

A CLUSTER ANALYSIS OF AN OBJECTIVE
MEASURE OF ACADEMIC MOTIVATION

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ABSTRACT

A CLUSTER ANALYSIS OF AN OBJECTIVE MEASURE OF ACADEMIC MOTIVATION

by Fred William Smith

The major concern in this study was directed toward the isolation and description of the dimensions of an objective measure of academic motivation called the Michigan M-Scales.¹ It was hypothesized that meaningful and descriptive dimensions related to academic motivation can be isolated and identified. The responses of 240 male eleventh grade high school subjects to the 139 male items in the M-Scales were subjected to McQuitty's Elementary Linkage Analysis (ELA) procedure. A cluster as identified by E.L.A. was defined as a structure in which every item is more like some other item in that cluster than any item in any other cluster. The clusters identified were labeled and described using the characteristics relative to academic motivation held in common by their constituent items. All of the clusters except Cluster XIV were internally consistent. Two elaborations of E.L.A., the Hierarchical Method and the Comprehensive Hierarchical Approach, each yielded two interpretable second order clusters. Only the clusters from the latter method were interpreted.

The Elementary Linkage Analysis yielded fourteen clusters labeled as follows:

Cluster I--Distractable

Cluster II--Irresponsible

Cluster III--Need Achiever

Cluster IV--Competition Versus Ease of Meeting a Standard

Cluster V--Intellectual Versus Material Accomplishment

Cluster VI--Immediate Versus Long-Term Involvement

Cluster VII--Occupational Responsibility: High Versus Low

Cluster VIII--Occupational Self-Development: High Versus Low

Cluster IX--Compulsivity

Cluster X--Self-Perceived Competence

Cluster XI--Self-Perceived Responsibleness

Cluster XII--Self-Perceived Intellectual Ambition

Cluster XIII--Need Achievement: High Versus Low

Cluster XIV--Self-Perceived Non-Conformity

The second order clusters identified by the Comprehensive Approach were labeled as follows:

Cluster A--Responsibleness: High Versus Low

Cluster B--Self-Perceived Ability

¹The study was conducted as part of a larger research project sponsored by the United States Office of Education under the direction of William W. Farquhar.

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By

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CHAPTER I

THE PROBLEM

Purpose of the Study

Although the concept of academic motivation has attracted considerable interest and concern from educators it continues to be an inadequately defined and complex determinant of scholastic achievement. This is true, partially, because of the paucity of research that contributes to the understanding of the relationship of motivation to learning.¹ Another reason has been the lack of comprehensiveness and objectivity in studies attempting to identify the dimensions which constitute academic motivation.

It is the purpose of this study to isolate and examine the meaningful dimensions found in an objective, validated measure of academic motivation which has been constructed to incorporate a variety of motivation related variables. It is proposed that this investigation will contribute to further description of the dimensions underlying the motivation complex, to increased theory integration and ultimately to a better understanding of academic motivation.

¹Raymond B. Fox, "Dearth of Research on Motivation," The Clearing House, XXXV, No. 4 (1960), 239-43.

Need for the Study

The fact that academic motivation is deemed to be important in determining academic success, yet is so little understood, is evidence of the need for this type of study.

Research findings have also indicated a need for further study on motivation. For example, Weiss, Wertheimer, and Groesbeck demonstrated that certain measures of motivation increase the prediction of scholastic performance when combined with an aptitude measure.¹ This and similar evidence suggests that non-intellective variables influence academic achievement and warrant investigation to identify their dimensional characteristics. However, research contributions in this area have been limited by their restriction to comparisons of performance on various personality measures.^{2,3,4} Although these studies show that a relationship exists between certain non-intellective variables and academic achievement, they lack meaningfulness and conclusiveness since the

¹Peter Weiss, Michael Wertheimer, and Byron Groesbeck, "Achievement Motivation, Academic Aptitude, and College Grades," Educational and Psychological Measurement, XIX, No. 4 (1959), 663-66.

²H.H. Morgan, "A Psychometric Comparison of Achieving and Non-achieving College Students of High Ability," Journal of Consulting Psychology, XVI (1952), 292-98.

³James V. Mitchell, Jr., "Goal-Setting Behavior as a Function of Self-Acceptance, Over- and Under-achievement, and Related Personality Variables," The Journal of Educational Psychology, L, No. 3 (June, 1959), 93-104.

⁴P.J. Bond, "The Relationship Between Selected Nonintellective Factors and 'Concealed Failure' Among College Students of Superior Scholastic Ability," Unpublished doctoral dissertation, Purdue University, 1960, cited in "Academic Underachievement in College," Student Personnel Methods Bulletin, Claremont, California: College Student Personnel Institute (August), 1964.

nature of the relationship can only be speculated. They are also characterized by fragmentation since each deals with only one aspect of motivation and by a lack of objectivity because the instruments used were not validated as measures of academic motivation. The result has been limited progress toward the identification and understanding of the constructs comprising academic motivation. An investigation based on an objective measure composed of validated items meets a need for this type of approach.

Unfortunately the factors identified in past studies as having a relationship to academic over- and underachievement have not been integrated into an underlying theory which accounts for the major constructs comprising academic motivation. The fact that theory comprehensiveness is yet unattained was illustrated in the Farquhar study where it was concluded that McClelland's three factor theory was "too simple to explain the academic motivation complex."¹ The limited predictability of personality measures as cited by Stone and Foster,² and Worell³ is further evidence that a more adequate theory is needed for improvement of future measure development. An analysis of the underlying psychological traits in an objective measure of academic motivation

¹William W. Farquhar, "An Integrated Research Attack on Academic Motivation," Journal of Counseling Psychology, IX (1962), 84-68.

²LeRoy A. Stone and James M. Foster, "Academic Achievement as a Function of Psychological Needs," The Personnel and Guidance Journal, XLIII (1964), 52-56.

³Leonard Worell, "Level of Aspiration and Academic Success," The Journal of Educational Psychology, L, No. 2 (April, 1959), 47-54.

which has predictive validity for over- and underachievement may substantially contribute to more adequate theory building.

Moreover, increased understanding of academic motivation has implications for the total educational process, especially teaching, counseling, placement and curriculum development. A theoretical understanding of academic motivation hopefully would enable teachers and counselors to help underachievers perform comensurate with their ability. Furthermore, prediction of underachievement may help prevent waste of academic talent. Such prevention might be at least partially achieved by placing predicted underachievers in an educational milieu that would be conducive to performance. This in turn has implications for curriculum development since the milieu would undoubtedly involve curricular considerations.

Statement of the Problem

The problem in this study is to isolate and describe the underlying dimensions of an objective measure of academic motivation of eleventh grade male students. This investigation was conducted in conjunction with a larger research project sponsored by the United States Office of Education, under the direction of William W. Farquhar.¹ The Farquhar project was concerned with the development of an objective battery of tests which measure various aspects of motivation for academic achievement. The resulting battery, The Michigan M-Scales, hereafter

¹William W. Farquhar, Motivation Factors Related to Academic Achievement. Final Report of U.S. Government Cooperative Research Project No. 846, Michigan State University: Office of Research and Publications, College of Education, January, 1963.

referred to as the M-Scales, are used in this investigation. The problem of this study is to conduct an Elementary Linkage Analysis of the 139 male items in the total battery of the M-Scales to (1) determine what items group together into clusters on the basis of the agreement responses to the items; (2) examine the item content and determine the underlying characteristics held in common by the items which account for their being grouped together; (3) label the clusters in meaningful terms; (4) suggest implications for further theory building.¹ The problem in essence then is to determine the number, nature, magnitude and structure of the dimensions functioning in the total male battery of M-Scales.

The theory on which the M-Scales was based follows.

Theory

Farquhar considered behavior theory as having three overlapping levels, two of which actually served as a basis for the development of the M-Scales. At the first level, focusing, an attempt was made to identify significant variables for the testing of null hypotheses concerning their relevance. Two scales were developed at this level: The

¹The total battery of the M-Scales is composed of four sub-scales: The Generalized Situational Choice Inventory (G.S.C.I.), Word Rating List (W.R.L.), Human Trait Inventory (H.T.I.), and the Preferred Job Characteristics Scale (P.J.C.S.). Sample copies may be obtained from Dr. William W. Farquhar, Michigan State University.

Factor analyses have been made on the individual sub-scales. It is the purpose of this study to analyze the battery in its entirety.

Word Rating List which was designed to measure academic self-concept,¹ and the Human Trait Inventory which was concerned with the measurement of personality traits.²

At the second level, predictive, directional hypotheses were established on the basis of past theorizing. McClelland's N-achievement factors were altered and polarized to allow prediction of extremes in academic motivation, i.e., need for (a) long-term vs. short-term involvement; (b) unique vs. common accomplishment; (c) competing with a maximal vs. a minimal standard of excellence.³ Two scales were developed at level two: The Generalized Situational Choice Inventory which gathered a person's preference for certain motivation related situations,⁴ and The Preferred Job Characteristics Scale which measured aspirations and values concerning certain future jobs.

Theory was not developed at level three, integrative, where an attempt would be made to relate the constructs of the sub-scales. Although it is hoped that within the present study a greater degree of

¹David A. Payne, A Dimension Analysis of the Academic Self-Concepts of Eleventh Grade Under- and Over-Achieving Students. Ph.D. Dissertation, Michigan State University, 1961, and Farquhar, Motivation Factors

²Ronald Taylor, "Personality Traits and Discrepant Achievement," Journal of Counseling Psychology, XI (Spring, 1964), 76-82, and Farquhar, Motivation Factors

³David C. McClelland, John W. Atkinson, Russell A. Clark and Edgar L. Lowell, The Achievement Motive. New York: Appleton-Century-Croft, Inc., 1953, pp. 110-13.

⁴Marion Dennis Thorpe, The Factored Dimensions of an Objective Inventory of Academic Motivation Based on Eleventh Grade Male Over- and Underachievers. Ph.D. Dissertation, Michigan State University, 1961, and Farquhar, Motivation Factors

comprehensiveness will be achieved because many motivation related variables are taken into account, theory building will remain at level two, predictive, as in the Farquhar study.

The Hypothesis

Several assumptions underlie this study. Those initially made by the Farquhar team in the construction of the M-Scales that apply here are: that over- and underachievement represent extremes in motivation (See Chapter III for a statistical definition of under- and overachievement); that the test items embody the related theory despite the possible bias of the test constructors; that the M-Scales actually measure academic motivation.¹ Validity estimates from the Farquhar study give some credibility to the last assumption.² An additional assumption to be made in this investigation is that the Elementary Linkage Analysis procedures to be used will accurately identify the underlying dimensions of the M-Scales so that they can be meaningfully described.

It is hypothesized that the items can be arranged in clusters which can be meaningfully described in relation to academic motivation.

Statement of the Hypothesis

Psychologically meaningful and descriptive dimensions which relate to academic motivation can be isolated and identified.

¹Farquhar, Motivation Factors . . . , p. 181.

²Ibid., p. 176.

Organization of the Study

The general plan of this study is as follows. In Chapter II a review of the related research is presented. A discussion of the design and methodology of the study including the sample selection and analytical procedures used in identifying the dimensions of the total male battery of M-Scales is presented in Chapter III. The analysis of the data including the discussion and interpretation of the cluster dimensions constitutes Chapter IV. The summary, conclusions and implications for further research appear in Chapter V.

CHAPTER II

REVIEW OF LITERATURE

A paucity of research designed to identify the dimensions of academic motivation via analyses of objective measures exists in the literature. The few studies relevant to the present investigation will be reviewed and evaluated. A summary of the contribution of these studies to the area of academic motivation will provide the frame of reference in which a further description of this investigation can be understood.

Motivation as a Factor in Academic Achievement

Weiss has demonstrated the existence of motivation as a factor influential in determining academic performance.¹ He conducted a factor analysis on the responses of a sample of 180 college students to ten questions concerning their expected performance on a verbal reasoning test. Two factors were identified, a judgmental or expectational factor and a motivational or aspirational factor. Weiss concluded that the judgmental factor represents a realistic appraisal of one's ability

¹Robert Frank Weiss, "Aspirations and Expectations: A Dimensional Analysis," The Journal of Social Psychology, LIII (April, 1961), 249-54.

(non-emotional) whereas the motivational factor represents emotional aspiration which he suggests is motivation and produces drive in learning situations.

Although Weiss' findings add evidence to the belief that non-intellective factors influence academic achievement they do not provide definite information regarding the motivation complex. Weiss' definition of motivation is limited to the idea of aspiration which is a complex, undefined concept itself and does not incorporate all the variables inherent in academic motivation.¹ A more satisfactory and comprehensive approach would be to identify the dimensions of a validated objective measure of academic motivation which has been constructed to incorporate a variety of non-intellective variables related to academic achievement.

Personality Traits Related to Academic Motivation

Middleton and Guthrie conducted a study which is relevant in a general way to the present investigation.² They attempted to identify personality syndromes that relate to academic achievement. A 300 item personality questionnaire designed to measure 18 of the needs in Murray's system was administered to a sample of 14 high achieving and 14 low achieving students. All subjects were upperclass male business

¹Leonard Worell, "Level of Aspiration and Academic Success," The Journal of Educational Psychology, L, No. 2 (April, 1959), 47-54.

²George Middleton, Jr. and George M. Guthrie, "Personality Syndromes and Academic Achievement," The Journal of Educational Psychology, L, No. 2 (April, 1959), 66-69.

management students at Pennsylvania State University. Low achievers were defined as those under a 2.0 G.P.A. and achievers as those over 2.5. Adjusted phi coefficients were computed between each pair of subjects and the 14 X 14 matrices for high and low achievers were subjected to a transposed factor analysis. The rotated factor loadings were correlated with the scores on each of Murray's 18 scales.

Five factors were extracted for the high achievers: I. Power and Approval; II. Resentment and Independence; III. Dependence; IV. Social Prestige and Influence; V. Hostile Agressive Denial of Tender Socialized Feelings.

Four factors were extracted from the matrix of low achievers: I. Preoccupied with Pleasure; II. Extroversion; III. Disavowing Social Shortcomings; IV. Power and Acceptance.

The findings of this study are limited in several ways. The sample used was too small and homogeneous to allow generalization of the results. The difference between 2.00 and 2.50 can hardly distinguish between low and high achieving students. To be sure, the subjects used could not be classified as over- and underachievers. As in many other studies of this type a causal relationship between the syndromes identified and academic achievement can only be inferred since the validity of the measure used is undetermined. The syndromes describe high and low achievers but do not define or describe academic motivation. The fact that high and low achievers were found to share some of the same needs further indicates that the results are limited in their conclusiveness. In fact, the authors suggest that the ". . . factors must be regarded as more illustrative than confirmed."

Although the study is limited to Murray's need system, the findings do indicate that some independent personality factors have some relationship to academic achievement.

McQuary¹ conducted a study in which he attempted to identify the factor pattern underlying twenty-three variables assumed to be related to scholastic achievement. The variables chosen were of both the intellectual (such as aptitude and achievement test scores, and grades) and non-intellectual (such as home background, and extracurricular participation) variety. Data pertaining to all of the variables was obtained from the University of Wisconsin Student Counseling Center on male freshmen in the 1948-49 and 1949-50 school years who had used the services of the center. A subject's inclusion in the sample was determined by whether complete data on all 23 variables was available on him. A sample of 174 resulted.

McQuary hypothesized that: "(1) Achievement in college is significantly related to certain non-intellectual variables; and (2) The non-intellectual variables can be grouped into several factors." Scores on the variables were normalized by converting them to stanine scores and were then intercorrelated. The multiple group method of factoring was used and the resulting factor matrix was turned into an orthogonal solution (F). Single-plane and radial rotations were made on columns of the F matrix until an oblique solution (V) was obtained.

¹John P. McQuary, "Some Relationships Between Non-Intellectual Characteristics and Achievement," The Journal of Educational Psychology, XLIV, No. 4 (April, 1953), 215-28.

The analysis yielded six factors which were labeled: I. Academic Performance Predictor; II. Social-class Intelligence; III. Participating Urban Scholar; IV. Social Extroversion; V. Academic and Financial Security; and VI. Introvertive Reader. Two of the factors accounted for most of the correlation of grades with the various variables. The two in point were: first, the Academic Performance Predictor factor which grouped together ACE-Q and ACE-L scores, the Speed of Reading score, the Level of Comprehension and Vocabulary tests and the high school percentile rank, credits carried and grade points earned; and second, the Social Class Intelligence factor which grouped the ACE-Q and L scores plus the educational level of the father and mother and the foreign-born parent variables.

McQuary's study is a comprehensive analysis of performance variables assumed to be related to academic achievement.¹ Since McQuary dealt with externally observed performance variables in contrast to variables theoretically built into test items and measured by subject response to these items as in this investigation, the two studies have limited comparability.

Although McQuary's study resulted in some interesting groupings of the variables used it is limited in several ways. His assumption that the variables used are related to scholastic achievement is unsubstantiated in certain cases. Perhaps other variables would have been equally or more appropriate. In addition, the sample used was restricted

¹Ibid.

by the data gathering procedures. To be included in the sample a student had to have used the Counseling Center and have complete data in his file concerning all 23 variables. This eliminated many students and produced a biased sample. Another limitation is the heterogeneity of the variables used. Labeling the common elements of a group of variables became a difficult task resulting in factor labels with vague meaning. For example, "Participating Urban Scholar" is a broad label that covers the variables in the factor but has little descriptive meaning.

Since the study was intended to measure non-intellective variables related to academic achievement its major limitation is that the only factor with a substantial correlation with G.P.A. contains all intellective variables such as aptitude test scores, credits earned, and high school percentile rank. The study does not contribute to a more definitive understanding of academic motivation.

Dimensions of Measures of Academic Motivation

Mitchell conducted a factor analytic study on a combination of various purported measures of achievement motivation.¹ His purpose was to investigate the question of whether achievement motivation was a single, invariable construct or whether it included a multiplicity of independent psychological dimensions. In the first phase of the study data was gathered on seven measures of achievement motivation and the A.C.E. all administered to a sample of 131 female college students

¹James V. Mitchell, Jr., "An Analysis of the Factorial Dimensions of the Achievement Motivation Construct," The Journal of Educational Psychology, LII, No. 4 (August, 1961), 179-87.

enrolled in his elementary educational psychology class at the University of Texas. These measures included the McClelland Test of Achievement Motivation; a sentence completion test, an adjective checklist containing achievement related items, an inventory-type test of achievement motivation with items taken from the MMPI, and a multiple choice questionnaire constructed by the investigator; the Taylor Manifest Anxiety Scale; and two level of aspiration measures. Scores on each measure were correlated with one another and with a criterion of achievement motivation, namely the discrepancy between G.P.A. and ACE scores.

