
110	36	59	01	-35	40	13	78
Sum of Squares	3.37	2.16	1.45	1.10	1.11	0.98[b]	

[a]Item numbers correspond to the number of the items on the Human Trait Inventory in Appendix A.

[b]Not significant.

Thurstone suggests that after rotation to a simple analytical structure the loading values be changed in accordance with the following criteria:[1]

1. Each item had at least one loading close to zero.
2. There were at least as many items with zero loading as factors chosen for rotation for each factor column.
3. For every pair of factors there were several items with projections (loadings) on one factor but not on the other.
4. A large proportion of the items had negligible loadings on any pair of factors.
5. Only a small number of items have appreciable loadings on any pair of factors.

The factors extracted after the final rotation met Thurston's criteria of having at least two items loading highest on any one factor and eigen values of at least 1.00.

Interpretation of the Factors[2]

The final factors extracted will be considered in two sections, the first for males and the second for females. The tradition of naming the factors has been followed. However, it should be recognized that this is a subjective procedure. An attempt is made to confine the naming of the factors to the most obvious content of the highest loading items. The naming and interpretation of the factors is based on the logic of the most highly loaded questions.

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[1]Benjamin Frutcher, Introduction to Factor Analysis (New York: D. VanNostrand Company, 1954), citing L. L. Thurstone, p. 110.

[2]The factors resulting from the factor analysis of the discriminating male and female items are hereafter referred to as male and female factors respectively.

Males--Results of Factor Analysis Rotation

Male factor I.--Factor I accounted for almost half of the total variance present in the seven unrotated factors (see the Sums of the Squares, Table 3.4). Factor I is presented in Table 3.6 along with the loadings and direction of scoring.

TABLE 3.6

ITEM CONTENT OF MALE FACTOR I

Item No.	Item Direction[a]	Content	Loading
54	-	I find it difficult to find time to study my assignments for the next day	+ .75[b]
124	-	I would like to belong to a motorcycle club	+ .70[b]
66	-	I have a hard time concentrating on the subject during class periods	+ .64[b]
101	-	I have trouble waiting for class to be over	+ .60[b]
37	-	I have difficulty working under strict rules and regulations	+ .52
50	-	I flirt	+ .46
63	-	I have a hard time getting along with some of my teachers	+ .46
62	-	I feel nervous when called upon in class to recite	+ .44
68	-	Even when I do sit down to study I find my mind tends to wander	+ .36

[a]Item assigned a - tends to be answered affirmatively by under-achievers.

[b]Items with the highest factor loadings.

Items with loadings highest on this factor appear to be involved with the students' inability to keep their minds from wandering. They indicate a need to escape. For this reason this factor has been called "an anxiety" factor.

Male factor II.--Factor II accounted for about one-sixth of the variance present in the seven unrotated factors.

TABLE 3.7

ITEM CONTENT OF MALE FACTOR II

Item No.	Scoring Direction[a]	Content	Loading
74	+	I like to study	+ .77[b]
16	-	I have been quite independent and free from family rule	+ .52[b]
89	-	I like to plan my activities in advance	+ .42

[a]Items answered positively by over-achievers are assigned a +.

[b]Items with the highest factor loadings.

The items suggest a conformity factor. Over-achievers appear to have been dependent, to like to study and to plan. Under-achievers reject these pressures.

Male factor III.--Factor III has only one item with an appreciable loading on it and for this reason is difficult to interpret.

TABLE 3.8

ITEM CONTENT OF MALE FACTOR III

Item No.	Scoring Direction[a]	Content	Loading
44	-	I pass up something I want to do when my friends feel that it isn't worth doing	+ .72[b]
56	-	I have a daydream about life which I have not told anyone	+ .46
60	+	I like just about everything about school	+ .35

[a]Items answered positively by over-achievers are assigned a +.

[b]Items with high factor loadings.

It was difficult to name this factor; however, item 44 has the heaviest loading and appears concerned with dependence.

Male factor IV.--Factor IV appears to be a compulsive factor which indicates that the individual is concerned with working things out for himself, standing up for an opinion, planning carefully, and being consistent. (See Table 3.9)

Male factor V.--Factor V is another factor which is difficult to interpret but appears to be a social factor although the exact type of social relationship is not apparent. (See Table 3.10)

TABLE 3.9

ITEM CONTENT OF MALE FACTOR IV

Item No.	Scoring Direction[a]	Content	Loading
27	+	When I have an opinion, I stand up for it	+ .80[b]
11	+	I like to work things out for myself rather than have friends show me	+ .58
75	+	I like to plan carefully what courses I will take in school	+ .58
122	+	I like to be consistent in the things I do	+ .41

[a]Items answered positively by over-achievers are assigned a +.

[b]Items with the highest factor loading.

TABLE 3.10

ITEM CONTENT OF MALE FACTOR V

Item No.	Scoring Direction[a]	Content	Loading
113	-	A person who can't take orders without getting angry or resentful must have something wrong with him	+ .70[b]
76	-	I like large noisy parties	+ .52

[a]Item answered positively by under-achievers is assigned a -.

