AN ANALYSIS OF FACTORS ASSOCIATED WITH CHANGES IN SCHOLASTIC PERFORMANCE PATTERNS

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THESIS

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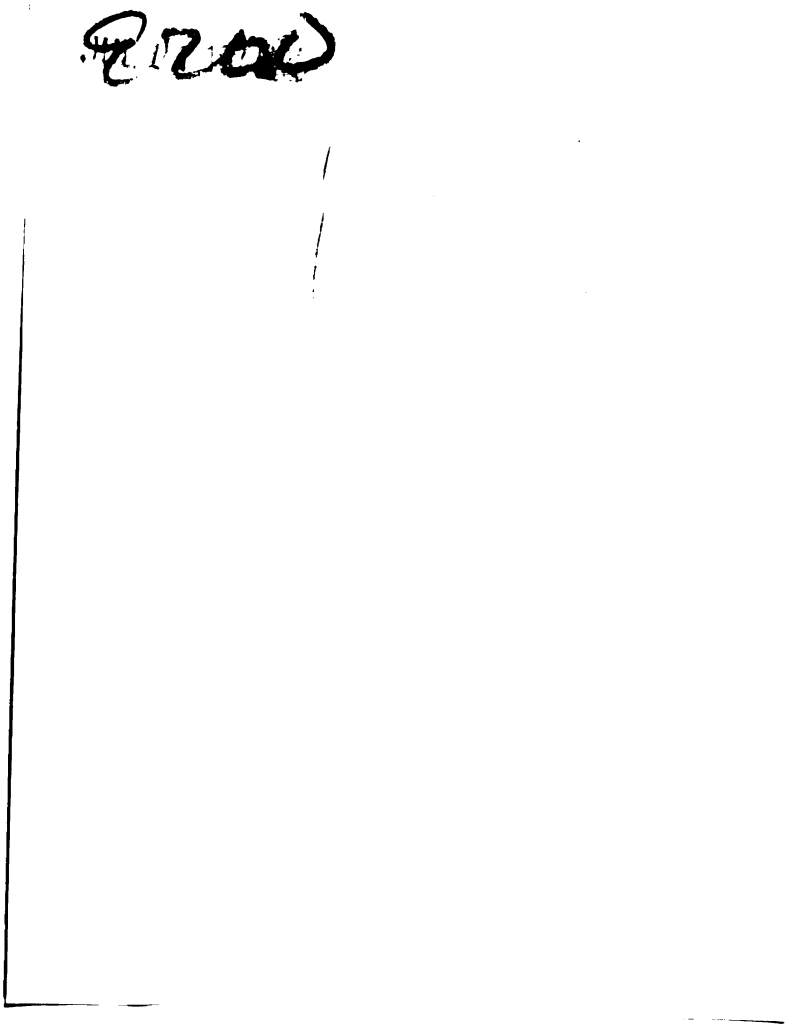

ABSTRACT

AN ANALYSIS OF FACTORS ASSOCIATED WITH CHANGES IN SCHOLASTIC PERFORMANCE PATTERNS

by Rodney T. Hartnett

The purpose of this investigation was to explore the relationship between selected variables and changes in the academic performance patterns of students during four years of college. The study was designed to differentiate between students whose performance pattern improved as opposed to those whose pattern of achievement changed negatively. The basic purpose was to examine the factors thought to have association with the change in performance at the time the change occurred.

The sample selected for the study was composed of 1,041 students who entered a large midwestern university as freshmen fall, 1958, and were in attendance during each fall, winter, and spring term through spring of 1962.

Subjects were classified into change groups on the basis of the difference between their performance predicted from the previous year's grade point average (determined by linear regression) and their actual performance. Any

discrepancy greater than a confidence band of .50 standard errors of estimate was used as the criterion for change classification. The subjects were also classified according to their achievement into high, middle, and low groups.

The change groups were then compared on three types of experimental variables. These variables were: (1) ability and aptitude, (2) attitudes and values, and (3) behavioral characteristics. Used as measures of the aptitude variables were The Michigan State University Reading Test, The College Qualification Test, and A Test of Critical Thinking, Form G. For measures of attitudes and values The Inventory of Beliefs, The Differential Values Inventory, and Rokeach's Dogmatism Scale were employed. The behavioral variables consisted of degree of participation in extra-curricular activities, place of residence, the amount of time devoted to part-time employment during the school year, and a number of personal factors.