In the second phase, the individual items (29 in number) of the achievement motivation measures were subjected to a centroid factor analysis and rotated to orthogonal simple structure by means of Kaiser's varimax technique. The six factors identified were labeled as follows: Academic Motivation and Efficiency (Mitchell says this is the only factor which is highly predictive of actual academic performance); Wish-Fulfillment Motivation; Non-academic Achievement Motivation; Self-Satisfaction; External Pressure To Achieve; and Imputed Generalized Motivation Without Attendant Effort.

Mitchell concludes that achievement motivation is not only multidimensional and complex, but that tests and test items vary widely in their ability to measure achievement motivation.

Although Mitchell's findings convincingly demonstrate that motivation is complex and multidimensional, they add little definitive information useful for further theory development. The study itself is not based on any theory pertaining to the substance of academic motivation thus the results have limited meaning. From an examination of the factor loadings, only factor I seems to have much significance, but it is too general to

be meaningful. The results are also limited by the low predictive validity of the measures of achievement motivation used. The factors identified have limited significance because of the lack of validity of the items upon which they are based. Again, little can be generalized from the results since the sample consisted of only 131 subjects of the same sex, in the same class and school. Mitchell's study does point out the need for further research in this area and underscores the need for such investigations to be based on objective measures that have a theoretical base and are validated on an adequate sample of under- and over-achieving subjects.

In another factor analytic study, Michael, Jones and Trembly analyzed a previously validated 34 item measure of academic motivation called the U.S.C. Inventory of Study Methods and Attitudes combined with a measure of verbal aptitude and a highly reliable achievement measure.¹ The two samples used consisted of 236 men and 131 women enrolled at the University of Southern California. From the principle axis solutions, orthogonal rotations were effected analytically by Kaiser's Varimax Method.

The factors identified for the females were: (1) general achievement drive; (2) freedom from neurotic orientation to study tasks; absence of neurotic behavior patterns; self-confidence; (3) basic study skills; (4) self-reliance and self-sufficiency; (5) collaboration (giving and receiving help); dependence - sociability orientation; succorance-

¹William B. Michael, R.A. Jones and W.A. Trembly, "The Factored Dimensions of a Measure of Motivation for College Students," Educational and Psychological Measurement, XIX (1959), 667-71.

nurturance; (6) verbal aptitude; (7) conformity to teacher expectation; (8) compulsive persistence; (9) systematic, methodical application; (10) efficiency in planning and studying; (11) positive affect intrinsic in the educational experience; (12) organizational perserverence. Male factors identified were female factors one through seven plus the following: (1) shyness, seclusiveness (with negativistic and withdrawal tendencies); (2) aversion to work (laziness); (3) procrastination accompanied by rationalization.

Several limitations of this study prevent it from significantly clarifying the motivation complex. The authors do not indicate the magnitude of the validity of the items in the motivation measure nor do they state the criterion used in validation. It appears that validation was not based upon under- and over-achieving students. In addition, the aptitude and achievement measures are not identified and no coefficient of reliability is given for the latter which is said to be "highly reliable." The samples further limit the conclusiveness of the study since they were confined to one class at one University.

An examination of the factors identified adds further doubt to the validity of the U.S.C. Inventory of Study Methods and Attitudes as a motivation measure. Although all the factors appear to be related to academic achievement, few of them suggest a motivational relationship. They more appropriately could be called a combination of personality traits, study methods and academic ability.

The Michael study again illustrates the need for dimensional studies to utilize valid measures of academic motivation as well as reliable criterion and an adequate sample.

Summary

The research literature contains a limited number of studies dealing with the dimensions of objective measures of academic motivation. Generally the findings indicate that motivation is a complex multidimensional phenomenon. Several situational and personality factors such as independence, conformity, goal orientation, etc. have been shown to have a relationship to academic motivation. The nature of these relationships is left undefined. The studies cited have limited meaningfulness since they lack a theoretical base from which the results can be interpreted. In addition, most of the studies lack well defined criteria, sufficiently large samples and validated measures of motivation. A more satisfactory approach would be to objectively define over- and underachievement by statistical means, develop an instrument to measure academic motivation validated on over- and under-achieving subjects as defined and then analyze the items in the instrument to identify the meaningful dimensions contained therein. Previous research lacks comprehensiveness since each study deals with a fragment of the motivation complex. The paucity and fragmentation of past research underscores the need for additional research which integrates the various elements related to motivation into a meaningful theoretical framework. The present study is designed to overcome: a) weakness in instrumentation by using a device which evidences validity and reliability, b) generalization from small samples by employing responses of 240 students, and c) inadequacies in number of assessment variables by using all 139 items on the M-Scales.

CHAPTER III

DESIGN AND METHODOLOGY

Within this chapter may be found: a) a brief review of the Farquhar sampling and instrument construction technique; b) a statement of the hypothesis of this study; and c) a description of the analysis procedures employed.

Review of the Farquhar Study

Quotations from publications describing the sampling and instrument construction techniques in the Farquhar study are cited as background to this investigation.

Sampling

Selection of under- and over-achieving students was accomplished by the use of the Two Stage Regression Model described by Farquhar. The population of the larger project consisted of 4,200 eleventh grade students from nine high schools in eight Michigan cities. On an a priori basis, schools were selected to represent the total range of socioeconomic environments. Individuals who varied more than 1 S.E.est. from the first to the second administration of two different aptitude measures were eliminated from the study to control for stability unreliability. Over-achievers were defined as falling at or above 1 S.E.est. relative to the linear regression of aptitude (Differential Aptitude Test, Verbal Reasoning sub-scale) on achievement (cumulative grade point average for academic subjects for 9th and 10th grades). Conversely, under-achievers were defined as falling 1 S.E.est. below the regression line. Regression equations were developed separately for each sex for each of the nine schools because of the lack of comparability in grading milieu.

Reliability of the achievement criterion (high school grades) was estimated to be $\neq 0.75$ for males and $\neq 0.80$ for females.

The total number of under- and over-achievers for each sex was randomly dichotomized to provide validation and cross-validation groups. Validation samples contained 95 male over- and 62 male under-achievers; and 95 female over- and 90 female under-achievers. Cross-validation samples contained 80 male over- and 69 male under-achievers; and 91 female over- and 87 female under-achievers. Equivalent number of individuals are not found in each category because of sample loss through poor test motivation, inability to follow directions, absenteeism, and attrition.¹

The analysis in this study was limited to a sample of 240 males selected as part of the Farquhar study.

Instrument Construction Techniques

Analysis Procedures.--The 2 x 2 chi square contingency table model was used for all item discrimination and questionnaire response analyses (over- and under-achiever's responses to either of the two alternatives). Those scales employing a four point rating scale (never, sometimes, usually, and always) were arbitrarily dichotomized between sometimes and usually. The level of significance for the chi square analysis was set at .20 for validation and .10 for cross-validation.

Multiple regression analyses were conducted to determine the effect of adding the motivation measures to aptitude in predicting grade point average. Finally, the valid sub-scales were factor analyzed. The purpose of factoring was to 1) empirically determine the homogeneity of the scale and 2) provide a psychologically meaningful interpretation of the item content groupings for retheorizing about the nature of academic motivation.

Reliability of the M-Scales.--Using a sample of 240, a Hoyt's analysis of variance reliability estimate of .94 for 139 male cross-validated items was obtained. A female sample of 240 yielded a comparable .93 reliability estimate on 136 cross-validated items. For the most part, the reliability estimates for the sub-scales and various defined groups of

¹William W. Farquhar and David A. Payne, "Factors in the Academic-Occupational Motivations of Eleventh Grade Under- and Over-Achievers," Personnel and Guidance Journal, XLII, No. 3 (Nov., 1963), 246-47.

achievers attain a satisfactory level ($r = .68$ to $.92$ for males and $.60$ to $.93$ for females).

Validity of the M-Scales.--Based upon a sample of 254 males and 261 females the validity estimates of the total M-Scales against grades was $.56$ and $.40$ respectively. The cross-validation estimates were $.49$ and $.48$ for males and females. The correlation of the sub-scales with the grade point criterion (GPA) follows the same pattern with the female correlations lower in magnitude than the males. The range was $.27$ to $.42$ for females and $.32$ to $.51$ for males.

The sub-scales correlate positively with each other indicating some measurement overlap. The range was from $.32$ to $.51$ for males and from $.32$ to $.53$ for females. The sub-scales findings for both sexes are comparable.

Multiple Correlation Estimation.--The multiple correlation based on the total M-Scales and DAT-VR estimates of grade point average was $.69$ and $.73$ for the male and $.64$ and $.63$ for the female validation and cross-validation samples.¹

The total M-Scales battery contains 139 male items.

Factor analyses have been conducted on the separate sub-scales.²

In the present study an attempt is made to analyze the total male battery in order to identify factors or traits that relate to academic motivation.

Hypothesis

Some of the assumptions underlying this study which were extended from the Farquhar investigation were cited in Chapter I. A further

¹Farquhar, Motivation Factors . . . , pp. 173-77.

²Farquhar has conducted a factor analysis of each sub-scale. Results of Farquhar's analysis is presented in Motivation Factors Related to Academic Achievement, p. 178.

assumption forced upon the data by the analysis technique was that all responses to the items have the same measurement indicant for all subjects in this study. It was assumed that when two or more subjects responded to a given item in the same way that they all meant the same thing.¹ In addition, it was assumed that the analysis technique grouped the items according to their relationship with one another. From this, it was hypothesized that psychologically meaningful and descriptive clusters which relate to academic motivation could be isolated and identified.

Statement of the Hypothesis

Psychologically meaningful and descriptive clusters which relate to academic motivation can be isolated and identified.

Elementary Linkage Analysis

The responses of the 240 male students to the 139 male items in the M-Scales were subjected to McQuitty's Elementary Linkage Analysis (ELA) procedure as programmed for the Control Data 3600 computer at Michigan State University.² The data was in the form of "1" and "0" responses with "1" being in the direction of high motivation.

ELA is a cluster method and was selected for the analysis on the basis of its simplicity and objectivity. It accomplishes the same basic task as factor analysis. McQuitty states that although ELA is applied to

¹Louis L. McQuitty, "Elementary Factor Analysis," Psychological Reports, IX (1961), 76.

²Louis L. McQuitty, "Elementary Linkage Analysis for Isolating Orthogonal and Oblique Types and Typal Relevancies," Educational and Psychological Measurement, XVII, No. 2 (Summer, 1957), 207-29.

a theory of psychological structure which is basically different from Thurstonian simple structure it ". . .sometimes yields results very similar to, or identical with, those of rotated factor-analytic solutions."¹ In fact, when correlation coefficients are used as the indices of association, results from ELA can be rotated to factor analysis simple structure.² As a cluster method ELA overcomes the weakness of similar methods of relying upon the experimenter to arbitrarily fix the lower limit of correlation coefficient acceptable for inclusion into a cluster. Since ELA requires that to be included in a cluster a variable must have a higher index of association with some other variable in the cluster than with any other variable in the matrix, the criteria for inclusion is set by the data exclusively.

McQuitty uses the terms "type" and "typal structure" in describing his technique. He defines a type as:

. . .a category of persons (or items) of such a nature that everyone in the category is in some way more like some other person in the category than he is like anyone not in the category. In terms of coefficients of correlations between persons, every person in a type would have a higher correlation with some other person in the type than he would with anyone not in the type.³

The psychological theory underlying typal structure as conceived by McQuitty applies to clusters of people. Although the procedure is equally as applicable for clustering items (as was done in this study) interpretation of items cannot be based on typal theory. As mentioned

¹Ibid., p. 207.

²Ibid., p. 212.

³McQuitty, "Elementary Linkage Analysis . . . ," 213.

above, grouping items or tests forces the assumption that all responses have the same measurement indicant for all subjects and therefore only an approximate solution can be achieved. By clustering people this difficulty is avoided and a pure solution is possible.¹ McQuitty suggests, therefore, that groups of items be called clusters rather than types.² Because this possible limitation is not unique to ELA but applies to all factor analytical studies in which items or tests are factored and because the interest in this study and the data available pertained to items rather than people the apparent risk in preciseness seemed to be warranted. To conduct a typical study of the people involved in this study, more information on the subjects would have been necessary. Such an endeavor could legitimately become a separate research study.

A minor potential limitation of ELA stems from the nature of the data used. The analysis used agreement scores, i.e., all 240 subjects were compared with one another with respect to their responses to each of the 139 items. The data, therefore, was unordered in the sense that the subjects were not ranked on a continuum of scores. The potential limitation was that of unreliability of the responses since responses to individual items are known to be less reliable when considered in isolation than when compared on the basis of their standing in a rank or profile.³ However, McQuitty states that:

¹McQuitty, "Elementary Factor Analysis . . . ," 76.

²Personal conversation with Dr. Louis L. McQuitty, June 25, 1965, Michigan State University, East Lansing, Michigan.

³McQuitty, "Elementary Linkage Analysis . . . ," 14.

. . .even though responses to individual items may be in general unreliable, they may nevertheless have "differential reliabilities" across people, i.e., a particular response though generally unreliable may be highly reliable for the members of a particular type of persons; all members of this type may give this response invariably, even though other individuals fluctuate with respect to it.¹

This limitation was, therefore, not considered to be serious.

Another limitation was that the reliability of the clusters identified by the Elementary Linkage Analysis procedure has not been established. However, on the basis of related studies conducted by McQuitty, he suggests that ELA, when applied to matrices of more than 100 subjects will yield respectable reliabilities and validities.²

Analysis Procedures

ELA procedures are relatively straight forward. Using the agreement scores for each item (which is simply the number of subjects who responded in the same fashion to that item) as the index of association, the first step is the identification of the highest reciprocal pair, i.e., the two items in the entire matrix which have the highest agreement of subject response. These two items form the core of the first cluster. The next step is to identify additional items which have their highest index of association with either of the two reciprocals and include them in the cluster. Then the closest associates are identified for these items, and so on until all items are included in the cluster that have a

¹Ibid.

²Ibid., p. 223.

higher association with some other item in the cluster than any item not in the cluster. After cluster one has been completed the next highest reciprocal pair is identified as well as the highest associates in order to form cluster two. This process is repeated until all items in the matrix have been assigned to a cluster.

Reference Items

When the constituent items of each cluster have been identified it is then possible to identify the items which are most representative of their respective clusters. The representative items, referred to as "reference items," can be identified by two procedures.¹ The first method is accomplished by forming a sub-matrix of the indices of association (agreement scores) between the items for each cluster. Within each cluster the indices of association are summed in the column of each item so that the reference item can be identified by finding the item with the highest sum of associations. The second, third, fourth, etc., most representative items can also be identified in the same way. By definition the reference item is the item with the highest association of other items to it within its own cluster. McQuitty has demonstrated that when correlation coefficients are used as indices of association instead of agreement scores the loading of the reference item obtained by the procedure described above compares favorably with the first factor solution.² The second procedure involves computing the average association each item in a cluster has with both members of the reciprocal

¹McQuitty refers to reference items as "reference factors."
"Elementary Factor Analysis," p. 74.

²Ibid.

pair.¹ Identification begins with the third highest reference item because the two members of the reciprocal pair are the first and second reference items. The latter procedure is preferable since it gives a more accurate indication of which items are most closely associated with the core of the cluster. In this investigation computations were made according to both procedures and the results compared. The comparison is discussed in Chapter IV. In deciding which items would be designated as reference items it was arbitrarily decided that not more than five reference items would be selected in each cluster. Only the reciprocals were selected in the smaller clusters. In the smaller clusters, those items whose indices of association were of a similar magnitude were selected. An important consideration applicable to both methods is that as purely statistical procedures they may not always concur with subjective or clinical judgment in identifying reference items. The proximity of the statistical and subjective judgments was noted in this study and is discussed in Chapter IV.

When the clusters and their respective reference items have been identified it is then possible to describe a prototype for the items in each cluster by examining the content of all the items, especially the reference items. Theoretically, the elements or characteristics they hold in common could then be meaningfully described which was the intention of the study. It has been hypothesized that an examination of the clusters will yield psychologically meaningful descriptions of traits having some relationship to academic motivation.

¹This procedure was suggested by Dr. Louis L. McQuitty in a personal conversation July 8, 1965 at Michigan State University, East Lansing, Michigan.

Elaborations of Elementary Linkage Analysis

Once the clusters are identified, two elaborations of ELA make it possible to investigate the relationship between the clusters. The first is called the Hierarchical Method.¹ The reference items from the clusters (one from each cluster having the highest column sum) are entered into a sub-matrix using the indices of association between them which were obtained from the original matrix. These items then are grouped into second-order clusters by the same procedure that the first-order clusters were formed. If more than one second-order cluster results the reference items of these clusters can be entered into a sub-matrix to identify third-order clusters. This procedure can be continued until one cluster remains which, theoretically, best represents the entire matrix.

A second method, the Comprehensive Hierarchical Approach provides additional comprehensiveness and refinement.² Entire clusters can be compared with one another by pairing every cluster with every other cluster. The items of one cluster are entered into a sub-matrix along the top and the items from the other cluster along the side. The index of association between two clusters becomes the mean of all the indices in their sub-matrix. As an alternative to this extensive procedure one can, instead of using all the items, select some limited number of items that appear to be most representative of their clusters. This limited approach was used in this study because it was assumed that the most

¹Louis L. McQuitty, "Capabilities and Improvements of Linkage Analysis as a Clustering Method," Educational and Psychological Measurement, XXIV, No. 3 (Fall, 1964), 446.

²Ibid., p. 447.

representative items would provide more meaningful results. The analysis yielded some implications regarding the tenability of this assumption which are discussed in Chapter IV.

Because it was of interest in this investigation to know the relationship between the reference items as well as the relationship between the clusters as a whole both the Hierarchical Method and the Comprehensive Hierarchical Approach were employed in the data analysis.

