

THE FACTORED DIMENSIONS OF AN  
OBJECTIVE INVENTORY OF ACADEMIC  
MOTIVATION BASED ON ELEVENTH GRADE  
MALE OVER-AND UNDERACHIEVERS

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**This is to certify that the**

**thesis entitled**

**THE FACTORED DIMENSIONS OF AN OBJECTIVE INVENTORY OF  
ACADEMIC MOTIVATION BASED ON ELEVENTH GRADE MALE  
OVER- AND UNDER ACHIEVERS**

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## ABSTRACT

### THE FACTORED DIMENSIONS OF AN OBJECTIVE INVENTORY OF ACADEMIC MOTIVATION BASED ON ELEVENTH GRADE MALE OVER- AND UNDERACHIEVERS

by Marion Dennis Thorpe

This study was concerned with 1) the development of an objective inventory of academic motivation, and 2) a factor analysis of the most discriminating inventory items. The inventory was based on a bi-polar theory of academic achievement motivation. One pole of the theory was described by 1) long-term involvement; 2) competition with a maximum standard of excellence; and 3) unique accomplishment. The other pole was described by 1) short-term involvement; 2) competition with a minimal standard of excellence; and 3) ordinary or common accomplishment. Two-hundred forced choice items were constructed on the basis of the theory. A statistically defined sample of 171 overachieving and 137 underachieving eleventh grade males was selected from nine Michigan high schools. After cross-validation, forty-five of these items reliably and significantly discriminated between male over- and underachievers in the direction predicted by the theory.

Twenty-two of these items were factor analyzed, using the principle axes solution and the quartimax method of rotation. Five significant factors were extracted and named as follows:

Factor I--Chance-taking versus No Chance-taking

Factor II--n-Academic Achievement

Factor III--Intrinsicness versus Extrinsicness

Factor IV--Speed versus Thoroughness

Factor V--Situational Involvement

The study was supported by funds from the U. S. Office of Education, under the direction of William W. Farquhar, in A Comprehensive Study of the Motivational Factors Underlying Achievement of Eleventh Grade High School Students, Research Project No. 846 (8458).

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By

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## CHAPTER I

### THE PROBLEM

#### Purpose of the Study

Recent emphasis in educational research has been to relate non-intellectual variables to academic achievement. Even so, few investigators have studied directly the underlying nature of an objective assessment of motivation as an academic achievement variable. The purpose of this study was to aid in filling this void.

#### Need for the Study

The construction and analysis of a diagnostic instrument of motivation could be justified solely because it would permit better educational selection and placement. A factor analysis of such an instrument should reveal the underlying structure which accounts for the success of the instrument, thereby providing the foundations upon which an even more successful instrument could be built. Moreover, the subsidiary value of strengthening the curriculum, teaching methods, and counseling procedures by better understanding the nature of motivational characteristics of students further emphasizes the need for extended research in this area.

#### Statement of the Problem

It was the problem of this investigation to explore the principal factors which accounted for item intercorrelations in an objective inventory of academic achievement motivation of eleventh grade male

students. The scale items were factor analyzed, and the obtained factor loadings were analytically rotated to simple structure. The investigation developed as part of a research sponsored by the United States Office of Education under the direction of William W. Farquhar.<sup>1</sup> The problem was to conduct a factor analysis on the item intercorrelations of the Generalized Situational Choice Inventory,<sup>2</sup> hence referred to as the GSCI, to 1) ascertain what items could be grouped because they functioned similarly; 2) delineate the relatively independent underlying factors responsible for these groupings; and 3) to relate the derived factors to the original theory of the GSCI. Thus, the problem was to determine the number, nature, magnitude and structure of the factors functioning in the GSCI. The theory on which the GSCI was developed follows.

### Theory

In an effort to describe achievement motivation McClelland et al., have hypothesized that achievement motivation (Achievement Imagery) is inferred from an individual's response(s) to selected Thematic Apperception Test cards. Achievement Imagery is scored when an examinee's responses show concern with 1) long term involvement; 2) unique accomplishment; and 3) competition with a standard of excellence.

Farquhar and associates made McClelland's theory bi-polar by postulating the opposite end of the n-Achievement continuum as being, 1) short-term involvement; 2) ordinary or common accomplishment; and 3) competing with a minimal standard of excellence.<sup>3</sup> The assumption was

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<sup>1</sup>William W. Farquhar, A Comprehensive Study of the Motivational Factors Underlying Achievement of Eleventh Grade High School Students, Research Project No. 846 (8458) in cooperation with the U. S. Office of Education.

<sup>2</sup>A Detailed Description of the Generalized Situational Choice Inventory may be found in Chapter II.

<sup>3</sup>Farquhar, loc. cit.

made by the Farquhar team that McClelland's three dimensions characterize the person with high need for academic achievement while the additional dimensions were assumed to characterize the person with low need for academic achievement.

McClelland's concern was with one facet of personality and one facet of motivation--general achievement motivation (n-Achievement). Farquhar's concern was with two facets of achievement motivation--high and low need for academic achievement. Farquhar and McClelland's theoretical reference may be conceptualized as a facet of personality as shown in Figure 1.

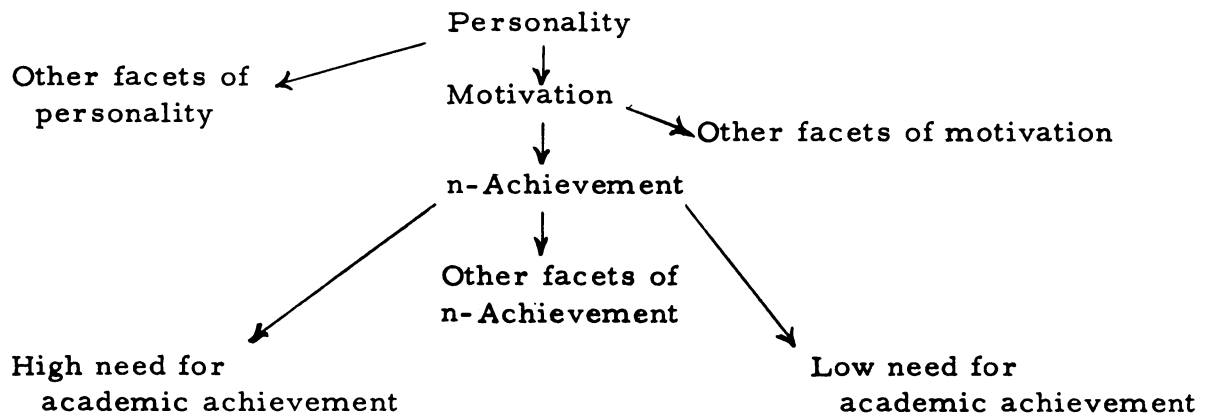


Figure 1. High and Low need for Academic Achievement as Facets of Personality.

A summary of the Bi-polar Theory of Academic Achievement is presented in Table I.

Table I--Summary of a Bi-Polar Theory of High and Low Academic n-Achievement

| High Academic n-Achievement                               | Low Academic n-Achievement                                |
|-----------------------------------------------------------|-----------------------------------------------------------|
| 1. Need for long-term involvement.                        | 1. Need for short-term involvement.                       |
| 2. Need to compete with a maximum standard of excellence. | 2. Need to compete with a minimal standard of excellence. |
| 3. Need for unique accomplishment.                        | 3. Need for common accomplishment.                        |

### The Hypothesis

A basic assumption was made that the overachiever is endowed with high need for academic achievement while the underachiever is endowed with low need for academic achievement. (See Chapter II for the definition of over- and underachiever.)

It was further assumed that an inventory could be constructed containing certain items which would significantly discriminate between criterion groups of extreme over- and underachievers. These items were to have two alternatives; one descriptive of the overachiever and the other descriptive of the underachiever. It was hypothesized that the two discrepant achievement groups would disproportionately choose alternatives in the direction predicted by the theory.

Subsequent to the validation and cross-validation of the motivational scale a factor analysis could be performed on the item intercorrelations. The factor analysis forms the basis of the hypothesis of the present study.

### Statement of the Hypothesis

The six theorized facets of academic achievement motivation which are descriptive of both high and low need for academic achievement will manifest themselves on one factor.

The over-all plan of the dissertation is as follows: In Chapter II, the background research, development and validation of an objective measure of motivation may be found. A review of the factor analytical studies on achievement motivation is presented in Chapter III. The methodology necessary for the factor analysis appears in Chapter IV. The analysis of the data is reported in Chapter V, while the summary, conclusions and theoretical implications are presented in Chapter VI.

## CHAPTER II

### THEORY AND INSTRUMENTATION

The assumption was made by Applezweig, Moeller and Burdick that behavior is developed in response to its adequacy to reduce one or more present tension or need systems of the individual.<sup>1</sup> These investigators hypothesized that where the response system serves a need (by providing a means for its reduction) a significant correlation should be found between a measure of the need served and the extent to which the person is engaged in the need produced behavior. For example, the measured need for achievement should correlate highly with the behavior which is characteristic of the person engaged in satisfying this need.

On the basis of the Applezweig assumption and the research generated to test the hypothesis, the Applezweig team found that scholastic performance is related to scholastic ability, but considerable "error" remains in any prediction using earlier achievement to predict future grades.

Recognizing this, such investigators as McClelland and his colleagues. . . . have devised measures of what has generally been used as predictors for that part of the variability in grades attributable to non-intellective factors. These measures have been used with moderate success to distinguish between groups of high and low academic achievers. . . .<sup>2</sup>

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<sup>1</sup>M. H. Applezweig, G. Moeller and H. Burdick, "Multi-Motive Prediction of Academic Success," Psychological Reports, Vol. 2, 1956, pp. 489-496.

<sup>2</sup>Ibid.

Applezweig, Moeller and Burdick conclude that 1) non-intellectual factors play a part in the prediction of academic success; and 2) that in some instances at least, the McClelland projective test adds to the prediction of academic success. To the extent that such a test becomes more refined, more residual variance will be predicted variance. Logically, with increase in precision of prediction of achievement, the less meaning the terms over- and underachiever have.

There are, however, certain problems the solving of which must be preliminary to such precise predictors. For example, Krumboltz and Farquhar highlighted two such problems in their study of the reliability and validity of the n-Achievement Test.<sup>1</sup> These investigators found that a nine week test-retest reliability of the n-Achievement test resulted in a reliability coefficient of .26. In addition, the correlation of n-Achievement with two other personality measures which correlate with academic success showed no consistently positive or negative relationships. N-Achievement was also independent of scholastic aptitude as measured by the American Council on Education Test. The investigators concluded that both the reliability and validity of the n-Achievement test were in doubt. Farquhar has since indicated that failure to get acceptable reliability and validity coefficients for the n-Achievement test, may be due to its projective nature and its consequent subjective scoring.<sup>2</sup> Presumably the theory behind the test may be sound, and could best be tested using an objective, easily scored inventory built upon an extension of the McClelland achievement imagery theory.

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<sup>1</sup>John D. Krumboltz and William W. Farquhar, "Reliability and Validity of the n-Achievement Test," Journal of Consulting Psychology, Vol. 21, 1957, pp. 226-228.

<sup>2</sup>William W. Farquhar, personal communication.

Research with the Iowa Picture Interpretation Test by Hurley was an attempt in this direction.<sup>1</sup> However, this exploration was not confined to achievement imagery but included attempts at measuring blandness, insecurity and hostility as well. Hurley used ten Thematic Apperception Test cards. Sets of four alternative choices were formulated for each of these cards. The choices consisted of statements representing 1) achievement imagery; 2) insecurity; 3) blandness; and 4) hostility. In essence, Hurley had four separate, ten item scales. Such short scales might be expected to have low reliability. The reported reliability for the four separate sub-scales of the IPIT were: Achievement Imagery .34, Insecurity .15, Blandness .46 and Hostility .35. Thus, the IPIT was not found to be reliable.