[b]Item with the highest factor loading.

Male factor VI.--In Factor VI each item has a high factor loading. Both items contain overtones of fantasy. The individuals are concerned about thoughts which bother them.

TABLE 3.11

ITEM CONTENT OF MALE FACTOR VI

Item No.	Scoring Direction[a]	Content	Loading
18	-	Unimportant thoughts keep running through my mind and bother me	+ .78[b]
14	-	I lose sleep at night because unimportant thoughts keep running through my mind	+ .70[b]

[a]Items answered positively by under-achievers are assigned a -.

[b]Items with high factor loadings.

Female--Results of Factor Analysis Rotation

One of the original six female factors was dropped because it did not have an eigen value of 1.00. The remaining five female factors are reported in this section.

Female factor I.--Factor I, although it only contains two items, accounts for about one-half of the variance present in the six unrotated factors. This factor appears to be some sort of a social planning factor.

TABLE 3.12

ITEM CONTENT OF FEMALE FACTOR I

Item No.	Scoring Direction[a]	Content	Loading
75	+	I like to plan carefully what courses I will take in school	+ .75
85	+	It would be worthwhile to belong to several clubs or lodges	+ .75

[a]Items answered positively by over-achievers were assigned a +.

Female factor II.--All of the items in Factor II have fairly significant loadings and appear to be concerned with (1) a lack of interest or boredom with school work, and (2) a longing for excitement. Factor II is labeled excitation. (See Table 3.13)

Female factor III.--Both items on Factor III have high factor loadings. The items are concerned with liking study and school. Factor III is called school attitude.

Female factor IV.--Factor IV is difficult to interpret because none of the loadings are high, and also because items 62 and 69 have loadings on other factors almost as high as the loadings found here. However, it does appear that individuals answering these factors positively have a tendency

TABLE 3.13

ITEM CONTENT OF FEMALE FACTOR II

Item No.	Scoring Direction[a]	Content	Loading
57	-	I have done something that is considered dangerous just for the thrill of it	+ .75[b]
29	-	It is difficult for me to keep interest in most of my school subjects	+ .72[b]
66	-	I have a hard time concentrating on the subject during class periods	+ .69
54	-	I find it difficult to find time to study my assignments for the next day	+ .60
104	-	I worry more about my looks than about school work	+ .56

[a]Items answered positively by under-achievers were assigned a -.

[b]Items with high factor loading.

TABLE 3.14

ITEM CONTENT OF FEMALE FACTOR III

Item No.	Scoring Direction[a]	Content	Loading
60	+	I like just about everything about school	+ .80
74	+	I like to study	+ .76

[a]Items answered positively by over-achievers were assigned a +.

to be discouraged, nervous, moody, and desire to be on the move. For these reasons this factor has been called an anxiety factor.

TABLE 3.15

ITEM CONTENT OF FEMALE FACTOR IV

Item No.	Scoring Direction[a]	Content	Loading
90	+	I think I would like the work of a teacher	- .60
102	-	I would be happier if I were able to move about the country	- .55
39	-	I am discouraged if not successful at completing something I have seriously started to do	- .50
62	-	I feel nervous when called upon in class to recite	- .46
69	-	I have to be in the mood before I study	- .45

[a]Items answered negatively by over-achievers are assigned a -. Those items answered positively by over-achievers as assigned a +.

Female factor V.--Factor V has two items, both with high loadings. By inspection, it appears that Factor I and Factor V belong together. Both have elements of planning. It is possible that what is being measured is a response set. However, with reservations, Factor V is labeled activity planning.

TABLE 3.16

ITEM CONTENT OF FEMALE FACTOR V

Item No.	Scoring Direction[a]	Content	Loading
89	+	I plan my activities in advance	+ .85
110	+	I like to plan my activities in advance	+ .84

[a]Items answered positively by over-achievers are assigned a +.

Summary

An item analysis was performed on the personality items shown to discriminate between under and over-achievers. Sixteen female and twenty-seven male items were found to significantly discriminate between discrepant achievers isolated by Krug's technique. A principal axis factor analysis was performed on these significant items. Six male and five female personality factors were identified. The male factors were labeled anxiety, conformity, dependence, compulsion, social, and fantasy. The female factors were called social planning, excitation, school attitude, anxiety, and activity planning.

CHAPTER IV

A COMPARISON OF RESULTS

In the following chapter findings of this study are compared with those of Taylor. All comparisons are made separately for the male and female items and factors isolated in the two studies.

An empirical comparison of the personality items found to discriminate between over- and under-achievers in the two studies was made. The number of items observed to discriminate in both this and Taylor's study were compared with the expected item overlap to determine if the number of items common to both studies exceeded the frequency that would be expected by chance.