As a further extension of the analysis, the internal consistency of the clusters was determined by comparing the mean association of items within a cluster with their mean association with items in other clusters.¹ The magnitude of a given cluster's internal consistency is expressed by the extent to which the mean of its within cluster item associations is greater than its association with any other cluster. The within cluster mean of item associations is computed by dividing the sum of the agreement scores by the number of associations in each cluster sub-matrix. The associations between entire clusters is determined by the procedures outlined in the Comprehensive Hierarchical Approach. It is possible for the items in one cluster to have a higher association with another cluster than they have among themselves. Such clusters have relatively low internal consistency. Because the computation of the inter cluster associations in this study (in the Comprehensive Hierarchical Approach) was based on a few selected "most representative" (those that have the highest agreement with the reciprocal pair and with one another) items

¹This procedure was suggested by Dr. Louis L. McQuitty in a personal conversation July 8, 1965 at Michigan State University, East Lansing, Michigan.

from each cluster, the criteria for internal consistency was high. If the "most representative" items in a cluster were more consistent (had a higher mean index of association) with another cluster than among themselves it was unlikely that all the items together would be more consistent (i.e., exceed the inter cluster association).

Knowledge of cluster internal consistency was of particular importance in interpreting clusters identified by the linkage analysis. By definition, an item must have its closest association with only one other item to be included in a cluster. The association with the other items in the cluster is through their "linkage." It is possible although not probable for two items having a distant "linkage" in a cluster to be unlike in content. Interpretation, therefore, had to take into account not only which items were related but how closely they were related.

Summary

Data gathered in the Farquhar project relative to the responses of 240 male eleventh grade high school subjects to the 139 male items in the M-Scales was used in this investigation. Factor analyses have been conducted on the separate sub-scales, therefore, it was the goal of this project to analyze the M-Scales in their entirety. It was hypothesized that psychologically meaningful and descriptive clusters could be isolated and identified. The Elementary Linkage Analysis procedure was selected for data analyzation because of its simplicity and objectivity. A cluster as identified by ELA is defined as a structure in which every item is more like some other item in that cluster than any item in any other cluster. The clusters were described in terms of the characteristics

relative to academic motivation held in common by their constituent items. Reference items which best represented each cluster were identified adding to the interpretability of the clusters.

Two elaborations of ELA, the Hierarchical Method and the Comprehensive Hierarchical Approach, each yielded two interpretable second-order clusters. In addition, information regarding the relationship between the reference items of each cluster as well as the relationship between the clusters was obtained. Using information from these two elaborations an indication of the internal consistency of the clusters was determined which facilitated more meaningful cluster interpretation.

CHAPTER IV

ANALYSIS OF RESULTS

In this chapter the clusters resulting from the analysis will be interpreted and discussed. The descriptive labels given to the clusters represent a subjective interpretation of the item content. Judgments of this nature are susceptible to various interpretations depending upon the meaning the items convey to the particular researcher concerned. Therefore, the results of this study must be interpreted with the subjective element in mind.

It is assumed that academic motivation is a continuum and that in reality most people fall somewhere in the middle zone between high and low motivation. However, the clusters are characterized as describing either high or low motivation with no attempt to describe the dimensions between these two extremes.

The discussion of each cluster will include the following:

1. The number of items in the cluster.
2. Item distribution from the four sub-scales.
3. Reference items.
4. Internal consistency.¹
5. Cluster label.

¹Data regarding the internal consistency of the clusters is presented in Appendix A.

6. Cluster description.

7. Comparison with results from factor analyses in the Farquhar project,

The description of the individual clusters is followed by a separate discussion of the second order solutions resulting from the Comprehensive Hierarchical Approach.

The hypothesis formulated as a basis for analysis was that psychologically meaningful and descriptive clusters which relate to academic motivation can be isolated and identified.

The distribution of items from the sub-scales in each cluster is shown in Table 4.1. The analysis yielded a total of fourteen clusters.

TABLE 4.1
NUMBER OF ITEMS FROM EACH SUB-SCALE IN
EACH OF THE FOURTEEN CLUSTERS

Cluster	H.T.I.	G.S.C.I.	P.J.C.S.	W.R.L.	Total
I	4	0	0	0	4
II	12	8	0	2	22
III	1	2	0	0	3
IV	●	2	0	0	2
V	●	5	0	0	5
VI	●	6	0	0	6
VII	6	5	12	4	27
VIII	1	1	7	0	9
IX	●	0	0	3	3
X	1	0	0	12	13
XI	1	0	0	13	14
XII	●	0	0	4	4
XIII	●	15	1	3	19
XIV	1	0	0	7	8
				Total	139

Clusters II, VII, and XIII had the greatest number of items, 22, 27, and 19 respectively, totaling almost half of the 139 male items in the entire battery. Items were drawn from more than one sub-scale in eight of the clusters. Clusters II, VII and XIII pulled items more frequently from all four sub-scales than any of the other clusters, thus achieving the highest degree of sub-scale integration. None of the other clusters contained more than two items from a second sub-scale.

The Elementary Linkage Analysis (ELA) technique arranged the items into clusters indicating the linkage or relationship of the items to one another and to the reciprocal pair in each cluster. An interpretation and discussion of the clusters follows. A graphic presentation showing the item associations and linkage patterns within each cluster may be found in Appendix B.

Interpretation and Discussion of the Clusters

Because of the nature in which the items were structured they presented, when grouped into clusters, varying descriptions of motivation. Some of the clusters characterized low motivation, others high motivation and others polar traits, i.e., traits whose possession are associated with extremes in achievement. Because some traits have a positive influence on achievement, their absence results in underachievement. Conversely, other traits inhibit achievement while their absence facilitates it.

Cluster I: Item content (four items) and indices of association for Cluster I are shown in Table 4.2. Items 12 and 4 formed the reciprocal pair and were designated as the reference items. Cluster I was found to be internally consistent when the association of the reciprocal items

TABLE 4.2

ITEM CONTENT AND INDICES OF ASSOCIATION FOR CLUSTER I.

Item Number and Content ^a	Index of Association ^b
4. It is difficult for me to keep interested in most of my school subjects.	181
9. I find it difficult to find the time to study my assignment for the next day.	164
12. Even when I do sit down to study I find that my mind tends to wander.	181
13. I have to be in the mood before I can study.	171

LEGEND (TABLES 4.2 through 4.15):

^aEach item has its highest agreement with the item under which it is indented. For example, in Cluster I, item 12 has its highest agreement with item 4, since they are the reciprocal pair. Item 9 associates highest with item 4, and item 13 is highest with item 12. Appendix B contains a graphic illustration of this arrangement in each cluster.

^bThe maximum agreement possible between two items is 240, i.e., the total number of subjects in the sample.

was compared with the cluster's highest mean intercluster association, but not when the mean association of all the items was used. Thus, items 9 and 13 did not contribute substantially to the central meaning of the cluster because they had relatively low indices of association with the reciprocal pair.

Cluster I was labeled Distractible because it characterizes a lowly motivated student who finds it difficult to concentrate on his studies and is easily diverted from academic pursuits. Item 4 indicates a lack of interest in school work and because item 9, which is associated with item 4, expresses a lack of time for studying, "interest" in non-academic matters appears to contribute to distraction from academics.

Item 12 had the highest column sum of associations and best expresses the idea of "distractability."

Cluster I is similar to Factor I, "Agitation," of the Human Trait Inventory (HTI) reported in the Farquhar Report. Factor I which contained many of the same items as Cluster I was described as "low motivation related to excitation, distractibility, and escapism."¹

Cluster II: Item content (twenty-two items) and indices of association for Cluster II are presented in Table 4.3. The items clustered heaviest on reciprocal item number 17. The cluster integrated items from three sub-scales (Human Trait Inventory, Generalized Situational Choice Inventory, and Word Rating List). The selected representative items in Cluster II indicate internal consistency but not the total cluster of items. As in Cluster I, the implication is that some of the items contribute little to the meaning of the cluster.

Cluster II describes a lowly motivated student and is labeled Irresponsible. The type of person described lacks an internalization of accepted behavior norms. He dislikes conforming to expectations set by others. At the same time, he desires significant achievement through non-conventional and non-academic means. Item 11 and its reciprocal, item 17, both involve socially unacceptable and irresponsible behavior, i.e., stealing and skipping school.

Items 55, 62, 46, and 2, all associated with item 11, convey the idea of independence, so that taken together these items present a

¹Farquhar, Motivation Factors . . . , p. 147.

TABLE 4.3

ITEM CONTENT AND INDICES OF ASSOCIATION FOR CLUSTER II.

Item Number and Content	Index of Association
11. When I was a youngster I stole things.	219
55. I would prefer to: (a) do what I think is right, or (b) do what others think is right.	205
62. I would prefer to: (a) carry out the plans of others, or (b) create something of my own.	197
46. I would prefer to: (a) work rapidly just "skimming along," or (b) work slowly with great thoroughness.	190
2. I have been quite independent and free from family rule.	178
17. I have played hooky from school.	219
23. I feel that I haven't any goals or purpose in life.	211
20. I work under a great deal of tension.	199
10. I have done something that is considered dangerous just for the thrill of it.	176
27. I would prefer to: (a) avoid failing in school, or (b) do well in school.	209
14. I like to make the best grades possible.	196
22. I get disgusted with myself if I don't do as well as I should.	169
35. I would prefer to: (a) be successful in finishing a job, or (b) finish a job.	195
51. I would prefer to: (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".	205
19. I want very much to be a success.	205
3. When I have an opinion, I stand up for it.	177
1. I worry about my grades.	171

Table 4.3 - Continued

Item Number and Content	Index of Association
38. I would prefer to: (a) make quick decisions and sometimes be right and sometimes wrong, or (b) deliberate over decisions and usually be right.	199
135. Teachers feel that I am passive.	196
132. Teachers feel that I am inconsistent.	194
71. I would prefer to: (a) have one of my children win a beauty contest, or (b) have one of my children win a college scholarship.	195
5. I have difficulty working under strict rules and regulations.	192

picture of rejection of socially acceptable behavior and authoritarian control. Item 13 expresses a lack of goals and life purpose.

Items associated with number 23 indicate concern and anxiety over achievement (20, 3, 1, 22) along with the concept of competing with a maximum versus a minimum standard of excellence in school (27, 35, 51). At the same time, items 10, 19 and 71 indicate a desire for personal significance. The characterization given is one of ambivalence and inconsistency which is supported by the self-perception indicated by this type of student in items 135 and 132.

In Cluster II is found an interesting integration of the concepts of irresponsibility, non-conformity, rejection of authority, goal ambivalence, competition with maximum versus minimum standards, and desire for unique or significant personal experiences. These concepts are expressed in the five highest reference items, 17, 11, 23, 27 and 51 (in that order). It could be speculated that the irresponsible student who rebels against authoritarian expectations has few long-term goals, thus he has no maximum standards for which he competes. Instead he gains significance through immediate, non-academic behavior. This non-conformity and ambivalence is accompanied by anxiety (item 2).

Based on the column sum of associations of its representative items used in the "Comprehensive" computation, Cluster II is the third most representative cluster of the entire male battery of M-Scales.

Although Cluster II does not correspond identically to any one factor cited in the Farquhar study, it does incorporate the concepts expressed in six of the Farquhar factors.¹ The two items from the Word

¹Ibid., pp. 138-57.

Rating List loaded on Farquhar's Factor II, "Educationally Resistive," which was interpreted by Farquhar to indicate that "the student sees himself through the teacher's eyes as resisting involvement with educational tasks, either actively or passively." Three factors of the Human Trait Inventory included some of the same items and expressed concepts similar to Cluster II: Factor IV, "Purposelessness--low motivation is related to lack of feeling of direction with concomitant feelings of anxiety"; Factor V, "Success Drive--high motivation for success is based on attempt to prove self as a defense against family interference"; and Factor VI, "Normlessness--low motivation is related to hostility towards social standards. Contains overtones of psychopathic characteristics." Cluster II also has similarities with two factors from the General Situational Choice Inventory: Factor I, "Unique Versus Common Accomplishment--the high motivated male chooses responses descriptive of unusual tasks for the typical male, the low motivated male chooses to do what most of his classmates will do"; and Factor III, "Competition With Versus Ease of Meeting a Standard--the high motivated male chooses responses describing a standard as personal challenge, the low motivated male chooses the responses which require the least effort." The concepts expressed in Cluster II logically relate to the factor descriptions from the Farquhar study.

Cluster III: Item content (three items) and indices of association for Cluster III are presented in Table 4.4. There is little sub-scale overlap with item 15 being from the Human Trait Inventory and items 65 and 49 from the General Situational Choice Inventory. Cluster III was internally consistent by both methods of computation used. The high internal consistency was a result of a low index of association with other clusters.

TABLE 4.4

ITEM CONTENT AND INDICES OF ASSOCIATION FOR CLUSTER III.

Item Number and Content	Index of Association
15. I like to study	163
65. I would prefer to: (a) be known as a person who knows his own mind, or (b) be known as a person who gets help in making decisions.	163
49. I would prefer to: (a) have average ability and be liked by many people, or (b) have superior ability but not be liked by as many people.	154

Cluster III was labeled Need Achiever. Item content indicates that the type of person characterized possesses need achievement to the exclusion of need affiliation. He is inclined toward academic interests rather than interpersonal interests. Both items 65 and 49 express the feeling of independence from other people and a desire for self-achievement. The type of person described is highly motivated academically.

Cluster III has no correlate factor in the Farquhar study indicating that this cluster describes an independent concept missed by the factor analysis. In fact, the legitimacy of Cluster III as a valid, meaningful cluster is questionable because of its small number of items, its rank as the least representative cluster in the total matrix, and the fact that two of the items (65 and 49) did not meet the criteria for inclusion into a factor in the Farquhar study.¹ As a result, its contribution to the basic conceptual patterns composing the M-Scales is limited.

¹Ibid., pp. 149-51.

Cluster IV: The item content and indices of association for Cluster IV are presented in Table 4.5. Cluster IV contains two items, both from the General Situational Choice Inventory, which are practically identical in content. It is internally consistent by virtue of being composed of just the reciprocal pair.

Cluster IV was labeled Competition Versus Ease of Meeting a Standard. Both items indicate a contrast between the type of student who seeks maximum accomplishment and the student who wants to fulfill only minimum requirements. The idea of risk taking is also involved in both items. A polarized concept is characterized in which the highly motivated student competes for maximum achievement and the lowly motivated student avoids competition and settles for achieving a minimum standard.

TABLE 4.5

ITEM CONTENT AND INDICES OF ASSOCIATION FOR CLUSTER IV.

Item Number and Content	Index of Association
32. I would prefer to: (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.	197
50. I would prefer to: (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.	197

Both items in Cluster IV loaded on Factor I of the General Situational Choice Inventory, "Unique Versus Common Accomplishment," cited above in the Farquhar study.¹

Cluster V: The item content and indices of association are summarized in Table 4.6. Five items were associated in Cluster V, all from the General Situational Choice Inventory. Based on the reciprocal items Cluster V was internally consistent but not when all items were used.

Cluster V was labeled Intellectual Versus Material Accomplishment. Cluster V is a polar dimension which attributes high motivation as having a different goal direction than low motivation. The highly motivated student is interested in intellectual achievement in school and the lowly motivated student is interested in material or, at least, non-academic accomplishment. Both of the reciprocal items (70 and 54) express the basic dimensional concepts. In addition, item 33, as well as items 54 and 70, suggest that a desire to be innovative or creative also contributes to high motivation.

The significance of Cluster V to the interpretation of the dimensions of the M-Scales is limited by its lack of dimensional representation as indicated by a rank of thirteen among the cluster mean indices of association.

Although this cluster is not comparable to any factor in the Farquhar study, it shares some of the same items as Factor II, "Immediate Versus Long-Term Gratification--The highly motivated male chooses responses describing delayed reward, the lowly motivated male chooses the immediate rewards."²

¹Ibid., p. 157.

²Ibid.

TABLE 4.6

ITEM CONTENT AND INDICES OF ASSOCIATION FOR CLUSTER V.

Item Number and Content	Index of Association
54. I would prefer to: (a) think of an idea that nobody has ever thought of, or (b) set a world's speed record.	158
70. I would prefer to: (a) discover a gold mine, or (b) discover a new medicine.	158
48. I would prefer to: (a) have a great deal of money, or (b) be an expert in my favorite school subject.	156
39. I would prefer to: (a) be allowed to take extra courses before or after school, or (b) just take courses offered during the school day.	145
33. I would prefer to: (a) develop a <u>new</u> product which may or may not be good, or (b) make a product as good as the best one available.	141

Cluster VI: Item content and indices of association for Cluster VI are summarized in Table 4.7. Six items, all from the General Situational Choice Inventory, are associated in Cluster VI. Items 58 and 60 formed the reciprocal pair. Internal consistency was evidenced when computation was based on the reciprocal items but not when all of the items were used.

Cluster VI was labeled Immediate Versus Long-Term Involvement.

Cluster VI polarizes motivation by distinguishing between students who are able to defer immediate satisfactions to obtain future, more

important accomplishments against those who prefer immediate gratification. The contrast in temporal orientation takes the form of academic versus non-academic interests. The two reciprocal items illustrate this: number 58 relates to a non-academic situation and number 60 to an academic situation. The student who is not able to set long-term goals for himself is less likely to see the value of an education.

Cluster VI corresponds to Factor II of the Farquhar study cited above "Immediate Versus Long-Term Gratification."¹

TABLE 4.7

ITEM CONTENT AND INDICES OF ASSOCIATION FOR CLUSTER VI.

Item Number and Content	Index of Association
58. I would prefer to: (a) wait ten years and receive fame throughout the nation, or (b) receive fame in my community overnight.	197
56. I would prefer to: (a) work overtime to make more money, or (b) get more schooling to make more money.	190
31. I would prefer to: (a) be well prepared for a job after graduation from high school, or (b) be well prepared to continue learning.	178
60. I would prefer to: (a) study to go to college, or (b) study to get out of high school.	197
30. I would prefer to: (a) buy a car, or (b) continue my education.	193
67. I would prefer to: (a) put together a new object, or (b) develop new ideas.	147

¹Ibid.

Cluster VII: Item content and indices of association for Cluster VII are summarized in Table 4.8. Cluster VII contains twenty-seven items drawn from all of the sub-scales with the Preferred Job Characteristics Scale most heavily represented with thirteen items. All of the items are associated with item 86 of the reciprocal pair. On the basis of its column sum of associations item 86 is the most representative item in the entire male battery of M-Scales. Selection of the second, third and fourth most representative items (90, 87 and 79 respectively) in Cluster VII illustrated the advantage of basing reference item selection on the mean association items have with the reciprocal pair over using the sum of the column associations. An example is item 7 (ranked 6th) which, when computed by the sum of associations procedure was ranked second, even above item 90, one of the reciprocals. Item 7 is not highly representative of the basic conceptual emphasis in Cluster VII.