It remains to be demonstrated that an objective reliable inventory to measure academic achievement can be built, and that such an inventory when factor analyzed will reveal factors which will support a motivational theory. In the following section such an instrument is discussed.

#### Construction of an Objective Measure of Motivation

Two hundred items were constructed, with each item having two alternatives. One alternative was logically seen as involving any one, two or all three of the dimensions theoretically descriptive of the individual motivated highly for academic achievement. The other alternative was logically seen as involving any one, two or all three of the dimensions theoretically descriptive of the individual with low motivation for academic achievement. Over- and underachievers were chosen for the validation of these items by the following procedure:

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<sup>1</sup>John R. Hurley, "The Iowa Picture Interpretation Test: A Multiple Choice Variation of the TAT," Journal of Consulting Psychology, Vol. 19, 1955, pp. 372-376.

### Population and Sample

- 1) Schools in eight Michigan cities and nine schools having 9th grade Differential Aptitude Test scores available on their current 10th graders, were asked to cooperate in the study.
- 2) A second aptitude measure was obtained so that reliable estimates of academic aptitude could be made. California Tests of Mental Maturity were administered.
- 3) The DAT-Verbal Reasoning and CTMM-Language scores were used in obtaining a stable estimate of academic aptitude after empirically examining possible DAT and CTMM sub-score combinations. (e.g. in one school the correlation of VR with cumulative grade point average (GPA) was  $+.65$  and CTMM-L with GPA was  $+.50$ ).
- 4) Regression lines were calculated for each school and sex assuming a correlation of  $+1.00$  between DAT\_VR and CTMM-L. Separate equations were calculated because a pilot study indicated that one equation could not be generalized from school to school.<sup>1</sup> Only those individuals who fell within one standard error estimate above and below the regression line were included in the study. Because it was important that the criterion groups be classified with little chance of making a Type II error (accepting when should have rejected) it was decided to run the risk of Type I error (reject when should have accepted) even if individuals were lost in the process (see Figure 2).

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<sup>1</sup>William W. Farquhar, A Comprehensive Study of the Motivational Factors Underlying Achievement of Eleventh Grade High School Students, Research Project No. 8461 (8458) in cooperation with the U. S. Office of Education.

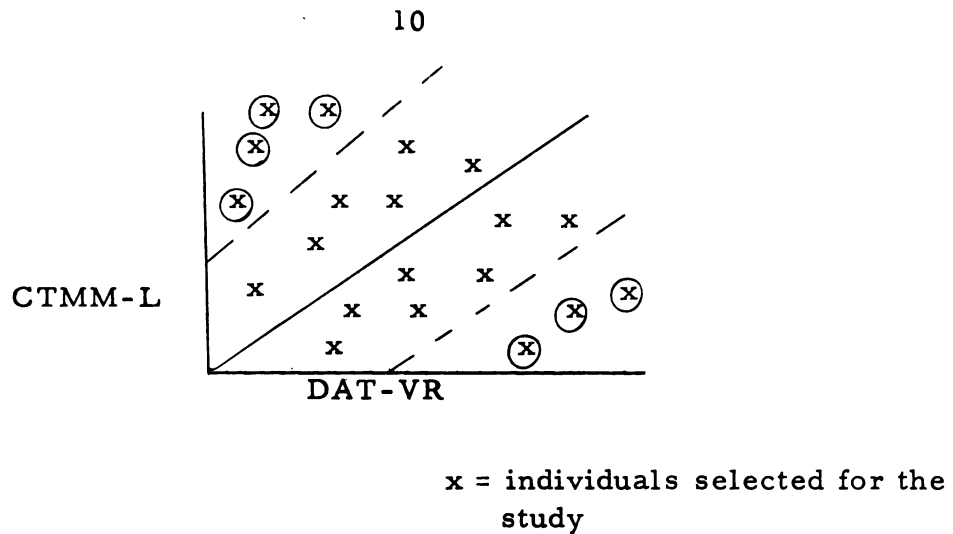


Figure 2. Methodological Selection of Individuals with Stable Measured Aptitude.

5. Regression equations predicting GPA from the DAT-VR scores were calculated for each sex in each of the participating schools. Underachievers were defined as those individuals whose GPA fell at least one standard error of estimate below the regression line prediction of achievement. Similarly, overachievers were designated as falling one standard error of estimate above the regression line (see Figure 3).

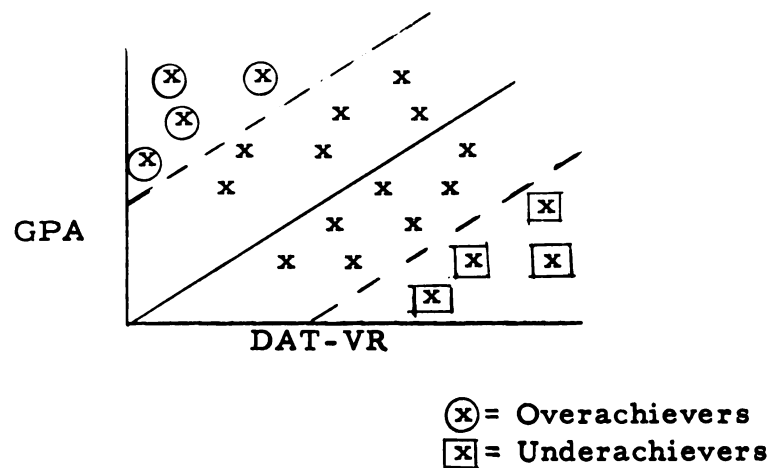


Figure 3. Method of Selecting Under and Overachievers.

By using the above described method, under- and overachievers were selected from the full range of academic ability. This procedure resulted in obtaining 171 male overachievers and 137 male underachievers on which GSCI results were available. Because McClelland's theory was found to be most valid for males, it was desirable to confine this research to the same population.<sup>1</sup> Although the sum of these two groups represent a sample from the entire population of the 4300 students, this sum also represents the total statistically defined population of eleventh grade male over- and underachievers from nine Michigan schools. The code name of the schools and the number of male over- and underachievers are listed in Table II.

Table II--Number of Male Over- and Underachievers in Each School.

| School | Male           |                 |
|--------|----------------|-----------------|
|        | Overachievers* | Underachievers* |
| A      | 16             | 10              |
| B**    | 23             | 12              |
| C      | 19             | 12              |
| D      | 13             | 12              |
| E**    | 20             | 14              |
| F      | 21             | 27              |
| G      | 24             | 10              |
| H      | 20             | 23              |
| I      | 15             | 17              |
| Total  | 171            | 137             |

\* Fourteen individuals were not included due to faulty test-taking, and do not appear in totals.

\*\* Same city.

<sup>1</sup>David McClelland et al., The Achievement Motive (New York: Appleton-Century-Crofts, 1953), p. 97.

The male overachievers for whom GSCI scores were available were divided randomly into two groups within each of the nine schools. The same procedure was followed with the male underachiever population. The first group became the validation sample and the second, the cross-validation sample. This procedure resulted in obtaining 88 male overachievers and 66 male underachievers for the validation process, and 83 male overachievers and 71 male underachievers for cross-validation. The GSCI was administered to the validation sample as a prelude to an analysis of the responses. This analysis took the form of finding (using Chi-square tests of significance) which items significantly discriminated between over- and underachievers. The level of significance was set by Farquhar and the associates of the major research project at .20 for the validation of the inventory, and .10 for cross-validation. The less stringent significance level was used for the validation of the items to minimize the acceptance of the null hypotheses when it should have been rejected (Type II error). The more stringent significance level was used for the cross-validation process in order to minimize rejecting the null hypotheses when it should have been accepted (Type I error).

#### Chi-square Analysis of the Generalized Situational Choice Inventory

The items of the GSCI were keyed in the direction of the alternative assumed to characterize the overachiever. The Chi-square analysis of the keyed responses produced 103 items which significantly discriminated between the over- and underachievers. Only on eleven items did underachievers, or overachievers take the alternative different from the one predicted by theory.

A similar analysis was conducted on the cross-validation sample of the 83 male overachievers and 71 male underachievers.

Forty-seven of the original 103 significant items remained significant in the cross-validation analysis. Of these, only two items were discriminating in a direction opposite to that originally hypothesized. The resulting 45 items may be found in Appendix A. Inasmuch as these 45 items discriminated in two validations they were chosen as the most reliable measures.

The coefficients of reliability for these 45 items as determined by Hoyt's analysis of variance<sup>1</sup> are as follows:

- .83 - Male overachievers (random sample, N=50, from total N of 171)
- .80 - Male underachievers (random sample, N=50, from total N of 137)
- .82 - General population (random sample, N=62, from total population N = 4300)
- .82 - Normals (over- and underachievers excluded, random sample, N = 50, from general population).

A more crucial exploration of the theory by factor analysis is possible by setting a more stringent level of significance for the cross-validation items. Therefore the .01 level was used, twenty-two items were selected. The 22 high discriminating items are reported in Appendix A. The computations for the Chi-squares were obtained with the help of Mistic, a computer on the campus at Michigan State University. This abbreviated form of the inventory provided the instrumentation necessary for a factor analysis of an objective measure of academic achievement motivation.

### Summary

Attempts at predicting scholastic achievement using projective non-intellectual measures have met varying success. Farquhar et al.,

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<sup>1</sup>C. J. Hoyt, "Test Reliability Estimated by Analysis of Variance," Psychometrika, Vol. 6, 1941, pp. 153-160.

have hypothesized that an objective instrument for measuring academic achievement motivation could be constructed on the basis of McClelland's n-Achievement theory.

Using a population of over- and underachievers to test this hypothesis, the feasibility of such research has been demonstrated. Two-hundred objective test items were constructed, and a Chi-square analysis revealed 47 significantly discriminating, cross-validated items. Forty-five of these items were in the direction predicted by Farquhar and associates. Twenty-two of these items met the criterion of significance for the present research. These twenty-two items provided the instrumentation necessary for a factor analysis.

## CHAPTER III

### REVIEW OF THE LITERATURE

#### Factor Analytical Studies of Motivation and Achievement

Few factor analytical studies on over- and underachievers and/or the factored dimensions of an objective measure of motivation for academic achievement have been reported in the literature. This of course, is one justification for the present research. Another justification lies in the fact that in the studies reported, the factor analysis was performed on measures of motivation which were not validated on over- and underachieving subjects. Yet, validation of a measure of motivation on under and over-achieving subjects is warranted if one is interested in accounting for the unpredicted variance provided by the extremes when the measure is administered to the general population. Furthermore, to the extent that intercorrelations of items (arrived at from scores on the extremes of a population) are factor analyzed, then to this extent may the factor analyst expect to increase the loadings on the factors which account for the item inter-correlations. Such increased loadings give clearer pictures of the factors. Furthermore, the researcher obtains a better indication of what the base of the factored measure is, as well as what it should be. The result is an opportunity to increase its predictive value.

Among the few studies reported in the literature is an investigation by McQuary.<sup>1</sup> This researcher studied one-hundred seventy-four first semester freshmen males at the University of Wisconsin in an effort to test two hypotheses: 1) achievement in college is significantly related

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<sup>1</sup>John P. McQuary, "Some Relationships Between Non-Intellectual Characteristics and Academic Achievement," Journal of Educational Psychology, Vol. 44, April 1953, pp. 215-228.

to certain non-intellectual variables, and 2) the non-intellectual variables can be grouped into several factors.