When comparing the factor composition in the two studies, it must be recognized that a logical inductive-deductive process was used rather than an empirical one. Items within the compared factors (even when named the same) are not identical, nor is it certain that the items are perceived in the same way by the individuals selected by the two operational procedures.

A Comparison of the Items Selected

Taylor's personality scales contained 32 male and 31 female items which discriminated between over- and under-

achievers defined by the two stage regression model. Only 27 male and 16 female items were found to discriminate between the under- and over-achievers isolated by Krug's techniques. A comparison of the scales developed in the two studies reveals an overlap of 13 male and 10 female items. The chi-square test of significance was used to determine if the item overlap for each sex was significantly different from the overlap that would be expected by chance alone. This involved determining the expected and observed item overlap, placing the frequencies in a 2 x 2 contingency table and determining the chi-square values.

The chi-square values computed by contrasting the observed and expected overlap in this and Taylor's study resulted in chi-square values of 1.29 for males and 3.47 for females (the .05 level of significance requires a chi-square value of 3.84). This would seem to indicate that the items isolated were dependent upon the operational definition of discrepant achiever used. In view of the above findings, it would appear that a factor analysis of the discriminating personality items in the two studies would yield different factors. A comparison of the factors extracted in the two studies was made.

The male factors were compared first. These factors are graphically presented in Table 4.1.

A Comparison of Male Factors

Factor I of this study appears related to Taylor's factors of authority relations, excitation and anxiety. Taylor's Factors III (authority relation) and IV (excitation)

TABLE 4.1

A GRAPHIC COMPARISON OF THE MALE FACTORS ISOLATED IN THE TWO STUDIES

	Taylor's Factors		Krug's Technique Factors		
No.	Eigen Value	Factor Name	Factor Name	Eigen Value	No.
I	4.29	School Attitude	Anxiety	4.94	I
II	2.38	Compulsivity	Conformity	2.08	II
III	1.42	Authority Relations	Independence Dependence	1.48	III
IV	1.23	Excitation	Compulsivity	1.33	IV
V	1.19	Self Value	Social Factor	1.26	V
VI	1.12	Anxiety	Fantasy	1.20	VI
VII	1.02	Internalized Pressure			

Relationship hypothesized ⟶

have two and three items, respectively, in common with Factor I of this study. Taylor's fourth factor and Krug's technique first factor have no common items. These factors, however, were both felt to have an underlying theme of anxiety, and are thus perceived as related. Conceptually, it appears that Factor I of this study contains two or more factors which did not separate. However, in both studies the underachiever appears nervous, not to be able to concentrate on school work, intolerant of restriction, and to seek excitement. The factors described above with their items, scoring direction, and factor loadings are presented in Table 4.2.

MALE FACTORS, ITEMS, AND LOADINGS FOR KRUG'S TECHNIQUE'S FACTOR I, AND TAYLOR'S RELATED FACTORS

Krug's Technique's Factor I (Anxiety)				Related Taylor's Factor III(Authority Relations)			
Item No.	Scoring Direction	Items	Loading	Item No.	Scoring Direction	Items	Loading
36	+	I find it difficult to study my assignment for the next day	.75	37[a]	+	I have difficulty working under strict rules and regulations	+.74
124[a]	+	I would like to belong to a motorcycle club	.70	16	+	I have been quite independent and free from family rule	+.56
66[a]	+	I have a hard time concentrating on the subject during class period	+.64	54[a]	+	I find it difficult to study my assignment for the next day	+.53
101[a]	+	I have trouble waiting for class to be over		69	+	I have to be in the mood before I can study	-.44
37[a]	+	I have difficulty working under strict rules and regulations	.52	Taylor's Factor IV (Excitation)			
63	+	I have a hard time getting along with some of my teachers	.46	50[a]	+	I flirt	.73
66	+	I feel nervous when called upon in class to recite	.44	124[a]	+	I would like to belong to a motorcycle club	.62
68	+	Even when I do sit down to study I find my mind tends to wander		57	+	I have done something that is considered dangerous just for the thrill of it	.52
				101[a]	+	I have trouble waiting for class to be over	
				Taylor's Factor VI (Anxiety)			
				3		I worry about my grades	+.66
				67	+	When I was a youngster I stole things	+.59

[a]Items which discriminate in both studies. +Items answered positively by over-achievers.

Another series of male factors which appear related in the two studies are Taylor's second factor and Krug's technique's factors II and IV.

It appears that the second male factor (conformity) and the fourth male factor (compulsivity) in this study are related to Taylor's second factor (compulsivity). Taylor's Factor II and Factor IV of this study have both been labeled compulsivity, which indicates that the males isolated by both selection techniques appear to manifest this quality. These compulsivity factors have two items (75, 122) in common. Over-achievers in both studies have been found to like to plan, be consistent, study, make the best grades possible and work things out for themselves. All of these items are concerned with the student's desire for structure and organization.

Krug's technique's Factor II (conformity) also appears related to Taylor's compulsivity Factor II. These factors have two items in common (14, 89). In these items, the over-achiever professes to like to study and plan. These related factors with their items, scoring direction, and factor loadings are presented in Table 4.3.