The substantial integration of items from the sub-scales in Cluster VII suggests along with Cluster II that the sub-scales overlap in the dimensions they measure. Cluster VII ranked as the second most representative cluster in the total male battery of M-Scales.

Cluster VII was labeled Occupational Responsibility: High Versus Low. The four items selected as the most representative of the Cluster (86, 90, 79 and 87) all express the concept of high versus low occupational responsibility. The types of students contrasted are those who see a job as requiring personal involvement, competence and leadership as against lowly motivated students who desire work that requires the least amount of responsibility. Presumably both types view their school work in the same manner. Along with the idea of responsibility is the element of ambition for (versus a lack of) unique, creative or significant accomplishment as evidenced in items 61, 66, 69, and 47.

TABLE 4.8

ITEM CONTENT AND INDICES OF ASSOCIATION FOR CLUSTER VII.

Item Number and Content	Index of Association
90. I would prefer: (a) a job where my opinion is valued, or (b) a job where I make few if any decisions.	216
86. I prefer: (a) a job which requires little thinking, or (b) a job where my opinion is valued.	216
87. I prefer: (a) a job where I make few if any decisions, or (b) a job where I could become known for outstanding accomplishments.	213
7. Most of my school subjects are a complete waste of time.	212
25. I like to go to the movies more than once a week.	205
8. Most of my school subjects are useful.	201
16. I like to plan very carefully what courses I will take in school.	176
119. Teachers feel that I am lazy.	201
117. Teachers feel that I am a person who postpones.	195
61. I would prefer to: (a) have a great deal of influence over people, or (b) have a great deal of ambition.	164
66. I would prefer to: (a) do something like everyone else, or (b) do something outstanding.	199
69. I would prefer to: (a) do something that I have done before, or (b) do something that I have never done before.	194
47. I would prefer to: (a) have a better job than my father has, or (b) have a job like my father has.	183

Table 4.8 - Continued

Item Number and Content	Index of Association
79. I prefer: (a) a job where I could decide how the work is to be done, or (b) a job where I make few if any decisions.	211
82. I prefer: (a) a job where I make few if any decisions, or (b) a job where I solve problems no one else can.	211
37. I would prefer to: (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 along with everyone else.	190
78. I prefer: (a) a job which requires little thinking, or (b) a job where I solve problems no one else can.	210
75. I prefer: (a) a job where my opinion is valued, or (b) a job where I could not be fired.	210
88. I prefer: (a) a job where I could not be fired, or (b) a job where I could decide how the work is to be done.	201
81. I prefer: (a) a job where I could not be fired, or (b) a job which absorbs my interests.	200
83. I prefer: (a) a job where I could become known for outstanding accomplishments, or (b) a job which requires little thinking.	208
94. Teachers feel that I am inefficient.	207
104. Teachers feel that I am uninterested.	203
64. I would prefer to: (a) be very happy, or (b) have lots of money.	178
76. I prefer: (a) a job which does not tie me down, or (b) a job which absorbs my interests.	198
80. I prefer: (a) a job which does not tie me down, or (b) a job where I could continue to learn the rest of my life.	196
26. I would like to belong to a motorcycle club.	175

As expected from the fact that Cluster VII contained the greatest variety of items from the sub-scales, it also incorporated several of the concepts expressed in factors identified in the Farquhar study.

They are as follows:

G.S.C.I. Factor I: "Unique Versus Common Accomplishment"¹

W.R.L. Factor II: "Educational Resistive"²

H.T.I. Factor III: "Academic Negativism"³

P.J.C.S. Factor I: "High Versus Low Job Involvement"

Factor II: "Long-Term Versus Short-Term Job Involvement"⁴

Cluster VIII: Item content and indices of association for Cluster VIII are presented in Table 4.9. Nine items composed Cluster VIII with all but two of these items coming from the Preferred Job Characteristics Scale. Items 91 and 89 formed the reciprocal pair. The cluster was internally consistent based on selected items but not when all its items were computed.

Cluster VIII was labeled Occupational Self-Development: High Versus Low. It characterizes the highly motivated male who sees a job as a means of personal and professional self-development versus the lowly motivated male who presumably views work as merely a necessity for earning a living. There is also an element of unique, creative accomplishment or competition versus common achievement relative to occupational involvement expressed primarily in items 85, 77, 74 and 72.

¹Farquhar, Motivation Factors . . . , p. 157.

²Ibid., p. 138.

³Ibid., p. 147.

⁴Ibid., p. 168.

TABLE 4.9

ITEM CONTENT AND INDICES OF ASSOCIATION FOR CLUSTER VIII.

Item Number and Content	Index of Association
89. I prefer: (a) a job which does not require a college education, or (b) a job where I could continue to learn the rest of my life.	215
85. I prefer: (a) a job with short working hours, or (b) a job where I solve problems no one else can.	192
91. I prefer: (a) a job which does not require a college education, or (b) a job where I could express my ideas, talents, and skills.	215
77. I prefer: (a) a job where I could become known for outstanding accomplishments, or (b) a job which does not require a college education.	211
74. I prefer: (a) a job where I solve problems no one else can, or (b) a job which does not require a college education.	195
73. I prefer: (a) a job which does not require a college education, or (b) a job where I could decide how the work is to be done.	194
72. I prefer: (a) a job where I solve problems no one else can, or (b) a job which permits me to take days off when I want.	169
41. I would prefer to: (a) do as well as most of my classmates, or (b) do better than most of my classmates.	185
21. I have trouble waiting for a class to be over.	177

Five of the eight items contain the alternative response, "A job which does not require a college education." The lowly motivated student described by these items may be expressing a disinterest in going to college more than a lack of interest in occupational self-development. In this sense, the cluster may be mostly an expression of pure intellectual versus non-intellectual interest.

Statistically, Cluster VIII best represents the basic dimensions measured by the male items of the M-Scales as indicated by the extent to which other clusters associated to it.

Elements of all three Preferred Job Characteristics Scale factors in the Farquhar study were evident in Cluster VIII with Factor III, "Unique Accomplishment Versus Avoidance of Education," being most comparable.¹

Cluster IX: Item content and indices of association for Cluster IX are summarized in Table 4.10. Three items, all from the Word Rating List, are associated in Cluster IX. Items 101 and 94 were reciprocal. Internal consistency was evident in the reciprocal items but not in the computation using all of the items.

TABLE 4.10

ITEM CONTENT AND INDICES OF ASSOCIATION FOR CLUSTER IX.

Item Number and Content	Index of Association
101. Teachers feel that I am thorough.	176
114. Teachers feel that I am systematic.	162
97. Teachers feel that I am logical.	176

¹Ibid., p. 168.

Cluster IX was labeled Compulsivity. It characterizes the male who perceives himself through his teachers' eyes as being well organized, disciplined and systematic. He is typically a highly motivated student. His achievement possibly is more a result of his organization and effort than his intelligence. It suggests that some academic motivation is neurotically produced and is, therefore, undesirable.

Although this cluster is not directly analogous to any of Farquhar's factors three of the same items loaded on Factor I of the Word Rating List, "Academician." The student described by the Farquhar factor "...sees himself through the teachers' eyes as effective, bright, orderly, goal oriented and amenable to learning."¹

Cluster X: Item content and indices of association for Cluster X are presented in Table 4.11. Cluster X contains thirteen items with all but one coming from the Word Rating List. Items 98 and 124 were reciprocal and item 99 was also selected as a reference item. The discrepancy between the results obtained by the two procedures used for selecting reference items is illustrated again in Cluster X in most of the items. Cluster X showed high internal consistency because it was consistent by both computations used.

Cluster X was labeled Self-Perceived Competence. The type of student described perceives himself through his teachers' eyes as having a high degree of academic ability. He possesses a general positive academic self-image and high motivation.

Cluster X ranks twelfth regarding its representativeness of the central dimension of the male M-Scales.

¹Ibid., p. 138.

TABLE 4.11

ITEM CONTENT AND INDICES OF ASSOCIATION FOR CLUSTER X.

Item Number and Content	Index of Association
98. Teachers feel that I am smart.	175
93. Teachers feel that I am talented.	174
99. Teachers feel that I am successful.	173
131. Teachers feel that I am competent.	166
130. Teachers feel that I am a planner.	164
122. Teachers feel that I am intellectual.	163
18. I plan my activities in advance.	151
108. Teachers feel that I am original.	165
124. Teachers feel that I am above average.	175
125. Teachers feel that I am productive.	171
105. Teachers feel that I am studious.	170
111. Teachers feel that I am in-the-know.	164
118. Teachers feel that I am exacting.	160

Eleven of the thirteen items appear in Word Rating List Factor I, "Academician," in the Farquhar study.¹

Cluster XI: Item content and indices of association for Cluster XI are presented in Table 4.12. Cluster XI contains fourteen items with thirteen of them contributed by the Word Rating List. Items 107 and 138 formed the reciprocal pair with 138 being the most representative of the cluster. Items 116 and 123 were also selected as reference items. Internal consistency was evident when based upon the selected items but not when all items were used.

¹Ibid.

TABLE 4.12

ITEM CONTENT AND INDICES OF ASSOCIATION FOR CLUSTER XI.

Item Number and Content	Index of Association
107. Teachers feel that I am responsible.	189
116. Teachers feel that I am dependable.	186
102. Teachers feel that I am orderly.	176
109. Teachers feel that I am consistent.	170
100. Teachers feel that I am careful.	177
110. Teachers feel that I am intelligent.	171
128. Teachers feel that I am contented.	158
138. Teachers feel that I am reliable.	189
133. Teachers feel that I am teachable.	182
92. Teachers feel that I am patient.	168
139. Teachers feel that I am serious.	178
123. Teachers feel that I am alert.	176
95. Teachers feel that I am practical.	174
24. I like to be consistent in the things I do.	160

Cluster XI was labeled Self-Perceived Responsibleness. The student characterized here perceives himself as being sincere, dependable and hard working. He possesses high motivation.

Cluster XI ranked fifth in representativeness of the basic dimension of the M-Scales.

All of the Word Rating List items in Cluster XI loaded on Factor I, "Academician," in the Farquhar study.¹ Apparently this dimension contributes substantially to the meaning of Factor I.

¹Ibid., p. 134.

Cluster XII: Item content and indices of association for Cluster XII are presented in Table 4.13. Four items, all from the Word Rating List, contribute to Cluster XII. Items 127 and 136 were reciprocal. Internal consistency was indicated in both computations.

Cluster XII was labeled Self-Perceived Intellectual Ambition. The highly motivated male perceives himself to be actively aggressive and ambitious regarding academic studies. No doubt he possesses many of the characteristics found in Clusters X and XI since words like "thinker" and "efficient" are practically synonymous with words like "intelligent" (Cluster XI) and "productive" (Cluster X). The emphasis, however, is on the ambition.

Cluster XII ranks eleventh in statistical representativeness of the central male dimension of the M-Scales.

All of Cluster XII's items loaded heavily on Word Rating List Factor I, "Academician," in Farquhar's study.¹ In fact, items 129 and 126 had the first and third highest loadings respectively.

TABLE 4.13

ITEM CONTENT AND INDICES OF ASSOCIATION FOR CLUSTER XII.

Item Number and Content	Index of Association
127. Teachers feel that I am ambitious.	175
129. Teachers feel that I am an achiever.	169
126. Teachers feel that I am a thinker.	172
136. Teachers feel that I am efficient.	175

¹Ibid.

Cluster XIII: Item content and indices of association for Cluster XIII are summarized in Table 4.14. Nineteen items were associated in Cluster XIII, fifteen of which were contributed by the General Situational Choice Inventory. Cluster XIII was the only cluster to have items with tie linkages, namely, items 28 and 36. Another irregularity was the occurrence of two sets of reciprocal pairs (items 36 and 43 and items 68 and 64).¹ Internal consistency was evidenced in the computation using selected items but not when all items were used. The four reciprocals were selected as the reference items. Reciprocal items 68 and 84 were statistically more representative of the cluster dimensions than items 36 and 43 on the basis of their column sum of associations. Item 113 had a high linkage to reciprocal items 68 and 84 and, in fact, on this basis it was more representative than reciprocal items 36 and 43 since they had a lower linkage with items 68 and 84 than item 113. Item 113 again illustrates the discrepancy between the item rankings in the two procedures used to identify reference items; the column sum ranked item 113 ninth and the mean association with the reciprocals ranked it third.

Cluster XIII was labeled Need Achievement: High Versus Low. The achiever is characterized as placing high personal value on accomplishment and having a desire to excell. He is competitive and considers himself to be competent. He is self-disciplined, purposeful, and a hard worker. The male with low need achievement meets minimum standards. He

¹Cluster XIII could have been split into two separate clusters with a reciprocal pair in each one. The logical dividing points would have been between items 28 and 96 and between items 36 and 68 (See Appendix B). However, in light of the high linkage between items 36 and 68 it was decided to maintain the items as one cluster. This decision was influenced by a suggestion from Dr. Louis McQuitty in a personal conversation June 25, 1965.

TABLE 4.14

ITEM CONTENT AND INDICES OF ASSOCIATION FOR CLUSTER XIII.

Item Number and Content	Index of Association
68. I would prefer to: (a) be demanding on myself to do good work, or (b) be demanding on my friends so that they will do good work.	192
36. I would prefer to: (a) get excellent grades because I have a great deal of ability, or (b) get average grades because I have average ability.	187
29. I would prefer to: (a) have the best teachers in the state in my school, or (b) have a large recreation center in my school.	173
42. I would prefer to: (a) be considered as being strong but not very smart, or (b) be considered as being weak but smart.	163
34. I would prefer to: (a) receive money for my good grades, or (b) be allowed to take any course I wanted because of good grades.	156
57. I would prefer to: (a) inherit a great deal of money, or (b) earn a great deal of money.	153
40. I would prefer to: (a) complete a job which I recognize as difficult, or (b) complete a job which others recognize as difficult.	142
44. I would prefer to: (a) work at <u>many less important jobs</u> which I know I could finish, or (b) work at <u>one very important job</u> which may never be entirely finished in my lifetime.	141

Table 4.14 - Continued

Item Number and Content	Index of Association
28. I would prefer to: (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.	131
43. I would prefer to: (a) be known as a person with much ability, or (b) be known as a person with adequate ability.	187
113. Teachers feel that I am nervous.	183
96. Teachers feel that I am confident.	157
45. I would prefer to: (a) be paid for how well I did a job, or (b) be paid the same amount no matter how I did the job.	167
52. I would prefer to: (a) be paid for the <u>amount</u> of work I did, or (b) be paid by the hour.	147
84. I would prefer: (a) a job which has high work standards. (b) a job where I make few if any decisions.	192
53. I would prefer to: (a) study my assignments during study hall, or (b) wait to study until the mood strikes me.	175
59. I would prefer to: (a) plan my life in advance, or (b) live my life from day to day.	166
63. I would prefer to: (a) be known as being a "good guy" or a "good gal," or (b) be known as a person who "does things well."	152
103. Teachers feel that I am purposeful.	149

is less competitive and lacks the drive to obtain extraordinary accomplishment. Cluster XIII is distinguished from a similar cluster and its closest associate, Cluster VII. The latter emphasized an attitude toward work whereas Cluster XIII emphasizes obtaining a result, namely, accomplishment. Items 68 and 84, the reciprocals, give the impression that this type of person is demanding of himself but not necessarily of others. Cluster XIII was ranked as the sixth most representative cluster.

Cluster XIII does not have a counterpart factor in the Farquhar study.

Cluster XIV: Item content and indices of association for Cluster XIV are presented in Table 4.15. Eight items clustered into Cluster XIV with seven contributed by the Word Rating List. In addition to the reciprocals (items 115 and 120), items 112 and 134 were selected as being most representative of the cluster. Item 112 tied with 115 for the highest column sum. Because Cluster XIV was not internally consistent by either procedure used and is distinctly similar in content to Cluster II, it could be interpreted as part of Cluster II.

Cluster XIV was labeled Self Perceived Non-Conformity. Cluster XIV characterizes a lowly motivated student. He perceives himself through his teachers' eyes as being reckless, rebellious, different, distracted, carefree, stubborn and impatient. A question which cannot be answered here is whether the student actually perceives himself in the same way as he feels his teachers do.¹

¹The Word Rating List was constructed on the premise that "significant others" influence the development of one's self concept. It was further assumed that teachers were significant others and therefore a picture of a student's self concept could be observed in his impression of how he was perceived by his teachers. Payne, A Dimension Analysis . . . , p. 6.

TABLE 4.15

ITEM CONTENT AND INDICES OF ASSOCIATION FOR CLUSTER XIV.

Item Number and Content	Index of Association
115. Teachers feel that I am reckless.	199
112. Teachers feel that I am rebellious.	196
106. Teachers feel that I am different.	177
137. Teachers feel that I am easily distracted.	171
121. Teachers feel that I am carefree.	167
6. I flirt.	165
120. Teachers feel that I am stubborn..	199
134. Teachers feel that I am impatient.	188

Cluster XIV contains most of the same items as Farquhar's Factor II, "Educationally Resistive."¹

Cluster XIV was ranked as the eighth most representative cluster.

Discussion of Elaborations of E.L.A.

In addition to the results of the basic Elementary Linkage Analysis, concern in this study was extended to include a comparison of two procedures for selecting reference items and computation of second order solutions by means of the Hierarchical Method and the Comprehensive Hierarchical Approach.

Identification of Reference Items

A reference item has been defined as the item which is most representative of the dimensional core of its cluster. In the present

¹Farquhar, Motivation Factor . . . , p. 133.

investigation several reference items were identified in each cluster. Theoretically, the two most representative items in each cluster are the reciprocal pair. The representativeness of the other items was determined by their average agreement or index of association with the reciprocals. This procedure was preferable to selection based on the magnitude of their column sums of associations, because theoretically an item's linkage with the reciprocal pair is the best indication of its contribution to the dimensional core of its cluster.

It was found that these two procedures yield comparable results, although in certain clusters there are distinct discrepancies.¹ For example, in Cluster VII item 7 was ranked second on the basis of its column sum of associations but ranked sixth in its association with the reciprocals. Similarly, in Cluster VIII, item 77, which is not a member of the reciprocal pair, was ranked first on the basis of its column sum but ranked third in its relationship to the reciprocals.² Other less significant discrepant rankings resulted in addition to these cited.