Using twenty-three variables and a factor analysis to account for the intercorrelations among these variables, McQuary concluded that his two hypotheses were tenable. Although other factors were found, two factors were given to account for the correlation of grade points earned with the other variables in the study. One factor grouped variables (primarily paper and pencil tests and rank in high school class) which had been found either singly or in combination to be efficient predictors of academic success. The other factor however, grouped high school rank, size of the community, high school extracurricular activity and grades.

The problem of the McQuary study (which was to determine the factor pattern underlying variables assumed to be related to scholastic achievement of male freshmen at the University of Wisconsin) was satisfactorily defined. Also, a verifiable hypothesis was formulated, but the theory upon which McQuary's research was based was not made explicit. McQuary does not report his reasons for choosing the twenty-three non-intellectual variables. The question might well be asked "why not leave this or that variable out and include some other." Although McQuary was interested in hypotheses testing, his research appears to be oriented more to hypotheses exploration. This confusion could have been avoided had McQuary included a statement as to how each variable used, related to some theory. It is not acceptable to say that the variables were assumed to be related to scholastic achievement when it is possible to relate these assumptions to available theory and research.

To question McQuary's assumptions is in essence to question the validity of McQuary's twenty-three variable measuring device. This question is appropriate because not all of the variables were "efficient" predictors as determined by McQuary's statistical methods. In addition, no reliability coefficients were reported for the variables, singly or in

combination. These two criticisms raise the question as to whether or not McQuary is justified in concluding anything about the factors underlying the variables.

Middleton and Guthrie conducted a transposed factor analysis on a three-hundred item questionnaire which was based on Murray's personality theory.<sup>1</sup>

The researchers divided their sample into two groups. One group was composed of 14 subjects whose grade point average was above 2.5 and the other group was composed of 14 subjects whose grade point average was below 2.0. Five factors were extracted for the 2.5 group, and four factors were extracted for the low group.

The factors for the high group were as follows: factor I, nurturance and dominance; factor II, autonomy and aggression; factor III, achievement-dependence; factor IV, achievement-hostile aggressive denial of tender socialized feelings. These researchers interpreted the factors as suggesting that achievement of high grades may be motivated by drives for power, resentment, dependence, social acceptance and aggression.

The factors for the low group were as follows: factor I, preoccupied with pleasures; factor II, extroverted in their relationships; factor III, intent on disavowing social shortcomings; and factor IV, preoccupied with power and acceptance. The low group factors were interpreted as reflecting trends toward pleasure seeking, extroversion, denial of normal shortcomings, and power.

Although Middleton's and Guthrie's research is not open to the same criticisms directed at McQuary, the results are generalizable only to some business management students at Pennsylvania State University because of the restricted sample (N=28). It would have been desirable to have a larger number of subjects as well as a larger number of items (variables).

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<sup>1</sup>George Middleton Jr. and George M. Guthrie, "Personality Syndromes and Academic Achievement," Journal of Educational Psychology, Vol. 50, April 1959, pp. 66-69.

It is to be noted also, that transposed factor analyses have to contend with the concept of populations of items, tests or variables, rather than the usual statistical concept of populations of subjects. No such population of items was defined, by the researchers, but if such a population were defined, the interpretation of the analysis could conceivably be affected. For example, the obtained factors would be generalizable to a population of test items rather than just to the actual items used.

Michael, Jones and Trembly reported another study which was concerned with a factor analysis of a measure of motivation for college students.<sup>1</sup> Although the present research is concerned with motivation in high school students, it seems worth-while to review the Michael, Jones and Trembly investigation.

The Michael team used 236 men and 131 women enrolled at the University of Southern California Inventory of Study Methods and Attitudes, and a short test of verbal aptitude.

The extraction procedure produced ten factors for the 236 men and twelve factors for the 131 women. While the authors claim that these factors are the dimensions of a highly reliable measure of college achievement, no such reliability is reported. In addition, no information on the cross-validation of the measure is given in the report. Finally, no description of the short test of verbal aptitude is present.

Because the authors made no claim of hypotheses testing, the criticism on theory which was leveled against McQuary is inapplicable. A defensible position may be taken that no theory is necessary in exploratory studies. Such a point of view would say, "there are factors present, so extract them."

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<sup>1</sup>William B. Michael, R. A. Jones and W. A. Trembly, "The Factored Dimensions of a Measure of Motivation for College Students," Educational and Psychological Measurement, Vol. 50, April 1959, pp. 66-69.

Michael extracted the factors through the use of the principle axes solution and the factor rotation was accomplished analytically. These are procedures for which the researchers are to be commended. McQuary extracted his factors using the multiple group method and effected his rotations to simple structure graphically. The multiple group method of factoring is not exact and is open to error, while the principle axes solution is mathematically precise.<sup>1</sup> There is no question of when to stop extracting factors because all factors are extracted and every residual is accounted for. As for the rotation procedures, graphical rotation is also open to judgmental errors, while an analytical solution is not.<sup>2</sup> Analytical rotation depends upon the exact solution of an equation, not individual judgment.

### Summary

Few factor analytical studies on objective measures of achievement motivation have been reported. These which have been reported are open to criticisms concerning the measures' reliability, validity and the sample on which the analysis was conducted. All of the studies lacked a theory base which produced limitations in interpreting the factors.

The factor analytical procedure for one research was the principal axes solution. This technique extracts all factors and leaves no personal decision of when to stop factoring. This solution, along with an analytical rather than graphical rotation procedure was not used with the other reported studies. In designing the present study, an attempt was made to build on the strengths of past research and at the same time, rectify their outstanding limitations.

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<sup>1</sup>Raymond B. Cattell, Factor Analysis (New York: Harper and Brothers, 1952).

<sup>2</sup>Ibid.

## CHAPTER IV

### FACTOR ANALYTIC METHODOLOGY

In preparation for the factor analysis it was necessary to determine the intercorrelations among the 22 items in the shortened GSCI. To achieve this, the entire male overachiever (N = 171) and underachiever (N = 137) population was used to build a response matrix. That is, each individual was given a "1" or "0" depending upon whether or not he chose the previously determined correct academic achievement alternative. This procedure produced a 22 x 308 matrix (22 items and 308 individuals).

The matrix was punched on computer tape and checked for accuracy. From this tape, the product moment, item intercorrelations were obtained. This step resulted in obtaining 231 intercorrelations. The intercorrelations may be found in the table in Appendix B.

The use of the product moment correlation coefficient for the factor analysis may be questioned. A rationale for their use has been given succinctly by Cattell.

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

The item intercorrelations were the data for the factor analysis.

#### Extraction Solution

Several methods of factorizing a matrix are available to the researcher.<sup>2</sup> However, only the principal axes solution is mathematically

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<sup>1</sup>Raymond B. Cattell, Factor Analysis (New York: Harper and Brothers, 1952), p. 328.

<sup>2</sup>Ibid., pp. 129-149.

precise.<sup>1</sup> This method extracts all of the variance presented by a matrix of intercorrelations, wherein other methods leave residual correlations.<sup>2</sup>

### Assumptions

Because of its precision and mathematical determinateness, the principal axes solution was preferred for the present research. The mathematics of this solution rests on the assumption that the total variance demonstrated by the intercorrelations can be divided into independent sets. These independent sets of variance represent factors or the number of orthogonal dimensions of geometric space necessary to account for a matrix of intercorrelations.<sup>3</sup> It is not required that the correlations be normally distributed, nor is it required that the population on which the correlations are obtained be normally distributed.<sup>4</sup> Although not an assumption, it is desirable that obtained factors be interpreted. To simplify the interpretation it is often necessary to simplify factor loadings. One such simplifying tool is factor rotation.

### Rotation of the Factors

Thurstone argued that "Nature est simplex."<sup>5</sup> In response to this view, 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.,

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<sup>1</sup>Ibid., p. 129.

<sup>2</sup>Ibid., pp. 129-187.

<sup>3</sup>Ibid., pp. 35-45.

<sup>4</sup>Ibid., p. 328.

<sup>5</sup>Raymond B. Cattell, Factor Analysis (New York: Harper and Brothers, 1952), p. 67, citing L. L. Thurstone.

that which requires fewest conditions and least bolstering by supplementary hypotheses.

In terms of factor analysis, Thurstone argued, this means that any one (item) should have the simplest possible factor constitution. . . . This means in terms of the factor matrix that every (item) should have some zeros in its row, 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 (items) should be affected by it.

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

On the basis of this rationale it was desirable to rotate the obtained factors to a simple structure. Neuhaus and Wrigley have devised a method of rotation called quartimax.<sup>2</sup> This method achieves rotation analytically. Other analytical methods of rotation have been devised, e.g. Kaiser's Varimax,<sup>3</sup> as well as numerous graphical methods.<sup>3</sup> However, it appears that the method chosen depends upon the particular researcher and the extent to which he wishes to meet Thurstone's criteria. There is no agreement nor proof in the literature that one analytical method is better than another. The quartimax method of rotation was used. This method achieves rotation to Thurstone's criteria with acceptable precision.

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<sup>1</sup>Cattell, op. cit., pp. 67-68.

<sup>2</sup>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. 81-91.

<sup>3</sup>Henry F. Kaiser, "The Varimax Criterion for Analytic Rotation in Factor Analysis," Psychometrika, Vol. 23, September 1958, pp. 187-200.

<sup>4</sup>Cattell, op. cit., pp. 253-290.

### Summary

In order to factor analyze the 22 most discriminating items of the Generalized Situational Choice Inventory it was necessary to obtain 231 item intercorrelations. This step was achieved by using Michigan State University's Mistic to calculate product moment coefficients. Subsequent to this procedure the principal axes solution of extraction was employed and the resulting factors analytically rotated to simple structure.

## CHAPTER V

### ANALYSIS OF THE DATA

It is characteristic that the principal axes method extracts as many factors as there are variables, items or tests. Therefore, 22 factors were extracted, one for each item. However, only six of these factors, with 22 loadings on each factor, had a sum of squares which exceeded 1.00. Therefore, each of the remaining 16 "factors" accounted for less of the total variance than would be expected of an individual item. The unrotated 22 factors with rounded loadings for the 22 items along with the factor's sum of squares are presented in Table III.

Using the criterion that a factor's sum of squares had to exceed unity in order to be considered a factor, six factors were found to account for the largest amount of variance. These six factors are presented in Table IV and became the data for the rotation process which will be discussed below.

#### The Rotation

When these six factors were rotated to an analytical simple structure, the loading values of the items were changed in accordance with the following criteria suggested by Thurstone.<sup>1</sup>

1. Each item had at least one loading close to zero.
2. There was for each factor column at least as many items with zero loadings as factors chosen for rotation.
3. For every pair of factors there were several items with projections (loadings) on one factor but not on the other.

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<sup>1</sup>Benjamin Fruchter, Introduction to Factor Analysis (New York: D. Van Nostrand Company, Inc., 1954), p. 110, citing L. L. Thurstone.