There is no perceived relationship between the other factors. They have been named differently and have no items in common.

Perhaps the most significant observation concerning the male discrepant achievers is the absence of a factor which corresponds to Taylor's primary factor. This factor, school

TABLE 4.3

MALE FACTORS, ITEMS, AND LOADINGS FOR KRUG'S TECHNIQUE'S FACTORS II AND IV, AND TAYLOR'S RELATED FACTOR

Item No.	Scoring Direction	Items	Loadings	Item No.	Scoring Direction	Items	Loadings
Krug's Technique's Factor IV (Compulsivity)				Taylor's Factor II (Compulsivity)			
27[a]	+	When I have an opinion I stand up for it	+.80	75[a]	+	I like to plan very carefully what courses I will take in school	+.68
11	+	I like to work things out for myself rather than have friends show me	+.58	89[a]	+	I plan my activities in advance	+.64
75[a]	+	I like to plan carefully what courses I will take in school	+.58	74[a]	+	I like to study	+.63
122[a]	+	I like to be consistent in the things I do	+.41	72[a]	+	I like to make the best grades possible	+.58
Krug's Technique's Factor II (Conformity)				122[a]	+	I like to be consistent in the things I do	+.49
74[a]	+	I like to study	+.77				
16[a]	+	I have been quite independent and free from family rule	+.52				
89[a]	+	I like to plan my activities	+.42				

[a]Items which discriminate in both studies. + Items answered positively by over-achievers.

attitude, comprises thirty-three per cent of the variance of the item intercorrelation matrix. Under-achievers located by the two-stage regression method were found to feel that school was a waste of time. This factor and the items comprising it were completely absent from the factors isolated using Krug's method. This difference may be due to: (1) the including of the inconsistent achievers in Krug's operational definitions, and (2) Krug's selection technique's tendency to select individuals closer to the regression line in the high under-achieving and low over-achieving groups.[1] The elimination of individuals with inconsistent aptitude scores may leave only those individuals who fail continually and thus have the feeling that school is a waste of time. The inclusion of individuals with fluctuating aptitude scores has led to a primary factor which is difficult to interpret. Factor I consists of items concerned with the inability to concentrate and the desire for excitement.

A Comparison of Female Factors

A graphic comparison of the female factors isolated in this and Taylor's study is presented in Table 4.4.

Related Factors

Taylor's third female factor, organizational need, is largely comprised of the four items (60, 74, 89, 110) that

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[1]Thirty-three per cent of the males selected were rejected in Farquhar's first stage because of inconsistent aptitude scores.

TABLE 4.4

A GRAPHIC COMPARISON OF THE FEMALE FACTORS ISOLATED IN THE TWO STUDIES

Factors Extracted by Taylor			Factors Extracted in this Study		
No.	Eigen Value	Factor Name	Factor Name	Eigen Value	No.
I	3.90	Fantasy	Social Planning	3.37	I
II	2.20	Achievement Attitude	Excitation	2.16	II
III	1.46	Organizational Need	School Attitude	1.45	III
IV	1.23	Self Attitude	Anxiety	1.19	IV
V	1.21	Excitation	Activity Planning	1.11	V
VI	1.17	Independence-Dependence Conflict			

Strong relationship hypothesized ⟶

make up Factor III (school attitude) and Factor V (activity planning) in the present study. In both samples, the over-achiever seems to exhibit a positive school attitude and a liking for organization and structure. These have factored into distinctly separate factors in the second case, but have remained in Taylor's Factor III to create a heterogeneous factor with rather low factor loading on some items. Perhaps there is an even closer relationship between Taylor's fantasy factor and the second factor (excitation) in this study. The inability of the under-achieving student to concentrate seems to permeate both of these factors.

None of the remaining factors appear to have any observable relationship, and it would be going beyond the data to attempt a comparison. This lack of comparable factors seems to be due to the different sampling procedures used. Only sixteen items were found to discriminate between the female over- and under-achievers located by Krug's selection technique (Taylor found thirty-one items to discriminate between discrepant females). The isolation of only sixteen items which discriminated between the female over- and under-achievers selected by Krug's technique limits the number of factors possible, and makes a comparison of factors difficult. This difference in the number of discriminating items is attributed to: (1) the including of individuals with fluctuating aptitude scores in Krug's operational definitions,[1] and (2) Krug's technique's selection of individuals closer to the regression line.[2]

There are no outstanding recognizable factors which distinguish between the female samples isolated by the two operational techniques as there were with the males. Generally, the under-achieving female in both cases is portrayed as a disorganized person with a wandering mind who desires excitement and, in general, does not feel the need for academic success. Tables 4.5 and 4.6 contain the related factors with their items, scoring direction, and factor loadings.

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[1]Forty-eight per cent of the females selected were rejected in Farquhar's first stage because of inconsistent aptitude scores.