It was mentioned in Chapter III that the same reference items, statistically identified, may not always be selected on a subjective basis. In every case subjective judgment in this investigation agreed with reference items selected on the basis of their association with the reciprocals. In fact, support for the preference of this procedure over

¹The comparative item rankings by these two procedures is presented in the cluster matrices in Appendix B.

²Cluster VIII was the only cluster in which a non-reciprocal was ranked first on the basis of column sums of association.

using column sums was illustrated in Cluster VII where the column sums method selected an item which did not directly contribute to description of the dimensional core. The item in point is item 7 which was ranked second by the column sums method but does not directly relate to the concept of "occupational responsibility."¹

Second Order Solutions

In both the Hierarchical and Comprehensive procedures the clusters were forced to associate into second order clusters. The procedures did not establish a cut-off point for determining when a cluster should not be linked to another cluster but instead described an independent dimension. Therefore, the magnitude a cluster's association and its internal consistency had to be considered in determining the meaning of the second order linkages. The internal consistency based on the selected most representative items of each cluster indicates that all of the clusters except XIV represent independent dimensions. The relationship of Cluster XIV to Cluster XIII described above accounts for Cluster XIV's lack of independence.

Six of the fourteen clusters associated differently in the two second order procedures. A comparison of the associations in the two procedures is presented in Table 4.16.

As stated in Chapter III it was assumed that using selected items that were most representative of their cluster dimension is a sounder procedure for associating clusters than using all of the items

¹Item 7 content is: "Most of my school subjects are a waste of time."

TABLE 4.16

COMPARATIVE SUMMARY OF THE CLUSTER LINKAGES IN THE
HIERARCHICAL METHOD AND THE COMPREHENSIVE HIERARCHICAL APPROACH

Cluster Number	Cluster Linkage in the Hierarchical Method	Cluster Linkage in the Comprehensive Hierarchical Method
I	VII	II
II	VII	VII
III	X	X
IV	IV	VI
V	VI	VI
VI	VIII	VIII
VII	II	II
VIII	VII	VII
IX	XI	XI
X	IX	XII
XI	XIII	IX
XII	XI	XI
XIII	II	VII
XIV	VII	II

in each cluster. The reason for this assumption was that in Elementary Linkage Analysis an item must have a close association with only one other item in the cluster to be included. Therefore, it is possible for those items most distantly linked to the reciprocals to be quite different from the reciprocals in content. The fact that only four of the clusters were internally consistent when all the items were used in the computation suggested that items distantly linked did not contribute substantially to their respective cluster dimensions. Therefore, the assumption made regarding the desirability of using selected items seemed to be justified.

Hierarchical Method--The item with the highest column sum of associations was selected from each cluster for the second order solution by this method.^{1,2} Since Cluster IV contained only a reciprocal pair both items were included as were items 112 and 115 in Cluster XIII since they had identical column sums. As a result, Cluster IV (reciprocal items 32 and 50) did not link to any other cluster nor did any cluster link to it. The implication from this is that this cluster is highly internally consistent and independent, having little relationship to the main dimensions measured in the male M-Scales.

Since the Comprehensive Hierarchical Approach was considered to be the more valid procedure no attempt was made to interpret the clusters formed by the Hierarchical Method.

Comprehensive Hierarchical Approach³--Nine clusters associated in second order Cluster A. Clusters II, VII and VIII had the closest associations and formed a three way reciprocal linkage. Based on its column sum, Cluster VIII was the most representative of the entire male M-Scales battery. Clusters II and VII also indicated high representativeness with column sums nearly as high as Cluster VIII. High indices occurred in the association of Cluster XIV with Cluster II (190) and Cluster XIII

¹The item content and indices of association along with the matrix and graphic description of the item associations resulting from the Hierarchical Method are presented in Appendix C.

²Since only one item was used, selection was based on column sums rather than associations to reciprocals. This facilitated deciding which reciprocal would be used.

³The item matrix, cluster matrix and a graphic illustration of the second order cluster linkages resulting from the Comprehensive Hierarchical Approach are presented in Appendix D.

with Cluster VII (189). Other associations were relatively low. Cluster I had a tie association with Clusters II and VII.

Second order Cluster A was labeled Responsibleness: High Versus Low. The concept was expressed in the two reciprocal clusters (II and VII). The relationship of responsibility to achievement is also suggested in the high association of Cluster XIII, "Need Achievement" with Cluster VII, "Occupational Responsibility." The achiever is characterized as being responsible, having long-range goals, preferring intellectual over material accomplishment, and viewing education and work as instruments of self-development and self-esteem. He is also a conformist. The linkage of Clusters II, "Irresponsible," and XIV, "Self-Perceived Non-Conformity," indicates a relationship between conformity and responsibility. The achiever is also competitive and the association of Cluster IV, "Competition....," with Cluster VI, "Immediate Versus Long-Term Involvement," further suggests a relationship between competitiveness and an ability to establish long-term goals. Also, the linkage of Cluster V, "Intellectual Versus Material Accomplishment," with Cluster VI suggests that the student who is more interested in material achievement has difficulty establishing long-term goals and is more inclined toward immediate gratification. The association of Cluster VI with Cluster VIII, "Occupational Self-Development," further suggests that perceiving work as a means of self-development involves delaying immediate wishes to achieve long-range goals. The highly motivated student is able to delay immediate material enjoyment and invest his time and money into an education in order to achieve occupational goals.

Second order Cluster A achieved better integration of the subscales than second order Cluster B. It was also a better expression of

TABLE 4.17
SUMMARY OF CLUSTER LABELS AND INDICES OF
ASSOCIATION FOR SECOND ORDER CLUSTER A

Cluster Number and Label	Index of Association
VIII. Occupational Self-Development: High Versus Low	203
VI. Immediate Versus Long-Term Involvement	179
IV. Competition Versus Ease of Meeting a Standard	174
V. Intellectual Versus Material Accomplishment	143
VII. Occupational Responsibility: High Versus Low	203
XII. Need Achievement: High Versus Low	189
I. Distractable *Tie	165
II. Irresponsible	203
XIV. Self-Perceived Non-Conformity	190
I. Distractable *Tie	165

TABLE 4.18
SUMMARY OF CLUSTER LABELS AND INDICES OF
ASSOCIATION FOR SECOND ORDER CLUSTER B

Cluster Number and Label	Index of Association
IX. Compulsivity	168
XI. Self-Perceived Responsibleness	168
XII. Self-Perceived Intellectual Ambition	165
X. Self-Perceived Competence	151
III. Need Achiever	135

non-intellectual variables than Cluster B. The fact that second order Cluster A contained most of the clusters ranking high in dimensional representativeness further suggests that this cluster better expresses the basic dimensions measured by the male M-Scales. The cluster rankings are presented in Table 4.19.

Second order Cluster B linked five clusters with Cluster IX and XI which were associated reciprocally. Compared to those in second order Cluster A the indices of association in second order Cluster B were relatively low indicating a lack of dimensional independence. A lesser degree of dimensional representation was also suggested by the low rankings of its constituent clusters. All of the clusters (IX, X, XI, and XII)¹ loaded heavily with Word Rating List items and all of the clusters characterized high motivation.

TABLE 4.19
CLUSTER RANKINGS
REGARDING THEIR DIMENSIONAL REPRESENTATION OF THE M-SCALES

Rank	Cluster	Label
1	VIII	Occupational Self-Development
2	VII	Occupational Responsibility
3	II	Irresponsible
4	VI	Immediate Versus Long-Term Involvement
5	XI	Self-Perceived Responsibleness
6	XIII	Need Achievement: High Versus Low
7	IV	Competition Versus Ease of Meeting a Standard
8	XIV	Self-Perceived Non-Conformity
9	I	Distractable
10	IX	Compulsivity
11	XII	Self-Perceived Intellectual Ambition
12	V	Intellectual Versus Material Accomplishment
13	X	Self-Perceived Competence
14	III	Need Achiever

¹The clustering of W.R.L. items indicates that this sub-scale measures a relatively independent dimension.

Second order Cluster B was labeled Self-Perceived Ability.

Although the type of person described may achieve because of his intellectual ability rather than his motivation, the important emphasis is on his perception of his ability. The achiever is characterized as having a positive academic self-concept. He perceives himself as being responsible, ambitious, and competent. The significant position of Cluster IX suggests that compulsivity is related to the traits just mentioned and contributes to achievement. In fact compulsivity may at times be mistaken for responsibility, ambition, and competence. The weak linkage of Cluster III is further evidence of its limited contribution to the dimensional interpretation of the male M-Scales. To the extent that Cluster III is relevant it suggests that need achievement contributes to high motivation. The cluster labels and indices of association for second order Cluster B are summarized in Table 4.18.

Viewed together the second order clusters consolidate the dimensional concepts of the male M-Scales into two comprehensive traits. The male achiever is responsible and has a positive impression of his ability.

Summary

The Elementary Linkage Analysis yielded fourteen clusters. Three clusters, II, VII and XII, accounted for almost half of the items (68 out of 139) in the entire battery. The same clusters contained the most heterogeneous representation of items from all of the sub-scales thus achieving the greatest degree of sub-scale integration. The fact that nearly half of the items clustered in an integrated fashion suggests that the sub-scales overlap in the dimensions they measure relative to academic motivation.

Reference items which statistically best represent the basic dimension of their respective clusters were selected by two different procedures for purposes of comparing the two techniques. In most clusters the same items were identified by both procedures although there were, in a few instances, distinct discrepancies. It was also observed that in six instances the second order cluster associations based on one reference item from each cluster differed from those produced by using several reference items. The method of considering the reciprocal pair to be the most representative items in their respective clusters and selecting other items on the basis of the magnitude of their average association with the reciprocals was the more satisfactory method because it gave a more representative picture of the cluster's dimensional core.

The clusters were interpreted and described in terms of the traits each characterized relative to academic motivation. Interpretation was based on subjective judgment of the meaning conveyed by the items with special weight given to the reference items. Each cluster was given a label representing the main characteristics it portrayed.

The clusters were labeled as follows:

- Cluster I: Distractable-low motivation
- Cluster II: Irresponsible-low motivation
- Cluster III: Need Achiever-polar
- Cluster IV: Competition Versus Ease of Meeting a Standard-polar
- Cluster V: Intellectual Versus Material Accomplishment-polar
- Cluster VI: Immediate Versus Long-Term Involvement-polar
- Cluster VII: Occupational Responsibility: High Versus Low-polar
- Cluster VIII: Occupational Self-Development: High Versus Low-polar
- Cluster IX: Compulsivity-high motivation

- Cluster X: Self-Perceived Competence-high motivation
- Cluster XI: Self-Perceived Responsibleness-high motivation
- Cluster XII: Self-Perceived Intellectual Ambition-high motivation
- Cluster XIII: Need Achievement: High Versus Low-polar
- Cluster XIV: Self-Perceived Intellectual Ambition-high motivation

An index of the internal consistency of each cluster was derived on two different bases: (1) by using all of the items in each cluster in the computation; and (2) by using only the several selected reference items. A cluster was internally consistent if its mean within-cluster item association was greater than its mean intercluster linkage. Based on the latter procedure, which proved to be the more meaningful of the two methods, all of the clusters except Cluster XIV were internally consistent. Cluster XIV was short of the criterion by a narrow margin. The implication was that Clusters I through XIII represent independent dimensions and that Cluster XIV could be interpreted as part of Cluster II.

As an elaboration of E.L.A. second order solutions were computed by two procedures, the Hierarchical Method and the Comprehensive Hierarchical Approach. Although each method yielded two second order clusters, they differed in the manner in which the original clusters associated. The latter procedure was considered to be more meaningful because of its comprehensiveness. Therefore, interpretation was limited to the results obtained by the Comprehensive Hierarchical Approach which included two second order clusters. Second order Cluster A contained nine clusters including most of those which were statistically most representative of the dimensional core of the total male battery of M-Scales as indicated by their column sums of associations in the second order matrix. The high degree of item integration in

Cluster A suggested that the sub-scales overlap in the dimensions they measure.

Second order Cluster A was labeled Responsibleness: High Versus Low. Second order Cluster B contained five clusters composed almost entirely of items from the Word Rating List indicating that academic self-concept is an independent dimension. Cluster B was labeled Self-Perceived Ability.

The academically motivated male student as characterized by the dimensions of the male M-Scales has a high sense of responsibility and perceives himself to be academically competent. The concept of responsibility is more representative of non-intellective variables than the concept of self-perceived ability. It is also more meaningful because the clusters in which it was characterized achieved a higher degree of item integration and were the most dimensionally representative clusters as indicated by their high indices of association.

On the basis of the analysis, the hypothesis, underlying this study, that meaningful and descriptive dimensions which relate to academic motivation can be isolated and interpreted, was accepted as tenable.

CHAPTER V

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary

The purpose of this study was to achieve a more comprehensive, meaningful description of the dimensions underlying academic motivation than has been achieved previously. The problem was to isolate and describe the dimensions of an objective measure of academic motivation called the Michigan M-Scales. The four sub-scales composing the M-Scales were each developed from a different theory of academic motivation. Therefore, the purpose of this investigation was to analyze the entire battery to achieve an integrated comprehensive description of the constituent dimensions. It was hypothesized that meaningful and descriptive traits related to academic motivation could be isolated and identified.

This study was conducted as part of a larger research project sponsored by the United States Office of Education under the direction of William W. Farquhar.¹ Data gathered in previous stages of the Farquhar project, relative to the responses of 240 male eleventh grade high school subjects to the 139 male items in the M-Scales, was used in this investigation.

¹Farquhar, Motivation Factors . . .

The Elementary Linkage ~~Analysis~~ procedure was selected for data analyzation because of its simplicity and objectivity. A cluster as identified by E.L.A. was defined as a structure in which every item is more like some other item (i.e., individuals who responded one way to one item responded similarly to another item) in that cluster than any item in any other cluster. Giving special weight to the reference items, which statistically are most representative of the dimensional core, the clusters were described according to the characteristics relative to academic motivation held in common by their constituent items.

Two elaborations of E.L.A., the Hierarchical Method and the Comprehensive Hierarchical Approach, each yielded two interpretable second order clusters. Only the clusters from the latter method were interpreted. In addition, information regarding the relationship between the reference items from each cluster as well as the relationships between the clusters was obtained. Using information from the Comprehensive Approach an indication of the internal consistency of the clusters was determined which facilitated more meaningful cluster interpretation.

The Elementary Linkage Analysis yielded fourteen clusters. Three clusters, II, VII, and XIII, accounted for almost half of the items (68 out of 139) in the entire battery. The same clusters contained the best representation of items from the sub-scales thus achieving the highest degree of sub-scale integration. The two techniques used to select reference items identified the same items in most clusters. However, in several clusters discrepancies in the items identified by the two procedures resulted. In addition, six of the second order clusters had different linkages when the computation was based on one reference item than they had on the basis of several selected reference items. The labels assigned and interpretive emphasis of each cluster

TABLE 5.1

SUMMARY OF CLUSTER LABELS AND INTERPRETIVE EMPHASES

Cluster	Label		Interpretive Emphasis
I	Distractable	Low	The <u>lowly motivated</u> male has difficulty concentrating on his studies and is easily diverted from studying and academic pursuits.
II	Irresponsible	Low	The <u>lowly motivated</u> male lacks an internalization of accepted behavior norms, dislikes conforming to expectations and authoritarian control, lacks competitiveness and goal direction, and finds personal significance in non-conventional and non-academic activities.
III	Need Achiever	High	The <u>highly motivated</u> male possesses achievement needs to the exclusion of affiliation needs. He is inclined toward academic rather than interpersonal interests.
IV	Competition Versus Ease of Meeting a Standard	Polar	The <u>highly motivated</u> male competes for maximum achievement. The <u>lowly motivated</u> male avoids competition and seeks the easiest means of meeting requirements.
V	Intellectual Versus Material Accomplishment	Polar	The <u>highly motivated</u> male seeks intellectual or academic accomplishment. The <u>lowly motivated</u> male prefers immediate gratification.

Table 5.1 - Continued

Cluster	Label		Interpretive Emphasis
VI	Immediate Versus Long-Term Involvement	Polar	The <u>highly motivated male</u> is able to defer immediate satisfactions to obtain future, more important accomplishments. The <u>lowly motivated male</u> prefers immediate gratification.
VII	Occupational Responsibility: High Versus Low	Polar	The <u>highly motivated male</u> views an occupation as requiring personal involvement, competence and leadership and as an opportunity for unique or creative accomplishment. The <u>lowly motivated male</u> desires work that requires little responsibility.
VIII	Occupational Self-Development: High Versus Low	Polar	The <u>highly motivated male</u> views a job as a means of personal and professional self-development. The <u>lowly motivated male</u> views work as a necessity for earning a living. He is not interested in college.
IX	Compulsivity	High	The <u>highly motivated male</u> sees himself through his teachers' eyes as being well organized, disciplined, and systematic.
X	Self-Perceived Competence	High	The <u>highly motivated male</u> sees himself through his teachers' eyes as possessing high intellectual competence. .
XI	Self-Perceived Responsibility	High	The <u>highly motivated male</u> sees himself through his teachers' eyes as being sincere, dependable and hard-working.

Table 5.1 - Continued

Cluster	Label		Interpretive Emphasis
XII	Self-Perceived Intellectual High Ambition		The <u>highly motivated</u> male sees himself through his teachers' eyes as academically aggressive and ambitious.
XIII	Need Achievement: High Versus Low	Polar	The <u>highly motivated</u> male places high personal value on accomplishment and excellence. He is competitive, self-disciplined, purposeful, and sees himself as being competent. The <u>lowly motivated</u> male meets minimum standards. He lacks competitiveness and the drive to obtain extraordinary accomplishment.
XIV	Self-Perceived Non-Conformity	Low	The <u>lowly motivated</u> male sees himself through his teachers' eyes as being reckless, rebellious, different, distracted, carefree, stubborn and impatient.

Internal consistency was evident in four clusters when all of each cluster's items were used in the computation. However, all except Cluster XIV indicated internal consistency when only the selected reference items were included in the computation.

Two elaborations of ELA, the Hierarchical Method and the Comprehensive Hierarchical Approach, each produced two second order clusters but differed in the patterns in which the clusters associated. The labels and interpretive emphases for the second order clusters (identified by the Comprehensive Approach) are summarized in Table 5.2.