Analysis of variance was used as the basis for determining the significance of the differences between the performance change groups on the first two types of variables, whereas chi-square tests were employed for analysis of the data pertaining to the behavioral variables. Throughout the study a

.05 level of probability was used in determining statistical significance.

The ability-aptitude and attitude-value variables failed to discriminate between the performance changers. An occasional F-value exceeded by .05 level of confidence, but no more than would be expected by chance. It was concluded that these variables were not associated with changes in scholastic performance patterns.

The behavioral variables, on the other hand, were more helpful in distinguishing between performance changers. Those making a positive change during the sophomore year, for example, were typically those who: (1) pledged and joined a fraternity or sorority during that year, (2) worked fewer hours at part-time jobs than negative changers, (3) lived in a residence hall (whereas negative sophomore changers tended to list a fraternity or sorority as their place of residence), and (4) participated less in extra-curricular activities. During the junior year, those making positive changes (as opposed to those making negative changes) were characterized by: (1) fewer changes of major field, (2) fewer students becoming "active" in fraternities and sororities, (3) less employment, and (4) less participation in extra-curricular activities. The behavioral variables associated with changes

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in academic performance during the senior year were not as pronounced as during the sophomore and junior years, but still provided some clues regarding behavioral differences. Positive changers during the senior year more likely lived in residence halls, whereas negative changers more likely lived in fraternity or sorority houses.

AN ANALYSIS OF FACTORS ASSOCIATED WITH CHANGES IN SCHOLASTIC PERFORMANCE PATTERNS

By

Rodney T. Hartnett

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CHAPTER I

THE PROBLEM

Introduction

Perhaps no area of research in higher education -- at least in the fields of psychology, sociology, and education -- has received as much attention in the last decade as the broad topic referred to as "research on college students." Originating out of pressures placed on the colleges and universities by soaring enrollments, tight budgets, and questioning citizens, inquiries into the four years of undergraduate schooling have increased rapidly.

Joining with those already probing the area, psychologists and sociologists have recently recognized the vast potential for social psychological research studies of college students. Consequently, we have seen a marked increase in the investigations of the environment of the college campus and its various subcultures. Along with this, there has been a natural growth of interest in research dealing with the personality of the individual college student, and especially the personality changes that take place during the undergraduate years,

presumably as a result of some facet of the college experience.

Prediction of college achievement, of course, has been studied with a number of approaches. Measures of scholastic aptitude, specific subject-matter ability, interests, socio-cultural backgrounds, high school performance -- all of these and others have been used as variables in attempting to predict college performance.

There have been a large number of studies dealing with over and under-achievers, as well as "drop-out" or retention and withdrawal of students investigations, characteristics of diverse curricular area majors, and the like.

Limiting the discussion to research on college students' academic performance alone, it can be seen that roughly four categories of current "types" of research exist: (1) census-type studies, which generally concern themselves with percentages, such as percentage of students withdrawing, percentage of students graduating, etc., (2) autopsy-type studies, which usually are post facto studies in the sense that they study characteristics of students who have withdrawn or been dismissed, (3) case-study approaches, which concentrate extensively on small samples of selected students for various reasons, and (4) prediction studies, generally attempting to

relate selected admissions variables to success or failure criteria (51).

Research findings in these areas will be further discussed in Chapter II. They are listed here, however, to illustrate the particular dearth of information which typifies our knowledge of what factors are associated with patterns of academic performance during the student's years in college. The existing research on college students' academic performance has concentrated on two points in the student's course -- early college achievement and the eventual record at graduation or withdrawal. This approach has overlooked the intervening performance pattern. This assumes that scholastic performance patterns are stable, an assumption which is not necessarily true. Students are generally regarded as being high achievers, low achievers or "average" achievers. The possible deception in this standard classification is that the student may be all of these at different times in his undergraduate years. The "average" achiever, for example, may actually be one whose term-to-term pattern consists of peaks and valleys -- high performance one term, low the next term, and so on. Or he may actually be a high achiever, but one whose over-all grade point average is depressed by low performance during his initial terms, or by a short-term period during later terms.