Table III--Rounded, Unrotated Loadings for Twenty-Two Items of the Generalized Situational Choice Inventory for Male Over- and Underachievers. (Values are positive unless otherwise indicated, and the decimals are omitted.)

|                |    | Factors |      |      |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |
|----------------|----|---------|------|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|
| em             |    | 1       | 2    | 3    | 4   | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22  |
| o.             |    | 1       | 2    | 3    | 4   | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22  |
| 1              | 23 | -02     | -02  | -02  | -10 | 04   | 48   | -00  | -18  | 17   | 03   | -48  | 34   | 06   | -28  | 00   | 01   | -23  | -02  | 07   | -11  | 20   | 32  |
| 2              | 52 | 21      | -07  | -10  | -10 | -32  | 14   | 05   | 07   | 15   | -07  | -08  | -14  | -48  | -08  | -11  | 15   | -08  | 31   | -31  | -03  | 04   | 13  |
| 3              | 75 | -17     | 40   | -12  | -05 | 17   | -19  | -03  | -01  | -01  | -09  | 16   | 07   | -04  | -14  | 14   | 06   | 02   | 06   | 16   | 17   | -03  | 16  |
| 4              | 52 | 05      | 09   | 24   | -03 | -20  | -03  | 00   | -10  | -12  | 31   | 03   | -19  | 16   | -06  | -47  | 29   | -22  | 08   | -12  | 13   | 00   | -20 |
| 5              | 25 | 14      | 00   | -01  | 22  | 41   | -02  | 06   | -36  | -08  | -08  | -20  | -07  | -02  | -07  | -37  | -50  | -31  | 07   | -04  | 02   | 13   | 06  |
| 6              | 31 | -38     | -03  | -10  | 00  | 00   | -05  | -01  | 10   | -29  | -17  | -03  | 06   | 08   | -09  | 36   | 22   | -29  | -26  | -33  | 04   | 06   | -40 |
| 7              | 60 | -35     | 08   | -08  | 18  | 11   | 37   | 01   | 22   | 13   | -22  | 18   | -06  | -06  | 23   | 05   | -13  | 13   | -10  | -18  | 18   | 03   | -01 |
| 8              | 24 | -29     | -02  | 23   | -02 | -32  | -32  | -09  | -05  | 10   | -07  | -23  | -52  | -08  | 04   | 20   | -26  | -13  | -17  | -03  | 09   | -38  | 20  |
| 9              | 34 | 23      | 04   | 21   | -24 | 23   | 23   | -06  | -19  | 29   | 05   | -24  | 04   | -03  | -03  | 22   | -27  | -02  | -12  | 16   | -07  | 16   | -56 |
| 10             | 59 | -28     | -12  | -08  | 25  | 19   | -30  | -16  | 31   | 10   | 23   | -13  | -13  | 10   | -04  | -04  | -07  | 17   | 04   | -25  | -20  | 09   | 03  |
| 11             | 37 | 02      | -00  | -05  | 06  | -17  | -17  | 17   | -18  | -23  | -01  | 05   | -55  | 01   | 07   | 34   | 04   | 10   | 20   | 18   | -06  | 44   | 04  |
| 12             | 36 | 55      | 01   | -38  | -08 | 03   | 03   | 14   | -14  | 08   | 02   | 10   | -13  | 40   | -00  | 13   | -11  | -16  | 05   | -06  | -06  | -34  | -03 |
| 13             | 55 | -04     | -02  | 13   | -10 | -03  | -03  | 15   | -07  | 16   | -37  | 09   | -06  | 24   | -01  | -54  | 09   | 19   | -25  | 05   | -04  | 08   | 03  |
| 14             | 53 | -13     | -07  | -20  | 19  | -14  | -14  | -07  | -06  | -01  | -07  | -14  | 05   | -26  | 23   | -24  | 19   | -12  | 16   | 36   | -11  | -23  | -34 |
| 15             | 36 | 28      | -05  | 28   | 20  | 28   | -03  | -03  | 34   | 19   | -08  | -24  | 02   | 25   | 09   | 30   | 32   | -13  | 27   | 06   | 03   | -01  | 15  |
| 16             | 35 | 36      | 01   | -14  | 15  | -36  | -04  | -04  | 50   | 01   | 04   | -09  | -16  | -07  | -26  | -06  | -10  | 36   | -13  | 00   | 06   | 01   | -22 |
| 17             | 30 | 31      | -02  | 07   | 01  | 13   | 13   | -10  | -33  | -41  | -01  | -44  | 13   | -01  | 05   | 08   | 15   | 46   | -08  | -15  | -01  | -16  | 07  |
| 18             | 23 | -12     | 02   | 21   | -01 | -01  | -40  | 04   | -02  | -10  | -11  | 18   | 32   | 09   | -02  | 08   | -30  | 13   | 62   | -14  | -03  | -10  | -18 |
| 19             | 63 | -27     | 02   | 12   | -16 | 14   | 14   | 14   | 27   | -23  | 17   | 07   | 07   | 00   | -05  | 03   | -04  | 04   | -11  | 15   | -42  | -15  | 20  |
| 20             | 73 | -16     | 33   | -08  | -21 | 06   | 06   | -08  | 04   | -14  | 08   | 14   | 18   | 10   | -03  | 08   | -09  | 03   | -02  | 20   | 34   | 04   | 10  |
| 21             | 43 | 42      | 06   | 02   | 07  | -36  | -36  | -18  | 13   | -04  | 00   | 17   | 18   | -04  | 48   | 01   | -11  | -13  | -24  | -12  | -06  | 19   | 16  |
| 22             | 37 | 40      | 06   | 22   | 28  | -01  | -01  | 14   | -22  | 01   | -02  | 45   | 16   | -31  | -20  | 20   | 04   | -13  | -24  | 04   | 02   | -10  | 04  |
| Sum of Squares |    |         |      |      |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |
| 4.70           |    | 1.65    | .321 | .638 | 584 | 1.29 | .442 | .785 | .883 | .383 | 1.10 | 1.08 | .764 | .590 | 1.25 | .879 | .843 | .974 | .668 | .472 | .723 | .994 |     |
| *              |    | *       | *    | *    | *   | *    | *    | *    | *    | *    | *    | *    | *    | *    | *    | *    | *    | *    | *    | *    | *    | *    | *   |

Table IV--Six Unrotated Factors for Twenty-Two Items of the GSCI  
 Selected on the Basis of Sums of Squares Above 1.00 for Male  
 Over- and Underachievers. (Values are positive unless other-  
 wise indicated, and decimals are omitted.)

| Item<br>Number    | Factors |      |      |      |      |      | Communality(h <sup>2</sup> ) |
|-------------------|---------|------|------|------|------|------|------------------------------|
|                   | 1       | 2    | 3    | 4    | 5    | 6    |                              |
| 1                 | 23      | -02  | 48   | 00   | -48  | 34   | 63                           |
| 2                 | 52      | 21   | 14   | -11  | -08  | -14  | 37                           |
| 3                 | 75      | -17  | 17   | 14   | 16   | 07   | 67                           |
| 4                 | 52      | 05   | -20  | -47  | 03   | -19  | 57                           |
| 5                 | 25      | 14   | 41   | -37  | -20  | -07  | 43                           |
| 6                 | 31      | -38  | -05  | 36   | -03  | 06   | 81                           |
| 7                 | 60      | -35  | 11   | 05   | -22  | 18   | 58                           |
| 8                 | 24      | -29  | -32  | 20   | -23  | -52  | 61                           |
| 9                 | 34      | 23   | 23   | 22   | -24  | 04   | 33                           |
| 10                | 59      | -28  | 19   | -04  | 23   | -13  | 86                           |
| 11                | 37      | 02   | -17  | 34   | 05   | -55  | 59                           |
| 12                | 36      | 55   | 03   | 13   | 10   | -13  | 48                           |
| 13                | 55      | -04  | -03  | -54  | 09   | -06  | 61                           |
| 14                | 53      | -13  | -14  | -24  | -14  | 05   | 40                           |
| 15                | 36      | 28   | 28   | 30   | -24  | 02   | 83                           |
| 16                | 35      | 36   | -36  | -06  | -09  | -16  | 42                           |
| 17                | 30      | 31   | 13   | 08   | -44  | 13   | 41                           |
| 18                | 23      | -12  | -40  | 08   | 18   | 32   | 37                           |
| 19                | 63      | -27  | 14   | 03   | 07   | 07   | 50                           |
| 20                | 73      | -16  | 06   | 08   | 14   | 18   | 62                           |
| 21                | 43      | 42   | -36  | 01   | 17   | 18   | 55                           |
| 22                | 37      | 40   | -01  | 20   | 45   | 16   | 55                           |
| Sum of<br>Squares | 4.70    | 1.65 | 1.29 | 1.25 | 1.10 | 1.08 |                              |

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 results of the rotation are given in Table V.

To further simplify the loading pattern, it was necessary to determine for each item, the factor of its highest loading. This procedure resulted in finding that no highest loading was below .385. This number represents the strength of relationship existing between the item and the rotated factor. The configuration which resulted from this procedure is presented in Table VI.

### Interpretation of the Factors

A review of factor analytic studies revealed that it is common to either name or number factors.<sup>1</sup> Cattell has demonstrated that factors may be numbered, leaving their naming to the reader.<sup>2</sup> For purposes of discussion however, the tradition of naming factors was followed. An attempt was made to confine the naming to what appeared to be the most obvious content of the items with highest loadings on the factor. In the final analysis, however, the naming of the factor is a subjective decision. The items and their content as well as their loadings are presented in Tables VII through XII. All but Table XII represents a factor, and each item was responded to by the examinee on the basis of "I would prefer to." "Factor VI" met the criterion of having a sum of squares above 1.00, but did not have two items which loaded highest on it. Because Factor VI only partially met the criterion it is presented but not interpreted as a significant factor.

Factor I accounted for the largest proportion of the variance present in the six unrotated factors (see the Sums of Squares in Table IV).

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<sup>1</sup>Ibid., pp. 149-191.

<sup>2</sup>Raymond Cattell and Andrew R. Baggaley, "The Objective Measurement of Attitude Motivation and Development and Evaluation of Principles and Devices, " Journal of Personality, Vol. 24, June 1956, pp. 401-423.

Table V--Rotated Factors for Twenty-Two Selected Items of the GSCI for Male Over- and Underachievers. (Values are positive unless indicated, decimals are omitted.)

| Item<br>Number | Factors |      |      |      |      |      |
|----------------|---------|------|------|------|------|------|
|                | 1       | 2    | 3    | 4    | 5    | 6    |
| 1              | -013    | -158 | -296 | 208  | -037 | 686  |
| 2              | -336    | -302 | -134 | 072  | -356 | -126 |
| 3              | -071    | -774 | -125 | 031  | -111 | -194 |
| 4              | -674    | -259 | -174 | 152  | 027  | 001  |
| 5              | -425    | -129 | 206  | -200 | -394 | -011 |
| 6              | 277     | -482 | 033  | 243  | 084  | 047  |
| 7              | -048    | -709 | 089  | 085  | -121 | 217  |
| 8              | -055    | -150 | 093  | 757  | 043  | -008 |
| 9              | 073     | -242 | -104 | 024  | -505 | -002 |
| 10             | -216    | -627 | 071  | 068  | 042  | -283 |
| 11             | -015    | -184 | -148 | 620  | -108 | -368 |
| 12             | -125    | -056 | -455 | 046  | -403 | -292 |
| 13             | -671    | -383 | -85  | -042 | 048  | -005 |
| 14             | -368    | -435 | -094 | 123  | -012 | 211  |
| 15             | 117     | -255 | -119 | 032  | -579 | -061 |
| 16             | -304    | -007 | -459 | 296  | -172 | 041  |
| 17             | -036    | -143 | -143 | 012  | -562 | 242  |
| 18             | 074     | -275 | -385 | 015  | 329  | 179  |
| 19             | -117    | -694 | -002 | 039  | -031 | -069 |
| 20             | -094    | -751 | -208 | -006 | -039 | -062 |
| 21             | -170    | -158 | -701 | 007  | -054 | 012  |
| 22             | 041     | -228 | -582 | -199 | -091 | -365 |

Table VI--Highest Factor Loadings for Twenty-Two Selected Items  
of the GSCI for Male Over- and Underachievers.

| Item<br>Number | Factors |       |       |       |       |      |
|----------------|---------|-------|-------|-------|-------|------|
|                | 1       | 2     | 3     | 4     | 5     | 6*   |
| 1              |         |       |       |       |       | .686 |
| 2              |         |       |       |       | -.356 |      |
| 3              |         | -.774 |       |       |       |      |
| 4              | -.674   |       |       |       |       |      |
| 5              | -.425   |       |       |       |       |      |
| 6              |         | -.482 |       |       |       |      |
| 7              |         | -.709 |       |       |       |      |
| 8              |         |       |       | +.757 |       |      |
| 9              |         |       |       |       | -.505 |      |
| 10             |         | -.627 |       |       |       |      |
| 11             |         |       |       | +.620 |       |      |
| 12             |         |       | -.455 |       |       |      |
| 13             | -.671   |       |       |       |       |      |
| 14             |         | -.435 |       |       |       |      |
| 15             |         |       |       |       | -.579 |      |
| 16             |         |       | -.459 |       |       |      |
| 17             |         |       |       |       | -.562 |      |
| 18             |         |       | -.385 |       |       |      |
| 19             |         | -.694 |       |       |       |      |
| 20             |         | -.751 |       |       |       |      |
| 21             |         |       | -.701 |       |       |      |
| 22             |         |       | -.582 |       |       |      |

\* Not interpreted as a significant factor because only one item loaded highest on it.