Conclusions

Several conclusions were drawn that pertain to the Elementary Linkage Analysis procedures:

1. Reference items selected on the basis of their average association with the reciprocals were more representative of their cluster dimension than reference items selected on the basis of their column sums of association.
2. Cluster internal consistency was more accurately determined when computed from selected reference items than when all items in each cluster were used.
3. The Comprehensive Hierarchical Approach produced a more accurate and meaningful second order solution than the Hierarchical Method.
4. Items with distant linkages in clusters produced by Elementary Linkage Analysis sometimes make little contribution to their cluster's dimension.

A number of conclusions were made based on the logical interpretation of the results of the Elementary Linkage Analysis:

TABLE 5.2
SUMMARY OF LABELS AND INTERPRETIVE EMPHASIS
OF SECOND ORDER CLUSTERS

Cluster	Label	Interpretive Emphasis
A	Responsibleness: High Versus Low	The <u>highly motivated</u> male is responsible, conforming and competitive. He is guided by long-range goals and views an occupation as a means of self-development and personal accomplishment.
		The <u>lowly motivated</u> male is irresponsible, non-conforming and non-competitive. He seeks immediate gratifications and has a weak appreciation for occupational self-development.
B	Self-Perceived Ability	The <u>highly motivated</u> male has a positive academic self-concept. He perceives himself through his teachers' eyes as being responsible, ambitious, and competent. He is also compulsive.

1. The sub-scales overlap in the dimensions they measure and a meaningful integration of the sub-scales was achieved by the analysis procedures.
2. The dimensions relative to academic motivation as measured by the male items of the Michigan M-Scales were isolated and meaningfully interpreted and described.
3. The clusters represent independent dimensions relating to academic motivation. The clusters are also internally consistent.
4. The clusters identified by the Elementary Linkage Analysis were comparable in part to factors produced by factor analysis.
5. The dimensions identified in the M-Scales indicate that the non-intellective traits most significant in determining the extent of a male student's academic motivation are his sense of responsibility and self-perception of ability.
6. Self-concept as measured by the Word Rating List functions as an independent construct with regard to academic motivation.

Discussion

The results of this investigation represent a more comprehensive and objective attack on the problem of defining and understanding academic motivation than previous studies. However, the dimensions produced here do not account for all of the non-intellective variance in academic performance. Academic motivation continues to be a vaguely defined, elusive concept. Further integration of factors affecting motivation is needed. Researchers are obviously limited to existing notions and hunches about non-intellective factors that influence motivation. Item construction

is based on these concepts, therefore, factors identified by dimensional analyses are described with old terminology. Perhaps new dimensions are being isolated by the analysis techniques but go unrecognized because they are described with familiar terms.

An encouraging indication of the validity and reliability of the dimensions underlying the M-Scales was made by the comparable labeling of the factors in the Farquhar study to the clusters in this investigation. This is significant in light of the fact that labelings in the two studies were conducted independently.

The cluster dimensions were also comparable to some of the factors cited in research studies reviewed in Chapter II.

Clusters II and XIV characterized lowly motivated students as being non-conforming. Correspondingly, in the Middleton and Guthrie¹ study "Dependence" (which presumably often leads to conformity) was identified as a factor characteristic of high achievers.

Mitchell's² "Academic Motivation and Efficiency" factor is similar to "Need Achievement" as described in Cluster XIII. Also the "Nonacademic Achievement Motivation" factor in the Mitchell study has some of the same emphasis as the "Material Accomplishment" aspect of Cluster V.

In the Michael, Jones and Trembly³ study the factor labeled "General Achievement Drive" corresponds with Cluster XIII, "Need Achievement" and a "Compulsivity" factor was identified corresponding to Cluster IX in the present study. In addition, the factor labeled "Systematic, Methodical Application" has the same emphasis as Cluster IX, "Compulsivity."

¹Middleton and Guthrie, pp. 66-69.

²Mitchell, "An Analysis . . . ," pp. 179-87.

³Michael, Jones and Trembly, pp. 667-71.

Because the results cited in the research literature were not derived in any of the studies, within a theoretical framework the similarity between the factors identified with the clusters in this study has limited significance.

The results of this study lend themselves to two concluding observations: First, the concept of responsibility implies doing what is necessary or expected. Although most educators have encountered a few students who enjoy and are excited about learning, the relationship of responsibility to academic motivation suggests that most students do not really enjoy studying and must discipline themselves to study because they realize it is necessary. Although this finding may be only statistical confirmation of what most practitioners already know it does raise the serious question of why our society and educational system do not cultivate a greater appreciation and enjoyment of learning.

Secondly, the emergence of self-perceived ability as a major dimension in conjunction with "responsibility" raises the suggestion that a sense of responsibility is at least partially developed in response to one's perception of his ability. It can be conjectured that the student who is above average academically learns to assess his ability from evaluations of his performance made by significant others. These significant others (such as parents and teachers) encourage able students to use their ability even at times to the extent of making the students feel obligated to achieve or in a sense to feel responsible for their ability.

Although, perpetual conjecturing about the interplay of variables that influence academic motivation continues, exceptions to almost every hunch are revealed. For example, the relationship suggested above between self-perceived ability and responsibility does not account for the

overachievement of students with low ability. The need for further motivation research is obvious.

Implications for Future Research

Several implications for further investigation are noteworthy:

1. Conduct a similar study using the female sample.
2. Develop a new theoretical base from the results of this study; construct a revised scale giving weight to the basic dimensions identified here, and determine if the revised scale has increased predictive validity over the present M-Scales.
3. Conduct a study to determine the reliability of the dimensions of the M-Scales. An identical analysis to the present study could be conducted using a new sample.
4. Conduct an Elementary Linkage Analysis in which people rather than items would be clustered. Additional information regarding the subjects in each cluster would have to be gathered in order to describe the "types" of people characteristic of each cluster.
5. Conduct a study identical to the present study on a sample of over- and under-achievers to compare the resulting dimensions with those produced in this study.
6. Rearrange the order in which the items are presented in the M-Scales so that the items in each sub-scale are not grouped together. The present investigation could then be duplicated and the resulting clusters compared with those identified in this study.
7. Design a study to identify the variables that contribute to or inhibit the development of a sense of responsibility and a positive academic self-concept.

8. Compare the dimensions identified in this study with those identified by a clinical study on a sample of comparable subjects. The clinical study would involve interviews, autobiographical data, and test scores. The intention would be to compare subjective description with statistical description.
9. A study identical to the present investigation could be conducted using college students to determine the extent to which the same dimensions exist at the college level.
10. The present study should be duplicated on students in various parts of the United States and foreign countries to determine the universality of the dimensions found here.
11. Rearrange the M-Scales battery so that subjects' performance could be scored on each of the fourteen dimensions separately.

The attempt to integrate variables related to academic motivation in this study achieved some comprehensiveness resulting in the identification of "responsibleness" and "self-perceived ability" as basic components of the motivation complex. Future research should be directed toward reducing the fragmentary conceptions of the variables that compose academic motivation. New items should also be generated for the other clusters to determine their actual contribution to explaining academic motivation. Finally, new studies need to be conducted which assess the predictiveness of the clusters as well as their interrelatedness.

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APPENDIX A

INTERNAL CONSISTENCY

COMPARATIVE SUMMARY OF TWO PROCEDURES FOR DETERMINING CLUSTER
INTERNAL CONSISTENCY: (1) COMPUTING REFERENCE ITEMS ONLY,
VERSUS (2) COMPUTING ALL ITEMS IN EACH CLUSTER

Cluster Number	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
Highest Mean Inter Cluster Association	165	203	135	174	143	179	203	203	168	151	168	165	135	190
Mean Association of Reference Items	181	209	163	197	158	197	209	215	176	171	180	175	177	189
Internal Consistency	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no
Mean Association of All Items	163	173	138	197	140	168	178	174	161	153	159	168	132	164
Internal Consistency	no	no	yes	yes	no	no	no	no	no	yes	no	yes	no	no

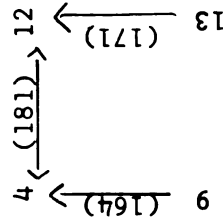
n within cells represented agreement scores

APPENDIX B

CLUSTER MATRICES AND LINKAGE PATTERNS

TABLE B.1
ITEM ASSOCIATIONS, RANKS AND LINKAGE PATTERN FOR CLUSTER I

Item No.	4*	9	12*	13
4		164	181	154
9	164		157	150
12	181	157		171
13	154	150	171	
Sums of Associations				
Item Rank	499	471	509	475
Mean Association with Reciprocal Pair	2	4	1	3
Item Rank	181	161	181	163
Item Rank	2	4	1	3



Legend: (Appendix B.1 through B.14)

n within cells represents agreement scores.

* indicates the items used in the Comprehensive Hierarchical Approach. Underlined numbers represent the highest agreement score in each column.

TABLE B.2
ITEM ASSOCIATIONS, RANKS, AND LINKAGE PATTERN FOR CLUSTER II

	11*	17*	2	5	19	23*	27*	38	46	51	55	62	71	135	1	3	10	14	20	35	132	22	
11	219	178	189	204	210	208	198	190	200	205	197	188	195	163	169	174	192	195	191	183	149		
17	219	<u>173</u>	192	205	211	209	199	<u>185</u>	205	<u>202</u>	<u>192</u>	195	196	164	172	173	187	198	190	182	150		
2	<u>178</u>	173	<u>163</u>	<u>160</u>	<u>168</u>	<u>170</u>	<u>158</u>	160	<u>166</u>	165	163	<u>156</u>	<u>163</u>	153	155	158	158	167	157	165	129		
5	189	192	163	185	187	179	171	159	185	174	178	173	182	156	148	155	173	172	174	170	148		
19	204	205	160	185	196	198	180	170	190	191	193	180	185	171	177	160	194	185	191	120	155		
23	210	211	168	187	196	196	186	178	200	193	193	180	191	<u>157</u>	<u>161</u>	176	186	199	189	171	145		
27	208	209	170	179	198	196	190	180	196	201	193	186	189	153	167	<u>156</u>	<u>196</u>	<u>183</u>	<u>195</u>	181	143		
38	198	199	158	171	180	186	190	186	182	179	177	168	177	153	161	164	170	183	185	167	139		
46	190	185	160	159	170	178	180	186	180	179	181	166	171	155	163	154	170	171	177	167	145		
51	200	205	166	185	190	200	196	182	180	191	189	184	193	155	169	164	184	183	189	177	153		
55	205	202	165	174	191	193	201	179	179	191	194	185	190	158	156	165	177	180	188	180	136		
62	197	192	163	178	193	193	193	177	181	189	194	185	184	154	164	163	183	178	190	178	148		
71	188	195	156	173	180	180	186	168	166	184	185	185	175	159	157	150	172	173	179	169	149		
135	195	196	163	182	185	191	189	177	171	193	190	184	175	152	162	165	177	178	180	194	140		
1	163	164	153	156	171	157	153	153	155	155	158	154	159	152	160	131	161	148	150	<u>146</u>	156		
3	169	172	155	148	177	161	167	161	163	169	156	164	157	162	160	139	165	156	162	150	144		
10	174	173	158	155	160	176	156	164	154	164	165	163	150	165	131	139	152	169	155	159	125		
14	192	187	158	173	194	186	196	170	170	184	177	183	172	177	161	165	152	179	179	159	169		
20	195	198	167	172	185	199	183	183	171	183	180	178	173	178	148	156	169	179	180	168	132		
35	191	190	157	174	191	189	195	185	177	189	188	190	179	180	150	162	155	179	180	184	140		
132	183	182	165	170	120	171	181	167	167	177	180	178	169	194	146	150	159	159	168	184	136		
22	149	150	129	148	155	145	143	139	145	153	136	148	149	140	156	144	125	169	132	140	136		
Sums	3997	3999	3385	3613	3790	3873	3869	3673	3587	3835	3789	3777	3629	3739	3255	3357	3307	3683	3677	3725	3506	3031	
of Associations	Item Rank	2	1	18	15	6	3	4	13	16	5	7	8	14	9	21	19	20	11	12	10	17	22
Mean Association	Pair	219	219	176	191	205	211	209	199	188	203	204	195	192	196	164	171	174	190	197	191	183	150
With Reciprocal	Item Rank	2	1	18	14	5	3	4	8	16	7	6	11	12	10	21	20	19	15	9	13	17	22

TABLE B.2 Con't.

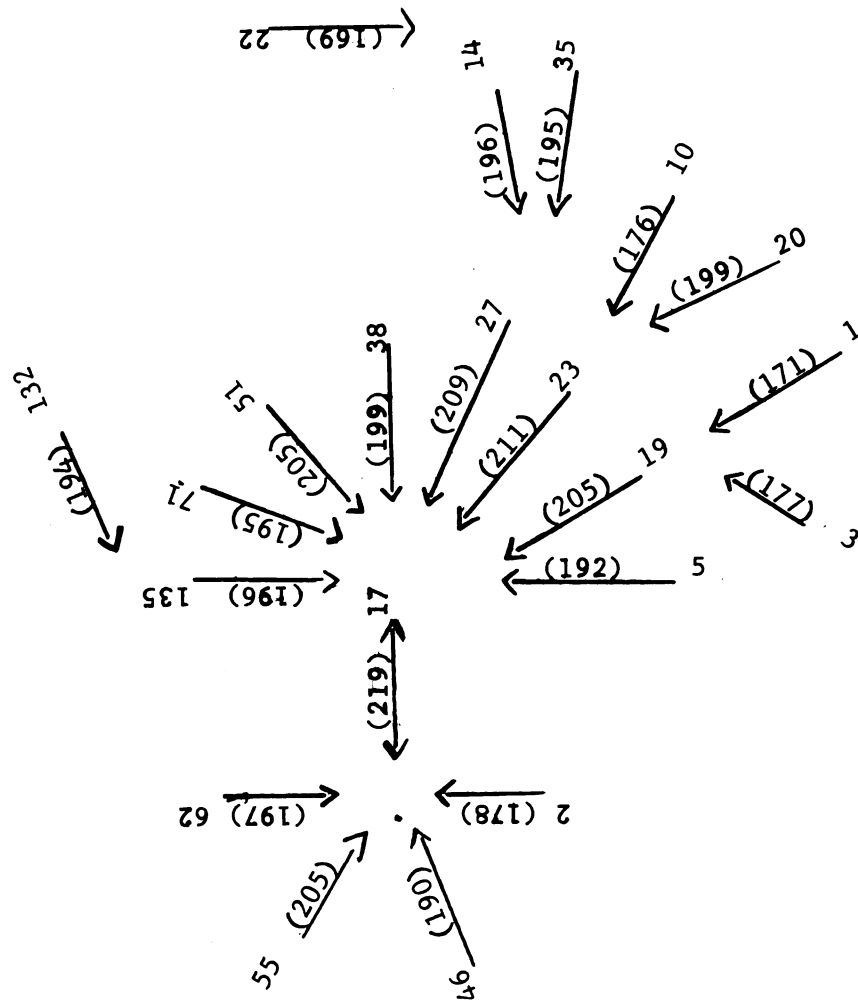


TABLE B.3
ITEM ASSOCIATIONS, RANKS, AND LINKAGE
PATTERN FOR CLUSTER III

	15*	65*	49
15		163	147
65	163		154
49	147	154	
Sums of Associations	310	317	301
Item Rank	2	1	3
Mean Association With			
Reciprocal Pair	163	163	151
Item Rank	2	1	3

15 $\leftarrow (163)$ 65 $\leftarrow (154)$ 49

TABLE B.4
ITEM ASSOCIATIONS, RANKS, AND LINKAGE
PATTERN FOR CLUSTER IV

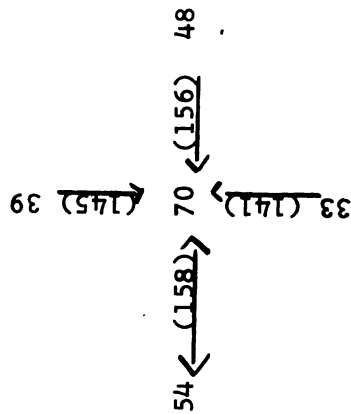
	32*	50*
32		197
50	197	
	197	197

32 $\leftarrow (197)$ 50

TABLE B.5

ITEM ASSOCIATIONS, RANKS, AND LINKAGE
PATTERN FOR CLUSTER V

	54*	70*	33	39	48
54		158	129	129	136
70	158		141	145	156
33	129	141		124	137
39	129	145	124		141
48	136	156	137	141	
Sums of Associations	552	600	531	539	570
Item Rank	3	1	5	4	2
Mean Association With					
Reciprocal Pair	158	158	135	138	146
Item Rank	2	1	5	4	3

TABLE B.6
ITEM ASSOCIATIONS, RANKS, AND LINKAGE
PATTERN FOR CLUSTER VI

	58*	60*	30	31	56	67
58		197	178	178	190	140
60	197		193	177	189	147
30	178	193		166	180	142
31	178	177	166		174	134
56	190	189	180	174		140
67	140	147	142	134	140	
Sums of Associations	883	903	859	829	873	703
Item Rank	2	1	4	5	3	6
Mean Association With						
Reciprocal Pair	197	197	189	178	190	144
Item Rank	2	1	4	5	3	6

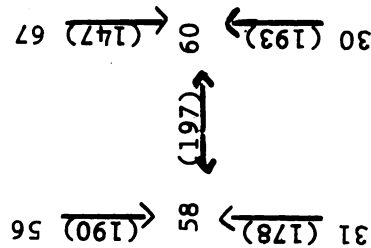


TABLE B.7

	5052	4920	4960	4467	4139	4765	4136	4607	4182	3911	4311	4673	4549	4800	4698
Sum of Associations	1	3	2	22	25	11	26	18	24	27	23	16	19	9	15
Item Rank															
Mean Association With															
Reciprocal Pair	216	216	208	183	162	200	170	187	167	159	168	191	185	204	196
Item Rank	1	2	6	22	26	12	23	18	25	27	24	17	19	8	15

TABLE B.7 Con't.