[2]Twelve per cent of the females selected were considered normal achievers in the Two-Stage Regression Technique.

TABLE 4.5

FEMALE FACTORS, ITEMS, AND LOADINGS FOR KRUG'S TECHNIQUE'S FACTORS III AND V, AND TAYLOR'S RELATED FACTOR

Item No.	Scoring Direction	Items	Loadings
Krug's Technique's Factor III (School Attitude)			
60[a]	+	I like just about everything about school	+.80
74[a]	+	I like to study	+.76
Krug's Technique's Factor V(Activity Planning)			
89[a]	+	I plan my activities in advance	+.85
110[a]	+	I like to plan my activities in advance	+.84

Item No.	Scoring Direction	Items	Loadings
Taylor's Factor III (Organizational Need)			
89[a]	+	I plan my activities in advance	+.81
110[a]	+	I like to plan my activities in advance	+.77
74[a]	+	I like to study	+.57
90[a]	+	I think I would like the work of a teacher	+.51
60[a]	+	I like just about everything about school	+.47

[a]Items which discriminated in both studies. + Item answered positively by over-achievers.

TABLE 4.6

FEMALE FACTORS, ITEMS, AND LOADINGS FOR KRUG'S TECHNIQUE'S FACTOR II, AND TAYLOR'S RELATED FACTOR

Item No.	Scoring Direction	Items	Loadings	Item No.	Scoring Direction	Items	Loadings
Krug's Technique's Factor II (Excitation)				Taylor's Factor V (Excitation)			
57	+	I have done something that is considered dangerous just for the thrill of it.	+.75	124	+	I would like to belong to a motorcycle club.	+.70
				50	+	I flirt	+.58
29[a]	+	It is difficult for me to keep interested in most of my school subjects.	+.72	118	+	Some subjects are so unpleasant to me that I can't talk about them	+.55
66[a]	+	I have a hard time concentrating on the subject during class period	+.60				
54	+	I find it difficult to find time to study my assignment for the next day	+.60				
104	+	I worry more about my looks than about school work.	+.56				

[a]Items which discriminated in both studies. + Items answered positively by over-achievers.

Summary

In this chapter the items and personality factors of the under- and over-achievers selected by Krug's technique were compared with the items and personality factors of discrepant achievers isolated by the two stage regression technique. A chi-square test of the significance of the item overlap in the two studies was not significant. However, a comparison of the male and female personality factors in this and Taylor's studies yielded four male and four female factors which would appear closely related. Factors were deemed closely related if they (1) contained the same or similar items, or (2) appeared to have the same underlying theme.

CHAPTER V

SUMMARY, CONCLUSIONS, RESEARCH IMPLICATIONS, AND SUGGESTIONS FOR FUTURE RESEARCH

Summary

The basic problem of the investigation was to determine what affect two different methods of selecting over- and under-achievers have on the construction and factor analysis of a personality instrument. The instrument, the Human Train Inventory, was developed for the Farquhar project by selecting items from tests which purported to measure the difference between under- and over-achieving students.[1]

The sample used in this study was randomly selected from a larger sample used in the Farquhar study. Farquhar administered the Human Train Inventory to 4,200 eleventh grade students from nine Michigan schools on whom aptitude and achievement scores were already available. In this study a random sample of 280 eleventh graders were proportionally extracted from each of the nine schools. The procedure recommended by Krug was used to operationally

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[1] Farquhar, A Comprehensive Study of the Motivational Factors Underlying Achievement of Eleventh Grade High School Students, op. cit.

define under- and over-achievers.[1] This procedure consisted of using an aptitude measure (DAT-VR) and an achievement measure (GPA) to construct a regression line. A predicted GPA was then calculated for each aptitude score. The distribution of predicted GPA's for each school was divided into three groups (high, average, low) using arbitrary cutting points. Discrepant achievers were determined by contrasting actual and predicted GPA's in each of the three achievement groups. The fifteen per cent of the individuals within each achievement whose actual GPA exceeded their predicted GPA by the greatest amount were designated over-achievers. The under-achievers within each achievement group were selected by reversing the procedure.

An item analysis was performed on the items within the Human Trait Inventory. Personality items found to significantly discriminate between under- and over-achievers were then factor analyzed in an attempt to isolate the personality characteristics of this group of discrepant achievers.[2]

With the exception of the method of selecting over- and under-achievers, this study is a replication of a study performed by Taylor.[3] A comparison of the results of the

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[1]The under- and over-achievers were defined by a method used by Krug, op. cit., pp. 133-136.

[2]The Chi-Square Model was used to select items which differentiated between under- and over-achievers within each sex at the .10 level of significance and after cross-validation.

[3]Taylor, op. cit.

two studies was made. The following research hypotheses were examined:

I. The method of selecting over- and under-achievers designated by Krug will yield different individuals from those selected by the two stage regression model.

II. The Human Trait Inventory contains items which will differentiate between under- and over-achieving students designated by Krug's technique.