The point being made here is essentially this: that while for some students the performance pattern in college is quite consistent from their freshman year to their time of graduation or withdrawal, this is often not the case, and that, in contrast, many students' patterns of attainment are characterized by gradual downward or upward trends or a "roller-coaster" up and down model. Consequently, to judge one's performance pattern by a cumulative grade average may be quite deceptive, for the process of averaging may actually conceal the most revealing index of the present level of achievement.

Those familiar with and involved in higher education can readily recognize the importance of understanding more about the student's performance pattern as opposed to a cumulative index of achievement. A student with an over-all grade point average of 2.5 might well be overlooked as one who possibly has academic difficulty, yet if it is understood that this 2.5 represents the average attainment, and his term-to-term pattern consists of a number of changes in his level of attainment, then further consideration should be given to this student's performance status.

While this kind of performance analysis has been attempted in modified forms at several universities (56, 87) there has

been, up to this point, a failure to ferret out the factors which might have some bearing on inconsistent performance patterns. If it can be demonstrated that student X, who has a grade point average of 3.0, is nevertheless a student in need of some assistance because of his instability of performance, the probem is only recognized. The question must still be answered: What factors seem to be associated with gross changes in college students' levels of scholastic attainment?

Various studies have indicated a relationship between such variables as attitudes, values, and beliefs, to changes in one's curriculum (51, 54). These same variables have been demonstrated to bear some relationship to withdrawal and attrition rates (43). Certainly such variables as attitudes, values, and beliefs would possibly be associated with sizable changes in academic performance.

There has also been a considerable amount of research regarding the mutual association of various student activities (i.e., fraternities, student government, etc.) and various levels of attainment in college, eventual graduation, or subsequent withdrawal. Once again, such variables would conceivably be important to consider in any investigation of changes in one's academic performance pattern.

The academic performance of a college student may simply be regarded as a specific sample of behavior. Like other bits of behavior, it is susceptible to change and is affected in various ways by different situations and previously held dispositions to behave in certain ways. Unfortunately, however, too few recognize that performance patterns change, and even fewer have attempted to isolate any factors associated with such changes.

Statement of the Problem

The problem investigated in this research is the relationship between various selected factors and changes in students' academic performance patterns during four years of undergraduate study at Michigan State University. The factors to be studied include certain measured "personality" variables, measured indices of aptitude or ability, and various biographical data pertaining to employment, the amount of participation in extra-curricular activities, place of residence during school, and the like.

It is hoped that the findings reported herein will be of value in better understanding some of the basic reasons related to students' inconsistent grade achievement during their four years in college. While the investigator realizes that

mere association of various factors with irregular patterns of performance does not necessarily mean causality, it is at the same time recognized that exploratory studies must come first if we hope to isolate the conditions associated with academic inconsistency.

Factors to be Examined

The factors to be examined can be classified into three categories: (1) abilities and aptitudes, (2) attitudes and values, and (3) behavioral variables.

The ability and aptitude factors may be further delineated into general aptitude, reading ability and critical thinking ability, all three which were measured by instruments discussed in Chapter III.

The factors falling under the "attitudes and values" category include dogmatism, personality rigidity, beliefs, and values. These characteristics were also measured by instruments described in detail in the third chapter.

Finally, those factors which have been given the label "behavioral" include amount of participation in extra-curricular activities, amount of weekly employment during the school year, place of residence during the school year,

and events or occurrences that may have been peculiar to the individual student. This information was gathered partially by questionnaire and partially by examination of the students' records, and, once again, will be discussed in detail in Chapter III.

Definition of Performance Change

In the final analysis, regardless of the statistical manipulations involved, any definition of what is a sufficient performance change must be arbitrary. The procedure used to determine the students whose performance pattern changed enough to merit further consideration, had to first cope with the problem of regression. Because of errors in measurement there is a normal tendency for any imperfect measure (in this case, a grade point average) to converge toward the mean score for the entire group. To insure against this statistical artifact confounding the present study, a regression analysis procedure was utilized.