	78	79	81	82	83	87	88	94	104	117	119	80
86	210	211	196	211	208	213	199	207	203	184	199	188
90	192	207	192	205	204	205	195	199	199	186	195	180
7	192	203	192	195	194	199	189	203	195	182	201	186
8	171	174	165	172	177	178	164	170	170	165	180	175
16	165	148	151	156	159	162	162	166	156	155	166	161
25	181	194	187	194	187	188	178	196	196	177	188	173
26	163	164	159	168	165	166	150	168	164	157	156	159
37	187	186	175	190	187	192	182	186	176	175	180	165
47	164	167	164	165	160	167	157	159	165	154	163	156
61	143	150	145	150	147	156	152	152	152	155	164	149
64	155	172	177	172	165	170	162	168	178	167	174	167
66	179	186	179	184	181	188	178	184	192	173	184	163
69	179	184	177	184	175	182	170	176	182	171	174	169
75	194	191	200	191	198	203	201	193	185	172	187	182
76	182	197	196	191	194	191	187	183	181	166	183	196
78		197	188	205	196	209	189	193	181	182	183	178
79	197		193	206	197	204	188	198	194	189	188	179
81	188	193		197	194	199	193	193	191	178	183	182
82	205	206	197		207	210	188	196	194	183	184	179
83	196	197	194	207		207	185	189	185	176	185	180
87	209	204	199	210	207		190	194	194	179	190	183
88	189	188	193	188	185	190		188	176	169	180	175
94	193	198	193	196	187	194	188		198	181	192	173
104	181	194	191	194	185	194	176	198		189	198	173
117	182	189	178	183	176	179	169	181	189		195	156
119	183	188	183	184	185	190	180	192	198	195		175
80	178	179	182	179	180	183	175	173	173	156	175	
Sum of Associations	4758	4867	4746	4877	4800	4919	4647	4805	4767	4516	4747	4502
Item Rank	12	6	14	5	8	4	17	7	10	20	13	21
Mean Association With												
Reciprocal Pair	201	209	194	208	206	209	197	203	201	185	197	184
Item Rank	11	4	16	5	7	3	14	9	10	20	13	21

TABLE B.7 Con't.

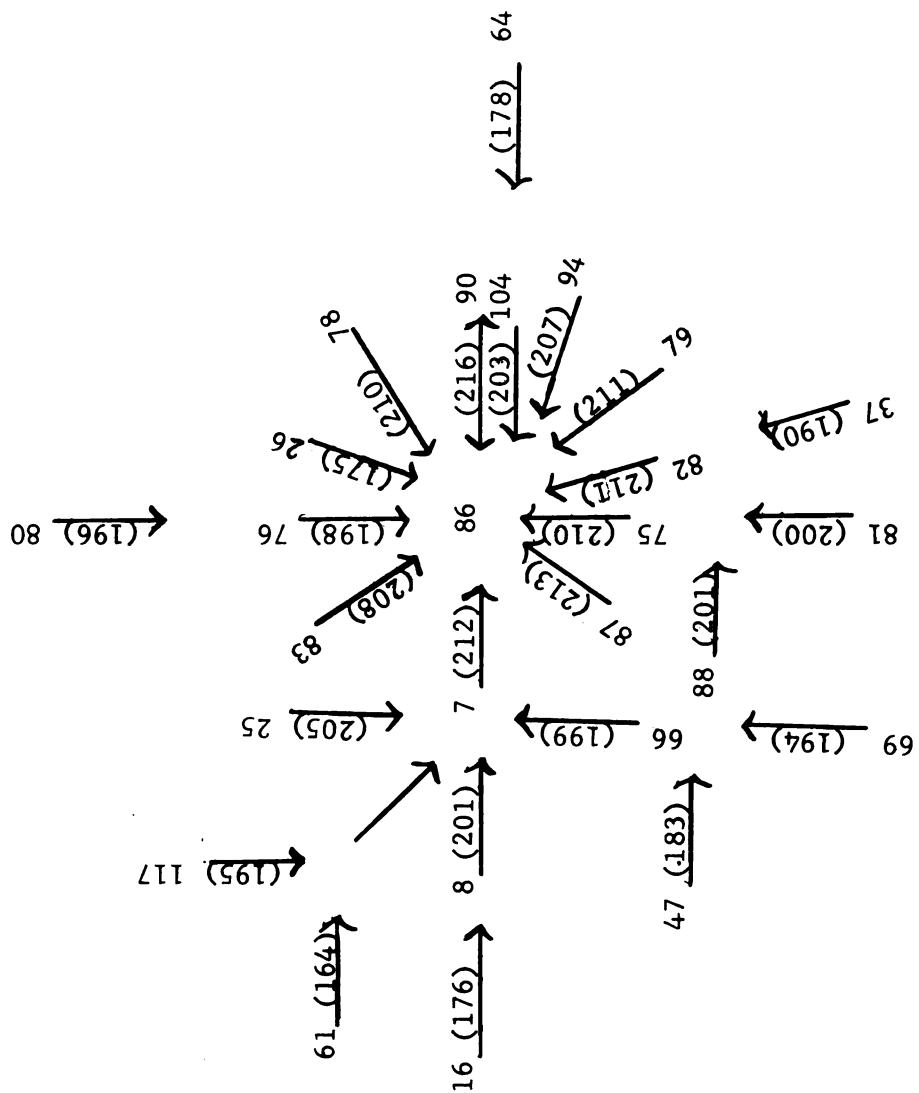


TABLE B.8

ITEM ASSOCIATIONS, RANKS, AND LINKAGE
PATTERN FOR CLUSTER VIII

	21	41	72	73	74	77	85	89*	91*
21		159	128	149	153	162	156	168	177
41	159		153	168	174	185	171	173	176
72	128	153		151	169	168	158	154	161
73	149	168	151		194	185	159	179	176
74	153	174	169	194		195	173	189	186
77	162	185	168	185	195		184	206	211
85	156	171	158	159	173	184		192	191
89	168	173	154	179	189	206	192		215
91	177	176	161	176	186	211	191	215	
Sums of Associations	1252	1359	1242	1361	1433	1496	1384	1476	1493
Item Rank	8	7	9	6	4	1	5	3	2
Mean Association With									
Reciprocal Pair	174	175	158	178	188	209	192	215	215
Item Rank	8	7	9	6	5	3	4	2	1

85 (192) → 89 (215) → 91 (177) → 21

77 (211) ←
 73 (194) → 74 (195) → 77 (211)

73 (194) → 74 (195) → 77 (211) ← 41

72 (169) →

TABLE B.9

ITEM ASSOCIATIONS, RANKS, AND LINKAGE
PATTERN FOR CLUSTER IX

	97*	101*	114
97		176	144
101	176		162
114	144	162	
Sums of Associations	320	338	306
Item Rank	2	1	3
Mean Association With			
Reciprocal Pair	176	176	153
Item Rank	2	1	3

97 (176) → 101 (162) → 114

TABLE B.10
ITEM ASSOCIATIONS, RANKS, AND LINKAGE PATTERN FOR CLUSTER X

	18	93	98*	99*	105	108	111	118	122	124*	125	130	131
18		138	146	129	130	131	139	143	151	137	130	138	144
93	138		174	169	144	149	151	143	151	159	166	150	152
98	146	174		173	160	165	163	147	155	175	160	154	166
99	129	<u>169</u>	173	<u>157</u>	157	<u>158</u>	154	144	152	<u>164</u>	163	143	<u>157</u>
105	130	144	160	157		143	149	151	155	169	170	142	146
108	131	149	165	158	143		158	146	152	150	163	149	153
111	139	151	163	154	149	158		160	156	164	152	155	157
118	143	143	147	144	151	146	160	<u>156</u>	156	156	153	147	151
122	<u>151</u>	151	155	152	155	152	156	156		156	157	155	163
124	<u>137</u>	159	175	164	169	150	164	156	156		171	153	155
125	130	166	<u>160</u>	163	170	163	<u>157</u>	153	157	171	<u>171</u>	154	154
130	138	150	154	143	<u>142</u>	147	155	147	155	153	154		164
131	144	152	166	157	146	153	157	151	<u>163</u>	155	154	<u>164</u>	
Sums of Associations	<u>1656</u>	<u>1846</u>	1938	1863	1816	1817	1863	1797	1859	1909	1898	1804	1862
Item Rank	13	8	1	5	10	8	4	12	7	2	3	11	6
Mean Association With													
Reciprocal Pair	142	167	175	169	165	158	164	161	156	175	166	154	160
Item Rank	13	4	1	3	6	10	7	8	11	2	5	12	4

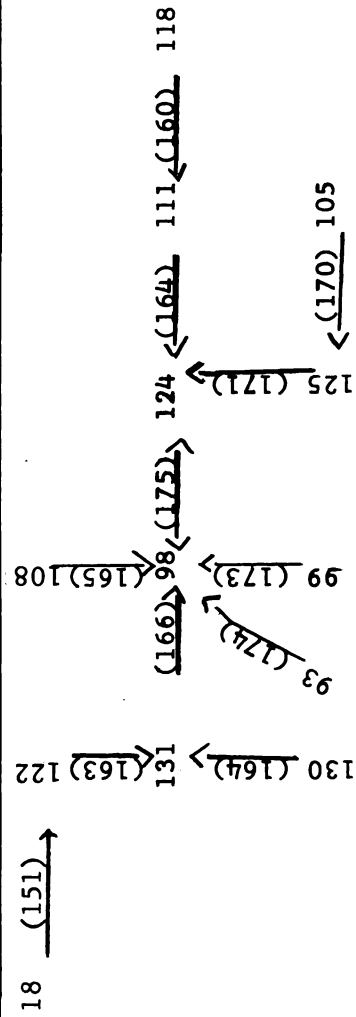


TABLE B.11
ITEM ASSOCIATIONS, RANKS, AND LINKAGE PATTERN FOR CLUSTER XI

	24	92	95	100	102	107*	109	110	116*	123*	128	133	138*	139
24		144	142	142	147	143	141	140	145	142	147	156	160	140
92	144		150	152	163	163	143	146	153	154	139	160	162	146
95	142	150		160	167	169	163	160	169	174	133	156	170	148
100	142	152	160		169	177	149	166	173	158	145	154	170	166
102	147	163	167	169		170	160	155	176	161	144	169	171	153
107	143	163	169	177	170		160	171	186	173	158	167	189	167
109	141	143	163	149	160	160		157	170	169	140	151	163	159
110	140	146	160	166	155	171	157		167	168	143	154	160	154
116	145	153	169	173	176	186	170	167		175	152	165	181	171
123	142	154	174	158	161	173	169	168	175		153	166	176	170
128	147	139	133	145	144	158	140	143	152	153		143	155	139
133	156	168	156	154	169	167	151	154	165	166	143		182	156
138	160	162	170	170	171	189	163	160	181	176	155	182		178
139	140	146	148	166	153	167	159	154	171	170	139	156	178	
Sums of Associations	1889	1983	2061	2081	2105	2193	2025	2041	2183	2139	1891	2087	2217	2047
Item Rank	14	12	8	7	5	2	11	10	3	4	13	6	1	9
Mean Association With														
Reciprocal Pair	152	163	170	174	171	189	162	166	184	175	157	175	189	173
Item Rank	14	11	9	6	8	2	12	10	3	4	13	5	1	7

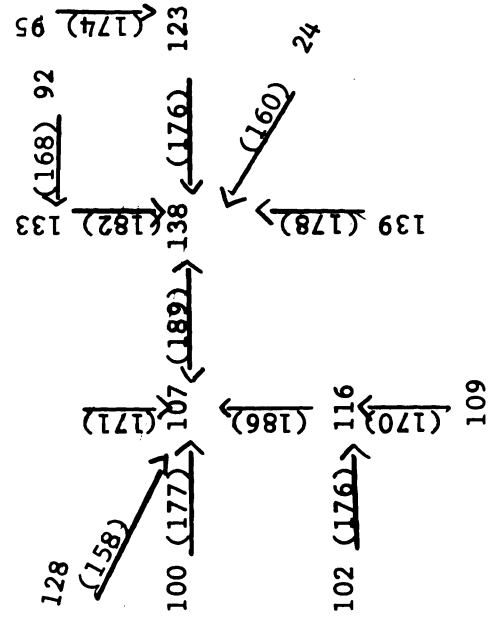
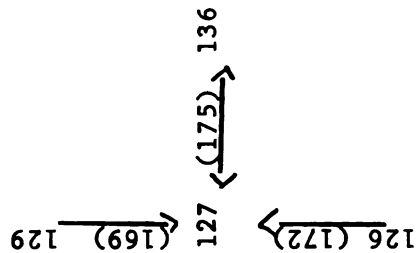


TABLE B.12
ITEM ASSOCIATIONS, RANKS, AND LINKAGE PATTERN FOR CLUSTER XII

	126	129	127*	136*
126		161	172	165
129		161	169	166
127		172	169	175
136		165	166	175
Sums of Associations	498	496	516	506
Item Rank	3	4	1	2
Mean Association With				
Reciprocal Pair	169	168	175	175
Item Rank	3	4	1	2



	44	34	57	40	29	28	42	96	36*	43*113*	68*	45	52	84*	53	103	59	63
	44	141	140	130	139	126	136	123	134	131	110	129	132	139	125	122	113	132
	34		153	129	156	113	155	122	147	142	131	152	149	140	146	147	140	135
	57	141		142	135	122	148	125	136	123	132	129	146	145	125	144	129	142
	40	140	153		129	116	120	117	112	111	124	117	130	129	107	124	123	118
	29	130	129	142														126
	29	139	156	135	129		131	163	122	173	156	129	154	151	144	150	133	134
	28	126	113	122	116	131		124	131	118	119	110	109	114	123	115	116	119
	42	136	155	148	120	163	124		141	160	159	140	153	150	135	151	150	139
	96	123	122	125	124	122	131	141		129	136	157	136	125	132	142	131	148
	36	134	147	136	112	173	118	160	129		187	154	187	158	137	173	162	141
	43	131	142	123	111	156	119	159	136	187		165	176	153	128	178	163	128
	113	110	131	132	115	129	110	140	157	154	165		183	154	117	179	160	143
	68	129	152	129	114	154	109	153	136	187	176	183		167	126	192	173	144
	45	132	149	146	130	151	114	150	125	158	153	154	167		147	155	158	137
	52	139	140	145	129	144	123	135	132	137	128	117	126	147		118	123	132
	84	125	146	125	118	150	115	151	142	173	178	179	192	155	118		175	122
	53	122	147	144	124	133	116	150	131	162	163	160	173	158	123	175		149
	103	113	140	129	130	134	119	139	148	141	128	143	139	137	132	149	149	
	59	132	135	142	118	147	120	140	141	152	151	138	151	140	145	166	166	137
	63	138	129	148	133	147	118	150	133	132	135	130	141	142	139	150	150	127
																		152
Sums of Associations																		
	2340	2527	2464	2224	2593	2144	2614	2391	2692	2641	2556	2714	2608	2399	2696	2646	2405	2550
Item Rank	17	11	13	18	8	19	6	16	3	5	9	1	7	15	2	4	14	10
Mean Association With																		
Reciprocal Pair	127	149	127	116	152	112	152	139	180	177	181	192	161	122	192	174	133	147
Item Rank	16	10	15	18	9	19	8	13	4	5	3*	1	7	17	2	6	14	11

TABLE B.13 Con't.

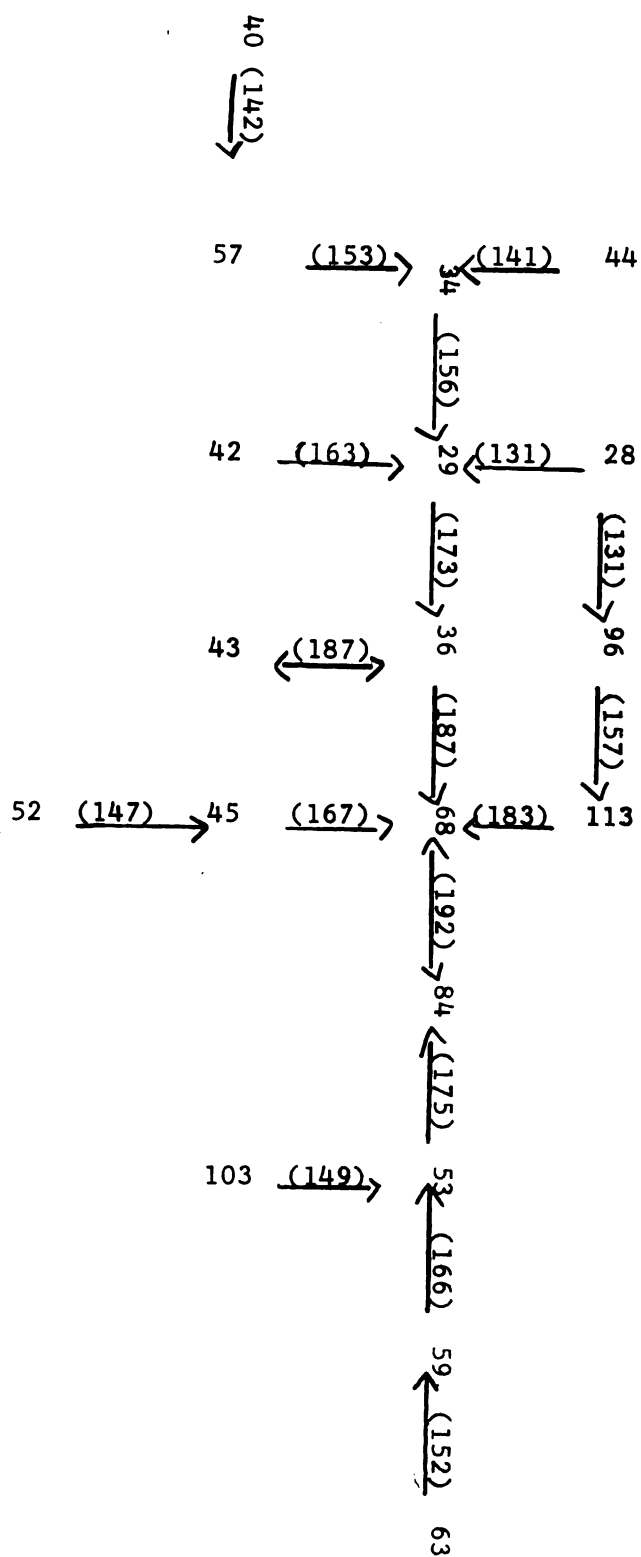
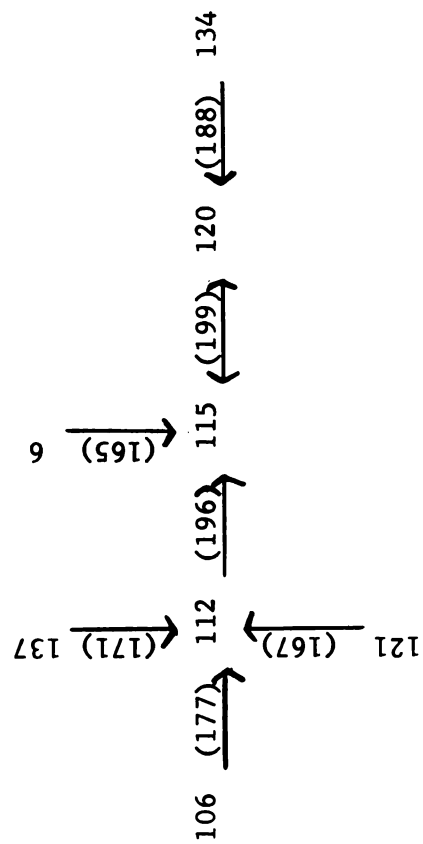