Table VII--Factor I

| Item Number and Content                                                                                    | Loading |
|------------------------------------------------------------------------------------------------------------|---------|
| 4. a) Have the teacher give everyone the same grade at the beginning of the term and know I had passed, or | -.674   |
| b) Take chances on getting a higher or lower grade at the end of the course.                               |         |
| 5. a) Develop a <u>new</u> product which may or may not be good, or                                        | -.425   |
| b) Make a product as good as the best one available.                                                       |         |
| 13. a) Have everyone in the class get a "C" at the beginning of the course, or                             | -.671   |
| b) Be graded at the end of the course with the possibility of getting a higher or lower mark.              |         |

The content of the items loading highest on this factor appear to categorize the factor as chance-taking versus no chance taking.

To a lesser extent, time involvement, competition, unique accomplishment and their opposites appear to define the content of the items. This categorizing of the item content also defines the factor.

Items 4 and 13 are much alike in their meaning, but the wording is different. However, the difference between the two loadings (.003) suggests that the items are functioning identically.

The lowest loading on this factor belongs to item 5. The content of item 5 appears to emphasize unique and common accomplishment in conjunction with chance-taking. This diminished emphasis on chance-taking may account for the item's lower loading.

Although most (7) of the items loaded highest on Factor II, this factor accounted for less than one-half of the variance accounted for by Factor I. This result might be due to the near absence of the chance-taking dimension in the content of the items. Only item 14 appears to suggest chance-taking directly. This item also appears to contain elements of accomplishment and competition, as was true of most of the items with highest loadings on Factor I.

Items 3, 19 and 20 appear to concern mainly, time involvement, while items 6, 7 and 10 concern accomplishment and competition.

Factor II suggests the tenability of the basic theory and hypothesis of this research. Factor I also seems to support the theory providing the chance-taking dimension is added.

When Factors I and II are considered together, the dimensions of 1) chance-taking versus no chance-taking; 2) long-term involvement versus short-term involvement; 3) competing with a maximum standard of excellence versus competing with a minimal standard of excellence; and 4) unique accomplishment versus ordinary accomplishment appear to have been mostly accounted for. When factor II was considered alone, it was characterized as an n-Academic Achievement Factor.

Table VIII--Factor II

| Item Number and Content                                                                       | Loading |
|-----------------------------------------------------------------------------------------------|---------|
| 3. a) Be well prepared for a job after graduation from high school, or                        | -.774   |
| b) Be well prepared to continue learning.                                                     |         |
| 6. a) Be successful in finishing a job, or                                                    | -.482   |
| b) Finish a job.                                                                              |         |
| 7. a) Get excellent grades because I have a great deal of ability.                            | -.709   |
| b) Get average grades because I have average ability.                                         |         |
| 10. a) Do as well as most of my classmates, or                                                | -.627   |
| b) Do better than most of my classmates.                                                      |         |
| 14. a) Receive a grade on the basis of how much my teacher thinks I have learned, or          | -.435   |
| b) Be graded at the end of the course with the possibility of getting a higher or lower mark. |         |
| 19. a) Wait until I finish college and make a better salary, or                               | -.694   |
| b) Get a job right after high school and make a good salary.                                  |         |
| 20. a) Study to go to college, or                                                             | -.751   |
| b) Study to get out of high school.                                                           |         |

Five items (12, 16, 18, 21, and 22) loaded highest on Factor III. Items 12, 21 and 22 required the examinee to respond to alternatives concerned with materialism versus non-materialism, while items 16 and 18 required that the response be made to alternatives concerned with following rules versus establishing self-rules or choices of inner-directedness versus outer-directedness. When the five items are viewed together, it appears that Factor III is characterized by Intrinsicness versus Extrinsicness.

This factor may be thus interpreted as adding a dimension to the basic theory which was discussed in Chapter I.

Two items (8 and 11), loaded highest on Factor IV. An inspection of these items revealed that they required the examinee to respond to speed versus thoroughness alternatives. The obviousness of the content in these items led to naming this factor along those same dimensions, i. e., Speed versus Thoroughness.

As was true of Factor III, Factor IV adds another, unhypothesized dimension to the basic theory reported in Chapter I.

Items 2, 9, 15 and 17 were loaded highest on Factor V. Items 2 and 9 concerned alternatives dealing with school orientation versus non-school orientation, while the content of item 9 suggested that it was concerned with the degree of involvement with school activities. Time involvement characterized item 15, and thought versus action involvement described item 17. Broadly, these items concerned situations, time and degree of involvement. On this basis, the factor was viewed as a Situational Involvement factor.

Table IX--Factor III

| Item Number and Content                                                                          | Loadings |
|--------------------------------------------------------------------------------------------------|----------|
| 12. a) Have a great deal of money, or<br>b) Be an expert in my favorite school subject.          | -.455    |
| 16. a) Study my assignments during study hall, or<br>b) Wait to study until the mood strikes me. | -.459    |
| 18. a) Do what I think is right, or<br>b) Do what others think is right.                         | -.385    |
| 21. a) Be very happy, or<br>b) Have lots of money.                                               | -.701    |
| 22. a) Discover a gold mine, or<br>b) Discover a new medicine.                                   | -.582    |

Table X--Factor IV

| Item Number and Content                                                       | Loadings |
|-------------------------------------------------------------------------------|----------|
| 8. a) Make a quick decision and sometimes<br>be right and sometimes wrong, or | +.757    |
| b) Deliberate over decisions and usually be<br>right.                         |          |
| 11. a) Work rapidly just "skimming" along, or                                 | +.620    |
| b) Work slowly with great thoroughness.                                       |          |

Table XI--Factor V

| Item Number and Content                                             | Loading |
|---------------------------------------------------------------------|---------|
| 2. a) Have the best teachers in the State in my school, or          | -.356   |
| b) Have a large recreation center in my school.                     |         |
| 9. a) Be allowed to take an extra course before or after school, or | -.505   |
| b) Just take courses offered during the school day.                 |         |
| 15. a) Be paid for the amount of work I did, or                     | -.579   |
| b) Be paid by the hour.                                             |         |
| 17. a) Think of an idea that nobody else has ever thought of, or    | -.562   |
| b) Set a world's speed record.                                      |         |

Table XII--Factor VI \*

| Item Number and Content                                                        | Loading |
|--------------------------------------------------------------------------------|---------|
| 1. a) Receive a grade on the basis of how well I did on the teacher's test, or | +.686   |
| b) Get a grade on the basis of how hard I tried.                               |         |

\* Not interpreted as a significant factor because only one item loaded highest on it.

### Discussion of the Factors

The hypothesis predicted that the six theorized facets of academic achievement motivation would manifest themselves on one Factor. It was found that Factor II supported this hypothesis. It was also found that the largest factor was Factor I. Factor I does not appear to negate the theory but emphasizes the importance of the unhypothesized chance-taking dimension.

Factors I, III, IV and V were unhypothesized but because they were extracted they may be used for extending the theory and making future hypotheses.

### Significance of the Factors

To determine if the extracted factors were or were not chance dimensions, a random factor was constructed for each of the six rotated factors. A table of random numbers was used for the construction. The first two digits of the random numbers determined the loading, and the third digit the sign (plus or minus) of the loading. These random factors may be found in Table XIII.

Random Factor I was correlated (using the Pearson  $r$ ) with extracted Factor I. The same procedure was followed with the remaining five factors, terminating with random Factor VI being correlated with extracted Factor VI. When the .05 level of significance is used as a criterion "Factor VI" becomes a chance factor. This finding supports the desirability of not interpreting "Factor VI." In no other case was the correlation between the extracted factor and the random factor significantly greater than zero at  $p \leq .05$ . The six correlations and the correlations required for significance at  $p \leq .05$  are presented in Table XIV.

Table XIII--Random Factors Generated from a Table of Random Numbers. (Decimals are omitted, and the numbers are positive unless otherwise indicated.)

| Item<br>Number | Factors |     |     |     |     |     |
|----------------|---------|-----|-----|-----|-----|-----|
|                | 1       | 2   | 3   | 4   | 5   | 6   |
| 1              | 10      | 15  | -01 | 02  | 81  | 91  |
| 2              | -22     | -46 | -25 | -85 | -30 | -89 |
| 3              | -24     | -48 | -22 | 97  | -76 | 64  |
| 4              | -42     | 93  | 06  | 61  | 07  | -16 |
| 5              | -37     | -39 | 81  | 16  | -06 | -91 |
| 6              | -77     | -06 | 11  | -42 | -27 | 53  |
| 7              | -99     | -72 | 56  | -69 | 98  | 31  |
| 8              | -89     | -91 | 05  | -07 | 18  | -20 |
| 9              | 85      | -14 | 63  | 10  | 17  | -18 |
| 10             | -28     | 36  | -53 | -53 | 53  | -59 |
| 11             | -63     | -69 | 88  | 33  | -70 | -79 |
| 12             | 09      | -40 | 48  | 03  | 49  | 69  |
| 13             | -10     | -93 | 52  | -92 | -88 | 33  |
| 14             | -07     | -61 | -87 | 85  | 48  | 52  |
| 15             | 51      | -97 | 71  | -08 | 77  | -13 |
| 16             | -02     | -12 | 51  | 51  | 77  | -16 |
| 17             | 01      | -21 | 52  | 60  | -89 | 19  |
| 18             | -52     | 54  | -33 | -94 | 31  | -04 |
| 19             | 07      | -53 | -46 | -58 | 23  | -14 |
| 20             | 46      | 97  | -33 | -09 | 42  | 06  |
| 21             | -54     | 91  | 85  | -13 | -09 | -30 |
| 22             | 32      | 58  | 22  | -74 | 47  | -25 |

Table XIV--Correlations Between Random and Extracted Factors

| Random  | Extracted Factors |       |       |      |      |      |
|---------|-------------------|-------|-------|------|------|------|
| Factors | 1                 | 2     | 3     | 4    | 5    | 6    |
| 1       | .024              |       |       |      |      |      |
| 2       |                   | -.011 |       |      |      |      |
| 3       |                   |       | -.164 |      |      |      |
| 4       |                   |       |       | .043 |      |      |
| 5       |                   |       |       |      | .045 |      |
| 6       |                   |       |       |      |      | .488 |

$p \leq .05 = .423$   
 d.f. = 20

The fact that the correlation between extracted Factor VI and random Factor VI was significant at  $p \leq .05$  suggests that this factor may be functioning on a chance basis. This result might be expected because the sum of squares for Factor VI is near 1.00. Thus, this factor is accounting for barely more variance than would be expected of a single item.