On the basis of their freshman year performance, regression equations were calculated for the group, yielding the expected performance of the students for the sophomore year. Because of a sex difference in the grade point averages, the regression formula was computed separately for males and females.

The formula used for determining the expected grade point average was (59):

$$X' = r\frac{\sigma x}{\sigma y} Y + (M_x - r\frac{\sigma x}{\sigma y} My)$$

where (using as an example, the prediction of sophomore grade point average on the basis of freshman grade point average):

σx = standard deviation of sophomore g.p.a.'s
σy = standard deviation of freshman g.p.a.'s
Mx = sophomore year mean grade point average
My = freshman year mean grade point average
Y = freshman year grade point average

After the entire group had been used in the regression procedure to determine their expected sophomore grade point average, the students were classified into three groups -- high, medium, and low, on the basis of the scholastic performance during their first year in college. This three-way division was necessary since the cognitive factors to be examined are highly related to achievement. Therefore, it was considered that a rough achievement grouping such as the one employed would reduce the possibility of this factor contaminating significant associations if they were to be found. The stratification procedure was done by simply calling those on the lower third of the first year grade point average distribution the low group, those on the upper third the high group, and those falling between these two points the middle

group. The actual g.p.a. ranges for the groups are presented in Chapter IV.

For the successive years, the three-way stratification and basis for prediction of the next year's achievement level was always moved up one year. In other words, when predicting the sophomore level of achievement, the achievement grouping was done on the basis of the freshman achievement and the freshman grade point average was used as the predictor variable. When predicting the junior year level of attainment, the achievement grouping was done on the basis of sophomore achievement and the sophomore grade point average was used as the predictor variable. Finally, when predicting the senior year grade point average, the achievement grouping was done on the basis of the junior year attainment, and the junior year grade point average was used as the predictor variable. By this procedure, it was assured that the standard "over and under achiever" patterns would not be the criterion of performance change, but that the student would have to change from term-to-term on the basis of his or her most recent level of achievement.

Comparison of a student's predicted performance with his actual performance then resulted in a discrepancy score. To illustrate: one of the students involved in this study

received a freshman year cumulative grade point average of 2.50 which placed him in the middle achievement category for the freshman year. By means of the regression equation calculated for the group, his expected score for the sophomore year was 2.52. He received a true sophomore grade point average of 3.11, the difference between his actual grade point average and his expected or predicted grade point average is 3.11 - 2.52 = .59.

The obtained discrepancy score was considered to be large enough for "change" classification if it was more than .50 standard errors of estimate. The confidence band of .50 standard errors of estimate was chosen for several reasons. First, it is large enough to require that a fairly wide discrepancy between observed and expected achievement levels actually occur before one is labelled a "changer." Second, it conveniently divides the sample in approximate thirds, and finally, use of a larger standard error of estimate would have resulted in change groups too small for statistical analysis, especially for the female sample.

The formula used for determining the standard error of estimate was (2):

$$\sigma_{est.} = \sigma_y \sqrt{1-r^2_{xy}}$$

where: r^2_{xy} = validity coefficient (correlation between predictor variable and criterion variable)

σ_y = standard deviation of the criterion variable.

Returning to our previous example, the discrepancy of .59 between the predicted grade point average and the true grade point average would be sufficient to place that student in a "change" classification, since it surpasses the .50 standard error of estimate band (cut-off points for grade point averages using the .50 standard error are also presented in Chapter IV.) Therefore his upward change (.59 grade points up from his expected level) would classify him as medium achievement, positive change.