III. The items found to discriminate between under- and over-achievers will be dependent upon which operational definition of under- and over-achievement is used.

IV. Factor analysis of item intercorrelations will yield interpretable factors.

V. Conceptionally, empirically extracted factors will differ between Krug's and Farquhar's operationalizing procedures.

Conclusion

A Comparison of the Individuals Selected

A comparison of the discrepant male achievers selected by the Two Stage Regression Model with those selected by Krug's technique reveals a relatively different sample.[1] Forty-seven (33%) of the 142 males selected by Krug's technique were individuals rejected in the two stage regression technique because of inconsistent aptitude scores. Another twenty-one (5%) of the 142 discrepant males selected by

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[1]The discrepant achievers isolated in this study are compared with the under- and over-achiever classifications on the same sample used in the Farquhar study.

Krug's technique had been classified as normal achievers by the two stage regression model.

A comparison of discrepant females isolated by the two operational procedures yields similar results. Fifty, or 36 per cent, of the 138 female discrepant achievers isolated by Krug's selection procedure had inconsistent aptitude scores and were rejected in the first stage of the two stage regression technique. Another twenty-five (18%) of the 138 discrepant females were considered normal achievers by the two stage regression model.

A Comparison of the Selected Items

Taylor's personality scales contained 32 male and 31 female items which discriminated between over- and under-achievers defined by the two stage regression model. Only 27 male and 16 female items were found to discriminate between the under- and over-achievers isolated by Krug's techniques. A comparison of the scales developed in the two studies reveals an overlap of 13 male and 10 female items.

A chi-square test of significance was used to determine if the observed item overlap between the two studies was significantly different from the expected item overlap. Neither the male nor female item overlap was found to be significant at the .05 level.

A Comparison of the Isolated Factors

A comparison of the isolated factors in the two studies resulted in four related male and female factors from each

study. These factors, while not always containing the same item appear to have a common underlying theme. The primary difference between the male discrepant achievers in the two studies was found in their attitude toward school. Male under-achieving students in Taylor's study tended to feel that school was a complete waste of time. No comparable attitude was found in the under-achievers located by Krug's technique. Under-achieving males isolated in this study seem to exhibit a great deal of anxiety concerning their school work and tended to try to escape from it in fantasy and excitement.

The female factors showed no outstanding personality differences between the samples selected by the two operational techniques. Generally, the under-achieving female in both studies is portrayed as a disorganized person with a wandering mind who craves excitement and does not feel the need for academic success. The lack of comparable factors is in part due to the fact that only sixteen discriminating items were found when the discrepant achievers were isolated by Krug's technique. The individuals isolated appear more heterogeneous and do not exhibit clearly interpretable factors.

The agreement between the findings in this and Taylor's study is a matter of degree. The items isolated in the two studies were dependent upon the operational definition of discrepant achiever used. A factor analysis of the discriminating items yielded both similar and different factors. Four male

and four female factors in each study were judged to be closely related on the basis of item content and factor name. Thus it appears that the discrepant achievers isolated by Krug's and Farquhar's technique have both similar and unique personality traits.

Research Implications

Farquhar reviewed the literature concerned with under- and over-achievement and noted that:

1. Conflicting results of under-over-achiever studies might be related to non-comparable selection techniques used in isolating criterion groups.

2. Seven techniques, representing four methodological categories were used to operationally define discrepant achievers.

3. There was little agreement among the techniques in the number of individuals designated as discrepant achievers or the aptitude-achievement extreme in which individuals were to be placed.

4. The nature of the characteristics of how various techniques function in selecting individuals has not been adequately examined.

5. No completely satisfactory operational definition of discrepant achievers exists.[1]

This study compared the effects of using two different regression techniques for selecting discrepant achievers. There remains, however, much that can be done in investigating the effect of using different operational definitions in the construction of motivational scales. This investigation

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[1]Farquhar, "The Comparison of Techniques Used in Selecting Under- and Over-Achievers," op. cit.

involves just one of the many possible definitional comparisons of under- and over-achievers that could be made. However, it is hypothesized that further comparisons of this type would yield personality factors very similar to those personality variables already isolated in this and other discrepant achiever studies.

Suggestions for Future Research

In general, research workers agree that an over-achiever is an individual who exceeds an aptitude-based-expectancy of academic performance. Conversely, the under-achiever falls below his expected academic performance. This definition it seems only partially defines the over- and under-achiever. It appears highly probable that the individuals selected within under- and over-achiever groups come from different statistical populations. Different individuals may then be under- and over-achievers for different reasons. The placing of these individuals in the same discrepant achiever groups may have the effect of masking the group traits. More work needs to be done in the way of:

1. Semantically defining the types of discrepant achiever populations.
2. Determining the personality characteristics of these populations.