### Summary

When the principal axes factor extraction procedure was used for the intercorrelations of 22 items of the GSCI, for male over- and underachievers it was found that six unrotated factors accounted for most of the variance among the items. These six factors were rotated to a simple structure. Five of these factors were significant.

The five rotated factors were characterized as 1) chance-taking versus no chance-taking; 2) n-academic achievement; 3) intrinsicness versus extrinsicness; 4) speed versus thoroughness; and 5) situational involvement. Factor II supports the tenability of the hypothesis of this research.

When a test of significance was applied to the extracted factors, it was found that five extracted factors bore no significant relation to chance factors at  $p \leq .05$ .

## CHAPTER VI

### SUMMARY, CONCLUSIONS AND THEORETICAL IMPLICATIONS

#### Summary

The major problem of this study was to determine the principal factors underlying a newly developed, objective inventory of academic motivation. Before the factor analysis could be conducted, the cross-validation of a reliable objective instrument had to be completed. It was a question whether or not such an objective measure of motivation could be constructed. To answer this question, Farquhar and associates made McClelland's theory of n-Achievement bi-polar and constructed two-hundred forced choice objective items to fit the theory.<sup>1</sup> Using a statistically defined population of male over- and underachievers, it was found that forty-five of the original two-hundred items significantly discriminated in the direction predicted by the theory. The reliability of these forty-five items as determined by Hoyt's estimate of reliability,<sup>2</sup> was found to be .83 for male overachievers, .80 for male underachievers, .82 for the general population, and .82 for normals i.e., no under- or overachievers included.

On the basis of the forty-five discriminating, reliable, cross-validated items, it is concluded that:

1. Objective assessment of academic motivation is possible.

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<sup>1</sup>William W. Farquhar, A Comprehensive Study of the Motivational Factors Underlying Achievement of Eleventh Grade High School Students, Research Project No. 846 (8458) in cooperation with the U. S. Office of Education.

<sup>2</sup>C. J. Hoyt, "Test Reliability Estimated by Analysis of Variance," *Psychometrika*, Vol. 6, 1941, pp. 153-160.

2. An objective measure of academic motivation can be constructed on the basis of a theory of achievement motivation.
3. The theory of the motivational instrument might have been designed originally for a projective test, but is valid and reliable when used as a basis for an objective inventory.

### Factor Analysis

Once the instrumentation was completed, the major problem of factor analysis was studied. Three purposes were considered in conducting the factor analysis; 1) analysis of the items could reveal factors which would further support a bi-polar theory of academic motivation; 2) factors could suggest additional dimensions of a theory of academic achievement motivation; and 3) item loadings and content could be suggestive of how to increase the precision of predicting academic achievement. To answer these questions, a mathematically precise factor extraction procedure and an analytical method of rotation was employed.

The application of the principal axes factor solution and the quartimax method of rotation produced five factors. These factors were found to account for most of the variance among twenty-two selected items which had been answered by male over- and underachievers. The content of the items loading highest on the five significant factors categorized the factors as follows:

1. Chance-taking versus no chance-taking
2. n-Academic Achievement
3. Intrinsicness versus Extrinsicness
4. Speed versus Thoroughness
5. Situational Involvement

None of these five factors correlated significantly with chance factors at  $p \leq .05$

The cross-validated, reliable GSCI and the factors extracted to account for selected item intercorrelations lead to the following conclusions:

1. Five significant factors were extracted from the item intercorrelations of the GSCI. Factor II mainly supported the bi-polar theory of academic achievement motivation.
2. Additional dimensions of the theory were suggested by the remaining four factors. The chance-taking versus no chance-taking nature of the over- and underachiever could be a basis for a revised theory of academic motivation.
3. The magnitude, structure, number and nature of the factors suggested what kinds of items should be built to increase the prediction of academic achievement. Furthermore, the item highest loadings suggested how the prediction could be increased for each of the factored dimensions of academic achievement.

These conclusions have particular meaning for the basic theory of the research.

#### Theoretical Implications

The extracted factors of the Generalized Situational Choice Inventory indicate the lack of comprehensiveness of existing theories of academic motivation. Bakan characterized motivation as "whatever moves us," but this unspecific characterization is too broad.<sup>1</sup> McClelland et al., presented a more specific theory of motivation by defining n-Achievement,<sup>2</sup> but this approach appears to be too narrow. Farquhar and associates objectified, extended and made bi-polar McClelland's theory. Thus, the basic theory of this research falls between the theory of Bakan and McClelland. A factor analysis of the bi-polar approach seems to support its tenability. Also, the extraction of unhypothesized factors suggests

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<sup>1</sup>Paul Bakan, personal communication.

<sup>2</sup>David McClelland et al., The Achievement Motive (New York: Appleton-Century-Crofts, 1953).

what Cronbach and Meehl<sup>1</sup> call "bootstraps value" i.e., the extraction of unhypothesized factors help the investigator to discover what variables are worth studying more precisely. The bi-polar theory of academic achievement motivation appears to be tenable, but it could be extended, using the extracted factors as a basis. With respect to such theory certain recommendations seem appropriate.

#### Recommendations

1. A new theory of academic motivation should be developed which incorporates the facets of motivation as revealed by this study, and companion studies of current motivation projects..
2. An even more refined technique for arriving at stable estimates of academic achievement and the selection of over- and under-achievers could profitably be developed.
3. Regression equations for predicting each interval of academic achievement could be developed rather than using a general prediction for the entire range of achievement.
4. More items similar in content to the discriminating, factor analyzed items should be constructed, thereby achieving an even more reliable and valid, objective assessment of motivation.
5. In addition to factor analysis, new grouping methods such as agreement analysis and multiple scalogram analysis could be employed and compared.
6. A test of whether or not the same factors appear in the general population but with lower loadings should be conducted.
7. The study should be replicated for females, different races and various socio-economic sub-groups therein.
8. Experimental studies directed towards manipulating motivation as suggested by the factors should be conducted. Such studies could have practical implications for the teacher as well as the counselor.

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<sup>1</sup>L. Cronbach and P. E. Meehl, "Construct Validity in Psychological Tests," Psychological Bulletin, Vol. 52, 1955, pp. 281-302.

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## APPENDIX A

### GENERALIZED SITUATIONAL CHOICE INVENTORY

(Starred items were found to be significant discriminators in cross-validation. Double starred items were used for the factor analysis.)

## THE GENERALIZED SITUATIONAL CHOICE INVENTORY

This is a survey of your choices. There are no right or wrong answers. The results will in no way affect your grades in school.

The inventory is made up of pairs of statements. Read each pair carefully. Choose the one you would most prefer or like to do.

Answer all questions as honestly and frankly as you can. Only in this way will the results be meaningful. Remember this inventory is about you and you alone. This is not a survey of what you can do, but of what you would like to do.

Do Not Write On This Booklet. You will be given an answer sheet and a special pencil to mark your answers with. Mark between the two small lines under the letter of your choice.

### EXAMPLE:

Which would you prefer to do?

1. a.) Go to a party
- b.) Read a book

### Answer Sheet

|     |    |    |                                                                                                 |    |    |
|-----|----|----|-------------------------------------------------------------------------------------------------|----|----|
| 1.) | A  | B  | C                                                                                               | D  | E  |
|     | x/ | // | //                                                                                              | // | // |
|     |    |    | <br>Ignore |    |    |

This person marked under the letter "A" on the answer sheet which means that he would prefer to go to a party to reading a book. Ignore columns "C", "D", "E".

If you have any questions, raise your hand. If not, turn to the next page and answer all the questions. Do Not Skip Any Questions! Work as rapidly as you can and do not spend too much time on any one item.

Remember this is not a survey of what you can do but of what you would prefer to do.

PLEASE DO NOT WRITE ON THIS BOOKLET!

I would prefer to:

1.     a.) Find out why a piece of machinery won't work, or  
       b.) Put together a piece of machinery
- \* 2.     a.) Avoid failing in school, or  
       b.) Do well in school
3.     a.) Use my free time to watch television, or  
       b.) Give up my free time to learn something
4.     a.) Have no outstanding abilities, but be liked by others, or  
       b.) Be able to do things well, even though others didn't like  
           me for it
5.     a.) Successfully complete a group project, or  
       b.) Successfully complete a project by myself

I would prefer to:

6.     a.) Make my own plans, or  
       b.) Follow someone else's plans
7.     a.) Be praised at home, or  
       b.) Be praised at school
8.     a.) Face danger with a group, or (negative discriminator)  
       b.) Face danger alone
9.     a.) Be quick, but often incorrect, or  
       b.) Be slow, but often correct
10.    a.) Find out how well I did on a school test right away, or  
       b.) Find out how well I did on a test later, if at all

I would prefer to:

- 11.    a.) Be thought of as being clever in dealing with people, or  
      b.) Be thought of as being clever in working with ideas
- 12.    a.) Work hard for what I get, or  
      b.) Just get what I want
- 13.    a.) Create something useful, or  
      b.) Create a thing of beauty
- 14.    a.) Be graded on how much the teacher thinks I have learned, or  
      b.) Be graded on how much I think I have learned
- 15.    a.) Work hard to satisfy my own curiosity, or  
      b.) Work hard to become famous

I would prefer to:

- 16.    a.) Be alone, or  
      b.) Be with people
- 17.    a.) Make something I have planned myself, or  
      b.) Make something planned by somebody else
- 18.    a.) Be thought of as being intelligent, or  
      b.) Be thought of as being practical
- 19.    a.) Play all games or sports about average, or  
      b.) Be exceptionally outstanding in one sport or game
- 20.    a.) Accomplish a task slowly, but in an orderly manner, or  
      b.) Accomplish a task in a hurry, but less carefully

I would prefer to:

- \*\* 21.    a.) Receive a grade on the basis of how well I did on the teacher's test, or  
          b.) Get a grade on the basis of how hard I tried
- 22.    a.) Be known as someone who doesn't need others, or  
          b.) Be known as someone who depends on others
- 23.    a.) Solve an easy puzzle that I had difficulty with, or  
          b.) Solve a puzzle that other people have difficulty with
- 24.    a.) Work hard to be smart, or  
          b.) Take it easy and become rich
- 25.    a.) Be graded compared to the rest of the class, or  
          b.) Be graded compared to a standard held by the teacher

I would prefer to:

- 26.    a.) Be thought of as being a studious person, or  
          b.) Be thought of as being a carefree person
- 27.    a.) Receive one of several "A's" in class, or  
          b.) Receive the highest test grade and get the only "A"
- 28.    a.) Work with others, or  
          b.) Work alone
- \*\* 29.    a.) Have the best teachers in the state in my school, or  
          b.) Have a large recreation center in my school
- 30.    a.) Have a few expensive clothes, or  
          b.) Have lots of less expensive clothes

I would prefer to:

- 31.    a.) Be the holder of one state record, or  
      b.) Be the holder of several city records
- 32.    a.) Write for a weekly newspaper, or  
      b.) Write for a paper which has nation-wide distribution
- \* 33.   a.) Buy a car, or  
      b.) Continue my education
- 34.    a.) Go to an amusement park, or  
      b.) Buy a book
- 35.    a.) Finish a very important job, or  
      b.) Finish several less important jobs

I would prefer to:

- 36.    a.) Be able to do difficult things better than other people, or  
      b.) Be able to do difficult things just as well as other people
- \*\* 37.   a.) Be well prepared for a job after graduation from high  
          school, or  
      b.) Be well prepared to continue learning
- 38.    a.) Be known as a person who can solve problems better  
          than anyone else, or  
      b.) Be known as a person who can solve problems well
- 39.    a.) Work on a difficult short puzzle, or  
      b.) Work on a difficult long puzzle
- 40.    a.) Be on a quiz program, or  
      b.) Be on a give-away program

I would prefer to:

- 41.     a.) Pass a usual classroom examination, or  
       b.) Pass a college entrance examination
- 42.     a.) Draw a freehand picture which may or may not be good, or  
       b.) Trace an excellent picture drawn by someone else
- 43.     a.) Wait and receive one large award, or  
       b.) Receive several small awards
- \*\* 44.   a.) Have the teacher give everyone the same grade at the  
          beginning of the term and know I had passed, or  
       b.) Take chances on getting a higher or lower grade at the  
          end of the course.
- \*\* 45.   a.) Develop a new product which may or may not be good, or  
       b.) Make a product as good as the best one available.