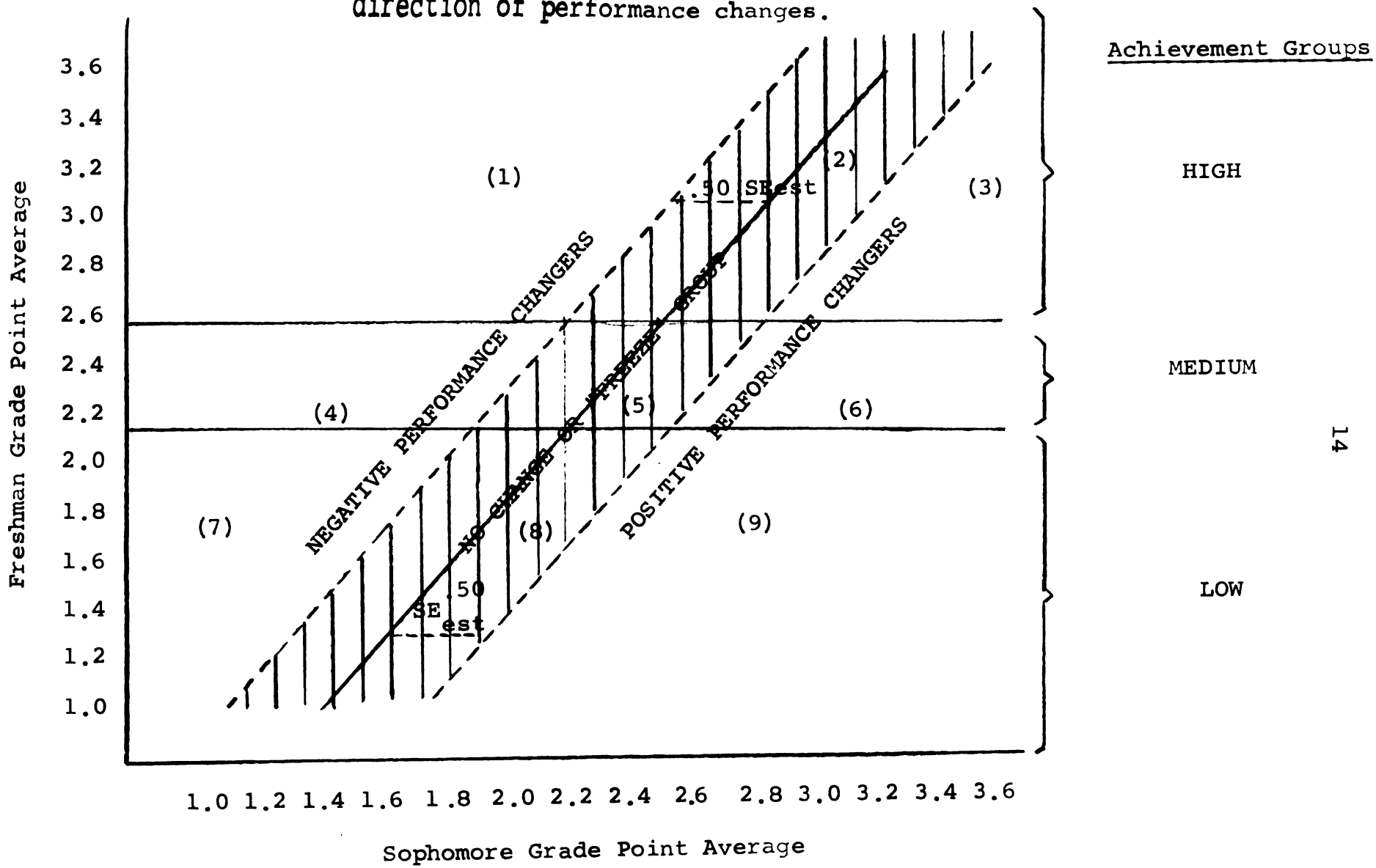
It can be seen, from what has been said, that for any one change point (sophomore, junior, or senior), a student may fall into one of nine possible classifications:

		Direction of Performance Change		
		− (Neg.)	0 (Freeze)	+ (Pos.)
Achievement Levels	High	1	2	3
	Medium	4	5	6
	Low	7	8	9

This procedure was repeated three different times, once for each of the three observed achievement points at the end of the sophomore, junior and senior years. The intent, of course, was to examine the variation in performance patterns from year-to-year and not just for the freshman to sophomore transition. Figure No. 1 on page 14 presents the outline of the regression model used to select the achievement groups and the performance changers. The numbers 1 - 9 in parentheses coincide with the chart on this page.

It is important to keep in mind that the grade point average used as the indices of achievement during the sophomore, junior and senior years was not a cumulative grade point average. It was the level of academic attainment achieved by the student during that particular academic year only. Utilization of a cumulative index would not have revealed

Figure 1. Regression of freshman grades on sophomore grades, illustrating achievement classification and direction of performance changes.



realistic changes in the students' performance patterns, since the inclusion of the past totals would either depress or raise the present level of performance, thereby disguising radical performance changes.