TABLE B.14
ITEM ASSOCIATIONS, RANKS, AND LINKAGE PATTERNS FOR CLUSTER XIV

	106	112*	121	137	115*	6	120*	134*
106		177	166	146	165	146	170	156
112	177		167	171	196	159	189	179
121	<u>166</u>	167		<u>154</u>	163	142	160	156
137	146	171	154		165	140	162	162
115	165	<u>196</u>	163	165		<u>165</u>	199	185
6	146	<u>159</u>	142	140	165		<u>162</u>	160
120	170	189	160	162	199	162		188
134	156	179	156	162	<u>185</u>	160	188	
Sum of Associations	1126	1238	1108	1100	1238	1074	1230	1186
Item Rank	5	2	6	7	1	8	3	4
Mean Association With								
Reciprocal Rank	167	193	162	164	199	164	199	187
Item Rank	5	3	8	6	1	7	2	4



APPENDIX C

THE HIERARCHIAL METHOD

TABLE C.1

ITEM CONTENT AND INDICES OF ASSOCIATION

Item Content	Index of Association
<u>Second Order Cluster</u>	M
17. I have played hooky from school.	211
68. I would prefer to:	
(a) be demanding on myself to do good work, or	
(b) be demanding on my friends so that they will do good work.	200
138. Teachers feel that I am reliable.	181
127. Teachers feel that I am ambitious.	169
101. Teachers feel that I am thorough.	166
98. Teachers feel that I am smart.	157
65. I would prefer to:	
(a) be known as a person who knows his own mind, or	
(b) be known as a person who gets help in making decisions.	129
86. I prefer:	
(a) a job which requires little thinking, or	
(b) a job where my opinion is valued.	211
77. I prefer:	
(a) a job where I could become known for outstanding accomplishments, or	
(b) a job which does not require a college education.	200
60. I would prefer to:	
(a) study to go to college, or	
(b) study to get out of high school.	186
70. I would prefer to:	
(a) discover a gold mine, or	
(b) discover a new medicine.	142
115. Teachers feel that I am reckless.	199
112. Teachers feel that I am rebellious.	196
12. Even when I do sit down to study I find that my mind tends to wander.	171

Table C.1 - Continued

Item Content	Index of Association
<u>Second Order Cluster</u>	N
32. I would prefer to: (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.	197
50. I would prefer to: (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.	197

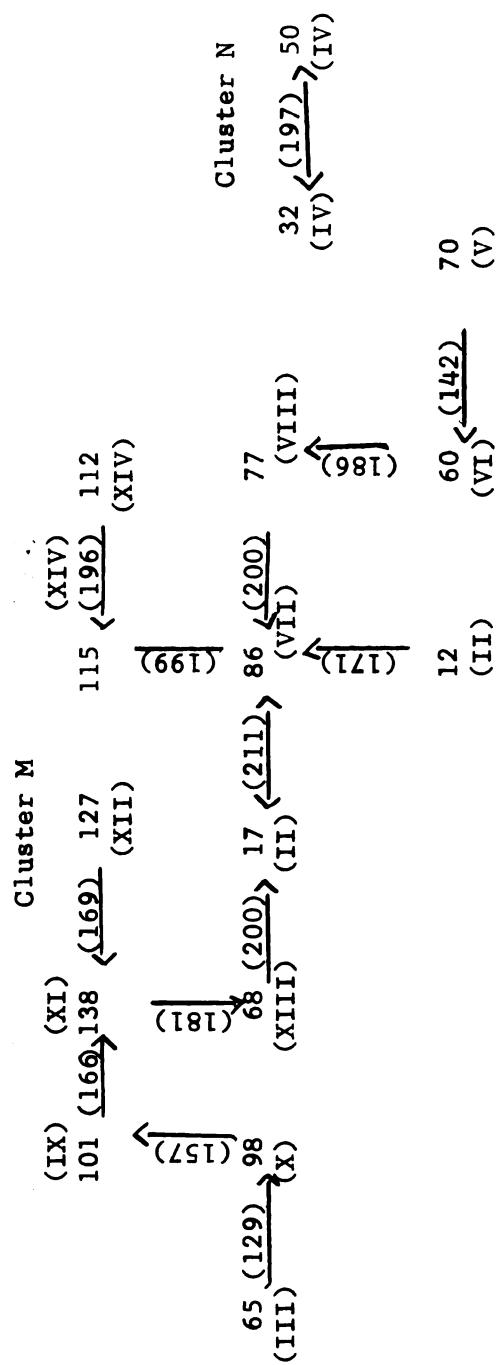
TABLE C.2

ITEM MATRIX AND LINKAGE PATTERNS FOR THE HIERARCHIAL METHOD
SECOND ORDER SOLUTION

Cluster No. I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV			
Item No.	12	17	65	32	50	70	60	86	77	101	98	138	127	68	112	115
12	156	87	149	146	135	153	171	159	141	132	155	136	156	160	158	
17	156	39	169	176	133	175	211	189	137	112	167	138	200	190	196	
65	89	39	70	73	112	66	44	56	104	129	86	105	43	59	49	
32	149	169	70	197	136	176	170	178	144	133	160	147	165	163	165	
50	146	176	73	197	137	183	177	173	147	134	165	146	168	158	172	
70	135	133	112	136	137	142	134	130	130	137	126	137	127	135	133	
60	153	175	66	176	183	142	182	186	148	135	168	135	183	167	173	
86	171	211	44	170	177	134	182	200	134	113	168	139	199	191	199	
77	159	189	56	178	173	130	200	142	142	131	168	143	191	169	183	
101	141	137	104	144	147	130	134	142	157	157	166	157	141	133	143	
98	132	112	129	133	134	137	135	131	157	149	149	142	124	114	110	
138	155	167	86	160	165	126	168	168	166	149	169	169	181	157	159	
127	136	138	105	147	146	137	135	143	157	142	169	138	138	138	138	
68	156	200	43	165	168	127	183	199	141	124	181	138	186	190	190	
112	160	190	59	163	158	135	167	191	169	133	114	138	186	196	196	
115	158	196	49	165	172	133	173	199	183	143	110	159	138	190	196	
Column Sums of Associations																
Item Rank	11	4	16	9	7	14	5	1	2	12	15	8	13	3	10	6

Legend: n in cells represents agreement scores.
underlined numbers represent highest agreement scores in columns.

TABLE C.2 Con't.



APPENDIX D

THE COMPREHENSIVE HIERARCHIAL APPROACH

TABLE D.1

ITEM ASSOCIATIONS

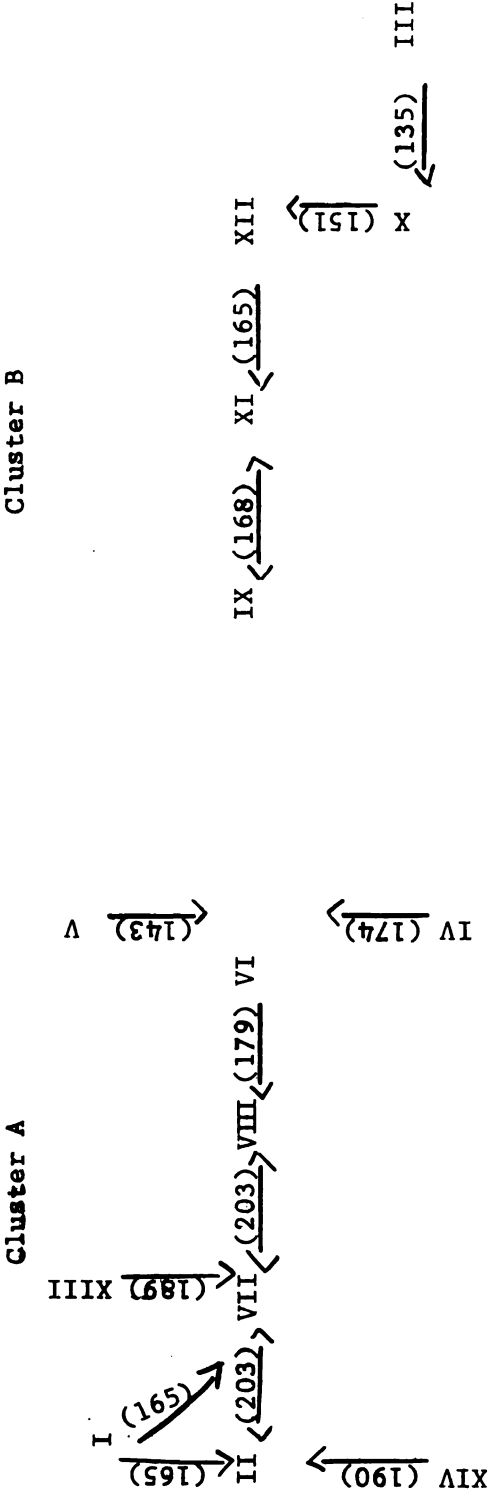
Cluster Number	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV																										
Item Number	12	4	7	11	23	27	65	15	32	50	70	54	60	58	86	79	90	87	89	91	101	97	98	124	99	138	107	116	123	127	136	68	84	36	113	43	134	112	120	115
12	181	156	155	165	159	89	122	149	146	135	131	153	142	171	160	161	158	157	164	141	141	132	131	137	155	154	154	141	136	135	156	160	159	155	156	143	160	159	158	
4	181	167	154	178	174	80	115	164	159	138	126	154	145	172	161	168	167	164	159	137	153	112	111	133	167	174	162	161	138	125	200	194	171	189	180	187	190	195	196	
17	156	167	219	211	209	39	80	169	176	133	131	175	160	211	204	205	204	199	192	137	153	112	111	133	167	174	162	161	138	125	200	194	171	189	180	187	190	195	196	
11	155	164	219	210	208	42	75	168	175	136	134	182	167	210	201	204	203	200	201	136	150	111	104	130	162	167	161	154	139	128	201	193	182	188	185	188	191	198	195	
23	165	178	211	210	196	52	83	170	177	142	134	172	157	206	199	204	195	192	191	134	148	113	114	134	168	167	167	160	139	128	189	191	166	192	177	180	189	194	187	
65	159	174	209	208	196	50	87	166	179	130	134	180	169	206	193	200	201	196	195	140	158	119	116	130	172	120	86	77	81	90	105	106	43	49	66	60	67	64	59	54
27	89	80	39	42	52	50	163	70	73	112	108	66	85	44	43	40	47	54	55	104	88	129	132	120	86	77	81	90	105	106	43	49	66	60	67	64	59	54	49	
15	122	115	80	75	83	87	163	99	106	123	125	97	106	87	78	85	88	97	98	133	117	148	145	135	117	112	112	121	134	135	94	90	99	97	90	101	78	77	80	
32	149	164	169	168	170	166	70	99	197	136	136	176	165	170	169	168	161	164	169	144	166	133	136	142	160	155	161	156	147	132	165	159	158	158	149	154	163	166	165	
50	146	159	176	175	177	179	73	106	197	137	145	183	170	177	174	177	172	169	168	147	149	134	135	145	165	158	160	159	146	137	168	160	159	163	134	157	158	165	172	
70	135	138	133	136	142	130	112	123	136	137	158	142	143	134	137	130	133	136	131	130	132	137	132	138	126	139	141	130	137	128	127	129	136	132	141	122	135	130	133	
54	131	126	131	134	134	134	108	125	136	145	158	148	137	138	143	133	130	135	130	132	139	126	137	124	143	137	146	126	139	126	139	126	139	126	139	126	139	126	139	132
60	153	156	175	182	172	180	66	97	176	183	142	148	197	182	175	184	177	186	185	168	162	135	134	138	168	167	163	160	135	144	183	169	184	152	181	168	167	172	173	
58	142	145	160	167	157	169	85	106	165	170	143	137	197	167	160	163	164	173	172	145	149	134	137	137	153	152	152	159	136	137	168	154	171	151	162	141	150	153	156	
86	171	172	211	210	206	206	44	87	170	177	134	138	182	167	211	216	213	210	207	134	146	113	112	132	168	163	167	156	139	132	199	205	182	186	187	182	191	198	199	
79	160	161	204	201	199	193	43	78	169	174	137	143	175	160	211	207	204	197	196	137	143	114	115	125	163	166	168	145	132	123	190	202	175	183	180	181	186	191	186	
90	161	168	205	204	204	200	40	85	168	177	130	148	184	163	216	207	205	200	203	134	152	115	110	132	170	167	159	174	163	158	159	143	152	150	143	148	149	152	151	
87	158	167	204	203	195	201	47	88	161	172	133	133	177	164	213	204	205	207	200	141	153	116	117	131	157	164	156	147	140	127	194	198	181	177	182	175	178	189	190	
89	157	164	199	201	192	196	54	97	164	169	136	130	186	173	210	197	200	207	215	140	154	123	122	132	170	165	169	158	145	136	195	189	176	178	177	168	177	186	187	
91	164	159	192	201	191	195	55	98	169	168	131	135	185	172	210	196	203	200	215	135	151	120	119	127	167	164	164	153	140	131	196	192	179	175	182	173	174	179	186	
101	141	138	137	136	134	140	104	133	144	147	130	130	148	145	134	137	134	141	150	135	176	157	150	148	166	175	169	164	157	166	141	133	144	134	131	134	133	144	143	
97	141	140	153	150	148	158	88	117	146	149	132	122	162	149	146	143	152	153	154	151	176	141	144	148	170	167	159	174	163	158	159	143	152	150	143	148	149	152	151	
98	132	125	112	111	113	119	129	148	133	134	137	139	135	134	113	114	115	116	123	120	157	141	175	173	149	138	134	139	142	153	124	102	135	115	122	101	114	115	110	
124	131	126	111	104	114	116	132	145	136	135	132	126	134	137	112	115	110	117	122	119	150	144	175	164	144	137	141	146	151	148	121	115	134	120	127	108	109	106	113	
99	137	144	133	134	130	120	135	142	145	138	138	137	132	132	125	132	131	132	127	148	173	164	158	153	151	162	151	162	143	121	140	136	127	132	125	122	131	131		
138	155	160	167	162	168	172	86	117	160	165	126	136	168	153	168	163	170	157	170	167	166	170	149	144	158	189	181	176	169	168	181	159	152	158	151	158	157	160	159	
107	154	149	174	167	167	169	77	112	155	158	139	139	167	152	163	166	167	164	165	164	175	167	138	137	153	189	186	173	164	163	170	160	161	153	148	163	158	167	168	
116	154	159	162	161	167	165	81	112	161	160	141	129	163	152	167	168	159	156	169	164	169	159	134	141	151	181	186	175	162	167	158	160	151	163	152	157	156	163	168	
123	141	148	161	154	160	156	90	121	156	159	130	126	160	159	156	145	152	147	158	153	164	174	139	146	162	176	173	175	163	164	157	169	168	146	167	152	137	144	155	
127	136	135	138	139	139	141	105	134	147	146	137	127	135	136	139	132	137	140	145	140	157	163	142	151	151	169	164	162	163	175	138	130	133	131	126	147	138	131	138	
136	133	136	125	128	128	132	106	135	132	137	128	124	144	137	132	132	132	132	132	136	131	166	158	153	148	162	168	163	167	164	175	139	123	162	130	127	134	135	132	141
68	156	167	200	201	189	201	43	94	165	168	127	143	183	168	199	190	201	194	195	196	141	159	124	121	143	181	170	158	157	138	139	192	187	183	176	177	186	187	190	
84	160	163	194	193	191	189	49	90	159	160	129	137	169	154	205	202	205	198	189	192	133	143	102	115	121	159	160	160	149	130	123	192	173	179	178	175	182	185	186	
36	159	162	171	182	166	176	66	99	158	159	136	146	184	171	182	175	182	181	176	179	144	152	135	134	140	152	161	151	148	133	142	187	173	154	187	152	165	172	173	
113	155	164	189	188	192	182	60	97	158	163	132	126	152	151	186	183	180	177	178	175	134	150	115	120	136	158	153	163	146	131	130	183	179	154	165	162	175	178	177	
43	156	155	180	185	177	179	67	90	149	154	141	139	181	162	187	180	187	180	183	182	177	182	131	143	122	127	127	151	148	152	147	126	127	176	178	187	165	149	168	173
134	143	166	187	188	180	176	64	101	154	157	122	126	148	141	182	181	186	175	168	173	134	148	101	108	132	158	163													

TABLE D.2
CLUSTER ASSOCIATIONS AND LINKAGE PATTERNS

Cluster Number	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
I	165	102	155	133	149	165	161	140	133	151	135	160	161	
II	165	64	173	134	170	203	196	145	119	165	134	186	190	
III	102	64	87	117	89	64	76	111	135	100	120	76	70	
IV	155	173	87	139	174	171	168	147	138	159	141	159	163	
V	133	134	117	139	143	137	133	129	135	133	129	136	131	
VI	149	170	89	174	143	172	179	151	136	159	138	168	158	
VII	165	203	64	171	137	172	203	143	119	161	133	189	188	
VIII	161	196	76	168	133	179	203	145	124	164	138	184	179	
IX	140	145	111	147	129	151	143	145	148	168	161	133	144	
X	133	119	135	138	135	136	119	124	148	146	151	125	116	
XI	151	165	100	159	133	159	161	164	168	165	165	156	158	
XII	135	134	120	141	129	138	133	138	161	151	165	132	137	
XIII	160	186	76	159	136	168	189	184	133	125	156	132	174	
XIV	161	190	70	163	131	158	188	179	144	116	158	137	174	
Column Sums of Associations	1910	2044	1211	1974	1729	1986	2048	2050	1865	1725	1985	1814	1978	1969
Cluster Rank	9	3	14	7	12	4	2	1	10	13	5	11	6	8

Legend: n in cells represents agreement scores.
underlined numbers represent highest agreement scores in columns.

TABLE D.2 Con't.



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