Some of the under-achiever populations that appear to exist and mask the personality characteristics of the group are:

1. Individuals who feel school is a complete waste of time.

2. Individuals whose energy is completely absorbed by pressing personality problems.

3. Individuals who are interested in knowledge, but who feel grades are not important.

4. Individuals who received an unrealistic aptitude score.

These statements may be reversed to describe over-achiever populations which have a similar masking effect.

The procedure for constructing sales for measuring the factors associated with under- and over-achievement has in the past consisted largely of (1) developing a large pool of items which, according to present loosely formulated theory, should differentiate between under- and over-achievers; (2) administering these items to a population on which there is aptitude and achievement data available; (3) determining which items discriminate between under- and over-achievers; and (4) performing a factor analysis of these items to determine those factors which are characteristic of the discrepant achiever. It appears that at the present time research has done much in the way of defining a clear "motivational" universe. It is recommended that Guttman's facet theory be used in an attempt to relate the abstract theory of motivation to empirical research.[1] To do this, a distinction must be made between the structural content of the theory and the

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[1]Louis Guttman, "A Structural Theory for Intergroup Beliefs and Action," American Sociological Review, Vol. 24 (June, 1959), p. 71.

statistical structure of the corresponding empirical observations. The state of the present "motivational" universe indicates that a special metatheory like the "contiguity principle" can be used to predict its statistical structure. The "contiguity principle" states that the closer two variables are semantically, the closer they will be statistically.

The factors isolated by the research to date may be used to formulate a semantic framework on which to formally substructure the "motivational" universe, in terms of facet design. From this framework it is possible to predict a certain statistical structure for the matrix of correlation coefficients. An examination of the empirical data should then reveal the predicted semantic structure, and those variables closer together semantically should be closer together statistically. The result of such a substructuring should, if done properly, yield a scalable set of motivational items within each facet.

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APPENDIX A

HUMAN TRAIT INVENTORY

HUMAN TRAIT INVENTORY

GENERAL DIRECTIONS: PLEASE READ CAREFULLY!

Following is a list of statements about YOU. Read each statement carefully! Then decide whether this statement is how you always feel, usually feel, sometimes feel or never feel.

Number	Meaning of Number
1	This statement would never describe the way I feel.
2	This statement sometimes describes the way I feel.
3	This statement usually describes the way I feel.
4	This statement always describes the way I feel.

Answer each statement--Do not leave any blank.

There are no right or wrong answers. The answers apply only to you. The way you answer these statements will not affect your school marks in any way. Mark between the lines under the number that best describes how you feel.

EXAMPLE:

1. I feel it is a good thing to be honest.

	1	2	3	4	5	
Answer Sheet 1.	//	▰	//	//	//	(Ignore Column 5)

This individual has chosen number "2" for the statement "I feel it is a good thing to be honest." This means he feels that this statement sometimes describes him.

In marking your answers on the separate answer sheet, be sure that the number of the statement in the booklet is the same as the number on the answer sheet. It is best to mark your first impression, try not to change your answer. If you change an answer, erase completely your first choice and then blacken between the lines under the other column.

Be sure to fill in all the information at the top of the answer sheet, name, age, sex, date today and so on.

Remember to answer the statements as they apply to you!

PLEASE DO NOT WRITE ON THIS BOOKLET

Ratings: 1. Never 2. Sometimes 3. Usually 4. Always

1. I am inclined to take things hard.
2. I like collecting flowers or growing house plants.
3. I worry about my grades.
4. Delete
5. Many times I become so excited I find it hard to go to sleep.
6. I worry about things I have said that may have injured other people's feelings
7. I take on more work than I should.
8. I take on more than I can handle.
9. I day dream frequently.
10. I prefer to work with the opposite sex on school projects.
11. I work things out for myself rather than have a friend show me how.
12. I work things out for myself rather than have a teacher show me how.
13. I wake up alert and rested most mornings.
14. I wake up tired and listless most mornings.
15. The one to whom I was most attached and whom I most admired as a child was a woman.
16. I have been quite independent and free from family rule.
17. Delete
18. People that break the law are caught and punished.
19. I like to collect things such as stamps, flowers, coins, house plants, etc.
20. Delete