I would prefer to:

- 46.     a.) Receive a gift I could use right away, or  
       b.) Receive a gift I had to put together in order to use
- 47.     a.) Be disliked but do well in the activities I undertake, or  
       b.) Be well liked but be relatively unsuccessful at most jobs
- 48.     a.) Have friends that are a lot of fun, or  
       b.) Have friends that I learn something from
- \* 49.    a.) Receive money for my good grades, or  
       b.) Be allowed to take any course I wanted because of good  
          grades
- \*\* 50.   a.) Be successful in finishing a job, or  
       b.) Finish a job

I would prefer to:

- 51.     a.) Play a game against experts and lose but learn how to play better, or  
           b.) Play a game against inexperienced players and win
- \*\* 52.     a.) Get excellent grades because I have a great deal of ability, or  
           b.) Get average grades because I have average ability.
- \* 53.     a.) Be graded at the end of a course with the possibility of making an "A", or  
           b.) Get a "C" at the beginning of a course alone with everyone else
- 54.     a.) Be thought of as a person with usual ideas, or  
           b.) Be thought of as a person with unusual ideas
- 55.     a.) Get one of many "C's" in a course and learn something, or  
           b.) Get the only "A" and not learn as much

I would prefer to:

- \*\* 56.     a.) Make quick decisions and sometimes be right and sometimes wrong, or  
           b.) Deliberate over decisions and usually be right
- 57.     a.) Be known to my parents as an intelligent person, or  
           b.) Be known to my parents as a practical person
- 58.     a.) Be a person of leisure, or  
           b.) Be a person of action
- \*\* 59.     a.) Be allowed to take extra courses before or after school, or  
           b.) Just take courses offered during the school day
- \* 60.     a.) Complete a job which I recognize as difficult, or  
           b.) Complete a job which others recognize as difficult

I would prefer to:

- 61.    a.) Receive money for good grades, or  
       b.) Have my picture in the paper for good grades
- 62.    a.) Receive grades which are like everyone elses', or  
       b.) Receive grades that please my parents
- \*\* 63.   a.) Do as well as most of my classmates, or  
       b.) Do better than most of my classmates
- 64.    a.) Catch many fish everytime I go fishing, or  
       b.) Catch the biggest fish of the day
- 65.    a.) Study hard enough just to get by, or  
       b.) Study hard enough to do very well

I would prefer to:

- 66.    a.) Be known to my acquaintances as a friend of everyone, or  
       b.) Be known to my friends as a self-confident person
- \* 67.   a.) Be considered as being strong but not very smart, or  
       b.) Be considered as being weak but smart
- 68.    a.) Have someone show me the solution to a problem, or  
       b.) Take a long time to figure out a problem for myself
- 69.    a.) Be the designer of a new type of airplane, or  
       b.) Be one of the first persons to ride in a new type of  
           airplane
- \* 70.   a.) Be known as a person with much ability, or  
       b.) Be known as a person with adequate ability

I would prefer to:

- \* 71.     a.) Work at many less important jobs which I know I could finish, or  
          b.) Work at one very important job which may never be entirely finished in my life-time
- 72.     a.) Work for a commission, or  
          b.) Work on a straight salary
- \* 73.     a.) Be paid for how well I did a job, or  
          b.) Be paid the same amount no matter how I did the job
- \*\* 74.    a.) Work rapidly just "skimming" along, or  
          b.) Work slowly with great thoroughness
- 75.     a.) Start a model plane from scratch, or  
          b.) Assemble a model plane from a kit

I would prefer to:

- 76.     a.) Make little or no progress on a difficult job and have to get help from others, or  
          b.) Work slowly and complete a difficult job alone
- 77.     a.) Do a less recognized but complete job, or  
          b.) Do a recognized but incomplete job
- \* 78.     a.) Have a better job than my father has, or  
          b.) Have a job like my father has
- 79.     a.) Begin a task, or  
          b.) Complete a task
- 80.     a.) Buy a thing of beauty, or  
          b.) Create something useful

I would prefer to:

- \*\* 81.     a.) Have a great deal of money, or  
          b.) Be an expert in my favorite school subject
- 82.     a.) Be criticized at school, or  
          b.) Be criticized at home
- 83.     a.) Be paid for how fast I did a job, or  
          b.) Be paid for how well I did a job
- \* 84.     a.) Have average ability and be liked by many people, or  
          b.) Have superior ability but not be liked by as many people
- 85.     a.) Be a minor actor in a large theater production, or  
          b.) Play the lead in a small theater production

I would prefer to:

- \*\* 86.     a.) Have everybody in the class get a "C" at the beginning  
              of the course, or  
          b.) Be graded at the end of the course with the possibility of  
              getting a higher or lower mark
- 87.     a.) Read one long story, or  
          b.) Read a book of short stories
- \*\* 88.     a.) Receive a grade on the basis of how much my teacher  
              thinks I have learned, or  
          b.) Take a course from an instructor who only gives "C's"
- 89.     a.) Go down in history as a person who settled a country  
              already discovered, or  
          b.) Go down in history as the discoverer of a new country
- 90.     a.) Be known as a person with unusually good ideas, or  
          b.) Be known as a person who goes along with the crowd

I would prefer to:

- 91. a.) Be known as a person who doesn't let problems worry me, or  
b.) Be known as a person who can solve problems well
- 92. a.) Influence people, or  
b.) Help people
- 93. a.) Be graded on how much effort I put forth, or  
b.) Be graded on how much I have learned
- 94. a.) Be an able person, or  
b.) Be wealthy
- 95. a.) Be thought of as being shrewd, or  
b.) Be thought of as being intelligent

I would prefer to:

- \*\* 96. a.) Be paid for the amount of work I did, or  
b.) Be paid by the hour
- 97. a.) Be comfortable and get what I want now, or  
b.) Be uncomfortable and get what I want in the future
- 98. a.) Make decisions, or  
b.) Follow directions
- 99. a.) Work with a group on an ordinary project which other groups in the class are working on, or  
b.) Work by myself on a different project
- 100. a.) Have my classmates know how I did on a test, or  
b.) Be the only person who knows how I did on a test

I would prefer to:

- 101. a.) Work hard in everything I do, or  
b.) Work at things as they come along
- 102. a.) Have a hard job which pays well, or  
b.) Have an easier job which pays less
- 103. a.) Have a hard teacher who makes me work, or  
b.) Have an easier teacher who makes class interesting
- \*\* 104. a.) Study my assignments during study hall, or  
b.) Wait to study until the mood strikes me
- 105. a.) Wait to do an unpleasant task in hopes that I might not  
have to do it, or  
b.) Do an unpleasant task and get it over with

I would prefer to:

- 106. a.) Consider all the possible outcomes when faced with a  
choice, or  
b.) Make a decision and not worry about all the possible  
outcomes
- 107. a.) Be known for what I could do, or  
b.) Be known for what I do.
- 108. a.) Win an argument with my friends, or  
b.) Win a school sponsored debate contest
- 109. a.) See my name as author of the Book-of-the-Month, or  
b.) Score the points that wins the game for my team
- \*\* 110. a.) Think of an idea that nobody has ever thought of, or  
b.) Set a world's speed record

I would prefer to:

- 111.     a.) Perform well in class, or  
          b.) Watch television
- 112.     a.) Memorize someone else's poem, or  
          b.) Create a poem of my own
- 113.     a.) Make many friends, or  
          b.) Complete a very difficult job
- 114.     a.) Learn by defeating an inexperienced player, or  
          b.) Learn by defeating an expert
- 115.     a.) Date a lot of different people, or  
          b.) Date one person steady

I would prefer to:

- 116.     a.) Take a job in a new city, or  
          b.) Take a job in my home town
- 117.     a.) Be thought of as being smart, or  
          b.) Be thought of as being practical
- 118.     a.) Save enough money to buy something with cash, or  
          b.) Buy something on credit and pay for it as I use it
- \*\* 119.   a.) Do what I think is right, or  
          b.) Do what others think is right
- 120.     a.) Receive a grade on the basis of how well I did on my  
              teacher's test, or  
          b.) Receive a grade on the basis of how I compared with my  
              classmates

I would prefer to:

- 121.    a.) Feel confident about dealing with people, or (negative  
          b.) Feel confident about handling money                    discriminator)
- 122.    a.) Be known as a person who is able to do many things, or  
          b.) Be known as an expert
- 123.    a.) Read, or  
          b.) Talk
- 124.    a.) Investigate something, or  
          b.) Join a club
- \* 125.    a.) Work overtime to make more money, or  
          b.) Get more schooling to make more money

I would prefer to:

- 126.    a.) Take it easy and conserve my energy, or  
          b.) Put forth my best effort all the time
- 127.    a.) Take an unknown short-cut through the woods, or  
          b.) Follow the route through the woods which is known but  
                                          is longer
- 128.    a.) Do things as other people would do them, or  
          b.) Do things better than other people
- \* 129.    a.) Inherit a great deal of money, or  
          b.) Earn a great deal of money
- 130.    a.) Watch my favorite television program, or  
          b.) Plan for a vacation to be taken next year

I would prefer to:

- 131. a.) Wait ten years and receive fame throughout the nation, or  
b.) Receive fame in my community overnight
- \*\* 132. a.) Wait until I had finished college and make a better salary,  
or  
b.) Get a job right after high school and make a good salary
- 133. a.) Prepare a familiar food, or  
b.) Prepare a new food
- 134. a.) Work on a not-so-important project which I may finish, or  
b.) Work on an important project which I may never finish
- 135. a.) Play a game for the sake of playing it, or  
b.) Play a game in order to win

I would prefer to:

- \* 136. a.) Plan my life in advance, or  
b.) Live my life from day to day
- 137. a.) Have decisions made for me, or  
b.) Make my own decisions
- 138. a.) Take a long vacation at the end of the year, or  
b.) Take a short vacation once a month
- 139. a.) Accomplish a difficult task well, or  
b.) Accomplish a difficult task fast
- 140. a.) Be graded on the basis of the effort I put forth, or  
b.) Be graded on the basis of how well I got along with my  
classmates

I would prefer to:

- \*\* 141.     a.) Study to go to college, or  
           b.) Study to get out of high school
- 142.     a.) Work on a short-term project, or  
           b.) Work on a long-term project
- 143.     a.) Be known as a good group member, or  
           b.) Be known as a leader
- 144.     a.) Live a life of leisure, or  
           b.) Live a life of many new experiences
- 145.     a.) Enjoy myself at a museum, or  
           b.) Enjoy myself at a night-club

I would prefer to:

- 146.     a.) Find out right away how I did on a test, or  
           b.) Wait to find out how I did on a test
- 147.     a.) Study, or  
           b.) Do things with my friends
- 148.     a.) Make progress on a task, or  
           b.) Complete a task once begun
- 149.     a.) Belong to a club, or  
           b.) Organize a club
- 150.     a.) Make my own decisions, or  
           b.) Help others make their decisions

I would prefer to:

- 151.     a.) Do my home work, or  
          b.) Watch my favorite television program
- \* 152.     a.) Have a great deal of influence over people, or  
          b.) Have a great deal of ambition
- 153.     a.) Be known as being patient in working with people, or  
          b.) Be known as being patient in working with ideas and objects
- 154.     a.) Develop a new and better way to study, or  
          b.) Make many new and close friends
- 155.     a.) Be thought of as having average intelligence and be  
              wealthy, or  
          b.) Be thought of as being quite intelligent and be poor

I would prefer to:

- 156.     a.) Work hard and become rich, or  
          b.) Take it easy and become smart
- 157.     a.) Play a "tie" game with an expert, or  
          b.) Win a game from an inexperienced player
- 158.     a.) Receive proper credit for accomplishments, or  
          b.) Be thought of by others as being "a lot of fun"
- 159.     a.) Help my friends pass an examination and receive a "C"  
              myself, or  
          b.) Study alone and receive an "A" on the examination
- 160.     a.) Stand up for my rights, or  
          b.) Keep my thoughts to myself

I would prefer to:

- \* 161.     a.) Carry out the plans of others, or  
          b.) Create something of my own
- 162.     a.) Paint one very large picture, or  
          b.) Paint several small pictures
- 163.     a.) Invent a new musical instrument, or  
          b.) Play a musical instrument already invented
- 164.     a.) Be able to say I had successfully completed a task, or  
          b.) Be able to say I had attempted a difficult task
- 165.     a.) Be known as a person who makes the classroom  
              pleasant, or  
          b.) Be known as a person who knows what he's talking  
              about

I would prefer to:

- 166.     a.) Be criticized at home and praised in school, or  
          b.) Be criticized at school and praised at home
- \* 167.     a.) Be known as being a "good guy" or a "good gal," or  
          b.) Be known as a person who "does things well"
- 168.     a.) Be a big frog in a little pond, or  
          b.) Be a little frog in a big pond
- 169.     a.) Do something which will cause your name to be in  
              history books, or  
          b.) Become a well-known popular singer
- \*\* 170.     a.) Be very happy, or  
          b.) Have lots of money

I would prefer to:

- \* 171.    a.) Be known as a person who knows his own mind, or  
          b.) Be known as a person who gets help in making decisions
- 172.    a.) Be thought of as being like everyone else, or  
          b.) Be thought of as being different
- 173.    a.) Choose a familiar well liked food, or  
          b.) Try a new food in a restaurant
- 174.    a.) Write a novel or play, or  
          b.) Read a novel or play
- \* 175.    a.) Do something like everyone else, or  
          b.) Do something outstanding

I would prefer to:

- 176.    a.) Have an instructor who gave me an "A" and not care  
                                          whether I learned anything or not, or  
          b.) Have an instructor who gave me a "C" but made sure  
                                          I learned something
- 177.    a.) Read an interesting story, or  
          b.) Take an examination to find out about myself
- \* 178.    a.) Put together a new object, or  
          b.) Develop new ideas
- \* 179.    a.) Be demanding on myself to do good work, or  
          b.) Be demanding on my friends so that they will do good work
- 180.    a.) Accept what someone else says even though I don't agree,  
                                          or  
          b.) Argue for what I believe to be right

I would prefer to:

- 181.     a.) Receive the only "A" in a class, or  
          b.) Receive the same grades as most of the students  
              in my classes
- 182.     a.) Receive an "A" on a test in which I missed several  
              questions, or  
          b.) Receive an "A" on a test and only miss one of the  
              questions
- 183.     a.) Study for an exam one night and know that I would receive  
              an "A", or  
          b.) Go to a party on this night and take a chance on a lower  
              grade
- 184.     a.) Be graded on the basis of how much effort I put forth, or  
          b.) Be graded compared to my classmates
- 185.     a.) Choose a friend because I could learn something from  
              him or her, or  
          b.) Choose a friend because I could have fun doing things  
              with him or her

I would prefer to:

- 186.     a.) Be responsible to somebody, or  
          b.) Be given responsibility for doing something
- 187.     a.) Date the smartest girl or boy in class, or  
          b.) Date the girl or boy who is the most fun
- 188.     a.) Do something like everyone else does, or  
          b.) Do something which is different
- \* 189.   a.) Do something that I have done before, or  
          b.) Do something that I never have done before
- 190.     a.) Work hard enough to be outstanding, or  
          b.) Work hard enough to pass my courses

I would prefer to:

- 191.     a.) Buy a set of encylcopedias for my children, or  
           b.) Buy a bicycle for my children
- \*\* 192.     a.) Discover a gold mine, or  
               b.) Discover a new medicine
- \* 193.     a.) Have one of my children win a beauty contest, or  
               b.) Have one of my children win a college scholarship
- 194.     a.) Get some new clothes, or  
               b.) Get a years' subscription to the Book-of-the-Month Club
- 195.     a.) Have a few "fine" clothes, or  
               b.) Have many ordinary clothes

I would prefer to:

- 196.     a.) Be the smartest person in the world, or  
               b.) Be the happiest person in the world
- 197.     a.) Play a game, or  
               b.) Be the planner of a game to be played
- 198.     a.) Be a boss, or  
               b.) Be a worker
- 199.     a.) Be an employer, or  
               b.) Be an employee
- 200.     a.) Learn by defeating an experienced player, or  
               b.) Learn by losing to an expert

## APPENDIX B

Correlation Matrix for Twenty-Two High Discriminating  
Items for the Generalized Situational Choice Inventory  
for Male Over- and Underachievers.

Rounded Intercorrelation Matrix for Twenty-Two Significant Items--GSCI Male Over- and Underachievers  
(Values are positive unless otherwise indicated, and the decimals are omitted)

| Item<br>No. | 1    | 2   | 3   | 4   | 5    | 6    | 7   | 8    | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17   | 18  | 19  | 20  | 21  | 22 |
|-------------|------|-----|-----|-----|------|------|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|----|
| 1           | 1    |     |     |     |      |      |     |      |     |     |     |     |     |     |     |     |      |     |     |     |     |    |
| 2           | 076  | 1   |     |     |      |      |     |      |     |     |     |     |     |     |     |     |      |     |     |     |     |    |
| 3           | 114  | 353 | 1   |     |      |      |     |      |     |     |     |     |     |     |     |     |      |     |     |     |     |    |
| 4           | 106  | 280 | 246 | 1   |      |      |     |      |     |     |     |     |     |     |     |     |      |     |     |     |     |    |
| 5           | -016 | 176 | 128 | 168 | 1    |      |     |      |     |     |     |     |     |     |     |     |      |     |     |     |     |    |
| 6           | 051  | 010 | 233 | 151 | 044  | 1    |     |      |     |     |     |     |     |     |     |     |      |     |     |     |     |    |
| 7           | 177  | 236 | 423 | 154 | 119  | 259  | 1   |      |     |     |     |     |     |     |     |     |      |     |     |     |     |    |
| 8           | 134  | 065 | 137 | 101 | 017  | 124  | 188 | 1    |     |     |     |     |     |     |     |     |      |     |     |     |     |    |
| 9           | 018  | 152 | 134 | 075 | 122  | 128  | 217 | 021  | 1   |     |     |     |     |     |     |     |      |     |     |     |     |    |
| 10          | 014  | 260 | 477 | 242 | 098  | 162  | 433 | 144  | 144 | 1   |     |     |     |     |     |     |      |     |     |     |     |    |
| 11          | 032  | 174 | 263 | 167 | 014  | 131  | 098 | 215  | 094 | 209 | 1   |     |     |     |     |     |      |     |     |     |     |    |
| 12          | 028  | 199 | 200 | 169 | 120  | -009 | 035 | 036  | 204 | 134 | 141 | 1   |     |     |     |     |      |     |     |     |     |    |
| 13          | 106  | 204 | 325 | 453 | 138  | 019  | 300 | 069  | 111 | 371 | 076 | 129 | 1   |     |     |     |      |     |     |     |     |    |
| 14          | 136  | 247 | 334 | 367 | 097  | 168  | 312 | 100  | 159 | 223 | 122 | 098 | 269 | 1   |     |     |      |     |     |     |     |    |
| 15          | 076  | 252 | 265 | 114 | 076  | 047  | 169 | -003 | 186 | 132 | 132 | 236 | 052 | 092 | 1   |     |      |     |     |     |     |    |
| 16          | 083  | 178 | 114 | 190 | 037  | 030  | 104 | 090  | 156 | 074 | 154 | 202 | 211 | 171 | 106 | 1   |      |     |     |     |     |    |
| 17          | 102  | 160 | 165 | 103 | 115  | 029  | 153 | -010 | 147 | 039 | 105 | 168 | 115 | 105 | 171 | 146 | 1    |     |     |     |     |    |
| 18          | 115  | 060 | 148 | 128 | -037 | 059  | 123 | 024  | 024 | 127 | 091 | 048 | 009 | 160 | 002 | 093 | -004 | 1   |     |     |     |    |
| 19          | 068  | 233 | 505 | 212 | 171  | 248  | 377 | 185  | 084 | 339 | 156 | 078 | 325 | 266 | 192 | 126 | 131  | 113 | 1   |     |     |    |
| 20          | 141  | 253 | 624 | 272 | 156  | 242  | 430 | 114  | 184 | 374 | 228 | 193 | 350 | 302 | 191 | 151 | 158  | 204 | 509 | 1   |     |    |
| 21          | 193  | 197 | 187 | 202 | 067  | 045  | 137 | 043  | 102 | 091 | 136 | 263 | 223 | 124 | 123 | 280 | 124  | 111 | 176 | 273 | 1   |    |
| 22          | 012  | 182 | 282 | 129 | 025  | 051  | 069 | -020 | 163 | 148 | 102 | 257 | 123 | 095 | 124 | 142 | 122  | 043 | 158 | 222 | 330 | 1  |

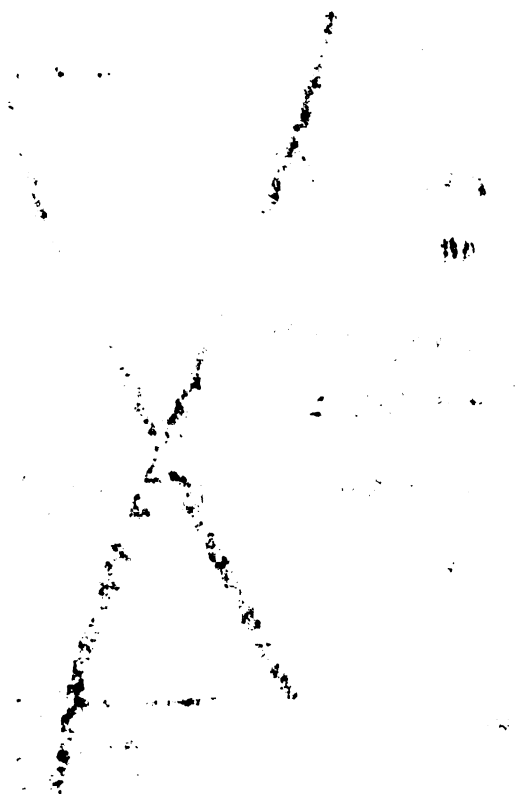
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