Be Sure You Have Given A Rating To Each Of The Statements On This Page

Ratings: 1. Never 2. Sometimes 3. Usually 4. Always

21. Most people make friends because of what the friends might be able to do for them.

22. I enjoy cooking.

23. I am bothered for days by unimportant thoughts running through my mind.

24. I mind being made fun of.

25. I have played that I am sick to get out of doing something.

26. While in trains, buses, etc., I strike up a conversation with a stranger.

27. When I have an opinion, I stand up for it.

28. Quite a few people are guilty of sexual conduct which is considered to be bad.

29. It is difficult for me to keep interested in most of my school subjects.

30. At least one member of my family is very nervous.

31. I fear bugs such as spiders.

32. When I am in trouble I feel it is best to keep my mouth shut.

33. I like to read about science.

34. I have difficulty sticking up for my rights because I am so reserved.

35. At parties I sit by myself or with just one other person rather than join a crowd.

36. The way of life of those about me controls my conduct.

37. I have difficulty working under strict rules and regulations.

38. I have a great deal of satisfaction when I do something better than what is expected of me.

<u>Be Sure You Have Given A Rating To Each of The Statements On This Page</u>

Ratings: 1. Never 2. Sometimes 3. Usually 4. Always

39. I am discouraged if not successful at completing something I have seriously started to do.

40. My parents have been strict and stern with me.

41. I find it hard to make friendly contacts with members of the opposite sex.

42. I enjoy reading the editorials in the newspaper.

43. If several friends and I were in trouble, I would rather take the whole blame than give them away.

44. I pass up something I want to do when my friends feel that it isn't worth doing.

45. When someone tries to cut in ahead of me in a line, I become annoyed and speak to them about it.

46. Delete

47. I sweat very easily, even on cold days.

48. I can read a long while without tiring my eyes.

49. I belong to a crowd that tries to stick together through thick and thin.

50. I flirt.

51. I spend time with the opposite sex.

52. Most of my school subjects are a complete waste of time.

53. Most of my school subjects are useful.

54. I find it difficult to find the time to study my assignment for the next day.

55. I care what happens to me.

56. I have a daydream about life which I have not told anyone.

57. I have done something that is considered dangerous just for the thrill of it.

<u>Be Sure You Have Given A Rating To Each Of The Statements On This Page</u>

Ratings: 1. Never 2. Sometimes 3. Usually 4. Always

58. I like to keep people guessing what I'm going to do next.

59. My parents have been satisfied with their economic position.

60. I like just about everything about school.

61. I have trouble getting my school assignments in on time.

62. I feel nervous when called upon in class to recite.

63. I have a hard time getting along with some of my teachers.

64. The questions on school tests often confuse me because I don't know what they are driving at.

65. I do things that are dangerous.

66. I have a hard time concentrating on the subject during class periods.

67. When I was a youngster I stole things.

68. Even when I do sit down to study I find that my mind tends to wander.

69. I have to be in the mood before I can study.

70. I lose sleep at night because thoughts or ideas bother me.

71. Delete

72. I like to make the best grades possible.

73. A college education is unimportant to me.

74. I like to study.

75. I like to plan very carefully what courses I will take in school.

76. I like large noisy parties.

77. Unimportant thoughts keep running through my mind and bothering me.

Be Sure You Have Given A Rating To Each of The Statements On This Page

Ratings: 1. Never 2. Sometimes 3. Usually 4. Always

78. I like to read about history.

79. I have played hooky from school.

80. I am said to be quick tempered.

81. There was a time in my life when I liked to play with dolls.

82. I learn slowly.

83. The way I do things is misunderstood by others.

84. It would be worthwhile to belong to several clubs or lodges.

85. My parents object to the friends I choose.

86. I feel worthless.

87. I have been sent to the principal for misbehaving in class.

88. I have trouble with my muscles twitching or jumping.

89. I plan my activities in advance.

90. I think I would like the work of a teacher.

91. I lose my temper.

92. I would rather be physically active than sit and read.

93. I want very much to be a success.

94. I watch TV.

95. I give up when I meet difficult problems.

96. When someone hurts my feeling I want to pay them back, just for the principle of the thing.

97. One or more times a week I suddenly feel hot all over for no apparent reason.

98. I work under a great deal of tension.

99. I have had many strange and unusual experiences.

Be Sure You Have Given A Rating To Each of The Statements On This Page

Ratings: 1. Never 2. Sometimes 3. Usually 4. Always

100. I enjoy social activity.

101. I have trouble waiting for a class to be over.

102. I would be happier if I were able to travel around the country.

103. I would be uneasy if some of my family were in trouble with the police.

104. I worry more about my looks than about my school work.

105. I get disgusted with myself if I don't do as well as I should.

106. Society owes a lot more to the business man and the manufacturer than it does to the artist and the professor.

107. I like fiction stories more than I do factual novels.

108. I would feel satisfied if one of my papers was read to the class in school.

109. I enjoy watching or starting a fire.

110. I like to plan my activities in advance.

111. It is more fun if your activities are not planned in advance.

112. I wish I were a child again.

113. A person who can't take orders without getting angry or resentful must have something wrong with him.

114. When I am disappointed I put it out of my mind.

115. I feel cross and grouchy without good reason.

116. I feel I would make a good leader if given the chance.

117. I like being with people in social gatherings.

118. Some subjects are so unpleasant to me that I can't talk about them.

119. Something about a fire fascinates me.

<u>Be Sure You Have Given A Rating To Each of The Statements On This Page</u>

Ratings: 1. Never 2. Sometimes 3. Usually 4. Always

120. I feel that I haven't any goals or purpose in life.

121. I think teachers are wrong many times and won't admit it.

122. I like to be consistent in the things I do.

123. I like to go to the movies more than once a week.

124. I would like to belong to a motorcycle club.

125. If I were an artist I would like to draw still objects.