The Hypotheses

As the review of literature presented in the next chapter demonstrates, much of the existing research bearing relevance to this investigation is either vague, inconclusive, or even contradictory. Moreover, the concept of scholastic performance change used in this study has not been employed previously in research dealing with the three classifications of variables being analyzed. As a result, the hypotheses, although evolving out of the general review of literature, lack the traditional framework of a stable theory. Keeping in mind, however, that this is essentially an exploratory investigation, it was considered necessary to define more clearly the direction of the investigation. Consequently, taking care to avoid the null form, the following hypotheses were used as guidelines for the study:

1) It is possible to differentiate among groups of students classified by direction of academic performance change, on the basis of their scores on ability and aptitude measures.

2) It is possible to differentiate among groups of students classified by direction of academic performance change, on the basis of their scores on attitude and value measures.

3) It is possible to differentiate among groups of students classified by direction of academic performance change on the basis of the amount of their employment, their place of residence, degree of participation in extra-curricular activities, and various personal factors.

Scope and Limitations of the Study

Not unlike many research studies dealing with college students' academic performance, the present investigation was hampered by several limitations. While recognized as factors to be considered when drawing inferences from the findings, however, it is felt that the limitations listed are not sufficient to offset the importance of the data presented.

One of the first limitations concerns the sample. Only those students who remained in continuous attendance (except for the summers) for four years following the term of their enrollment were included. Obviously, students who withdrew from the university were not among those for whom it was possible to compute the attainment patterns in the sophomore, junior and senior years, depending on the time of their withdrawal. But neither were their levels of attainment used in the regression equations used in arriving at predicted levels

of achievement. It was felt that inclusion of the grade point averages of those students who dropped out of the university would lend a spurious change pattern to those who remained in school for the entire four years.

A second limitation is one encountered by numerous investigators employing data pertaining to obtained measures of personality. These measures, in this study, were used to determine such personality traits as dogmatism, rigidity, beliefs, and values. The typical approach to measuring these various characteristics is to elicit from the respondent some indication of his feeling or judgment on an empirically derived affective scale. There is no guarantee that this response is an honest one, nor, assuming that it is honest, is their any evidence that this felt attitude has any stability. Nevertheless, this is a limitation faced by nearly all investigators engaged in research of this nature, and if it is to be considered as a limitation, it certainly is not one which is peculiar to this particular study.

There are other limitations concerned with the grades of the students, the variable used to construct the entire study. Probably most obvious is the problem of different grading standards. The utilization of grade point averages for various statistical manipulations such as part of a regression

equation, or simply a rough classification procedure as that employed here, makes the assumption of uniformity of grade assignment. However, what is work of "A" calibre for one professor may only be deserving of a "B" for another instructor in the same course. As a result, changes in the academic performance patterns of the students may possibly be the result of different faculty standards, not any factor dealing with the student at all. Different curriculum standards (i.e., unequal standards in different academic departments) is a similar difficulty.

The students who carry part-time loads introduce another type of limitation under the grading problem. It is possible that changes in one's pattern of attainment may actually be the result of his credit-hour-load. Only grade point averages were considered here, and consequently those carrying one or two courses were not separated from those carrying full academic schedules.

Still another limitation having to do with the grade factor is the problem of repeated courses. Students receiving unsatisfactory grades in courses have the opportunity of repeating that course with the good probability that their grade will be improved. No extra credit is given when the course is repeated, but the honor points earned are substituted in place

of those deserved during the student's first time in the course. As a result, a student could conceivably go from a low level of achievement to a very high level, as long as his performance in the repeated courses is much better. Again, the change in performance pattern may actually be a function of repetition of courses, rather than any of the variables being examined in this investigation.

These limitations regarding the grading factor, while lending a proper note of caution to the interpretation of the results, do not render meaningless the grade-based procedure employed. In spite of the recognized limitations, grade point averages still represent reliable evaluation and certainly remain our best estimate of student performance.

Importance of the Study

The importance of this study is best illustrated through considerations of the basic substantive and methodological implications. Analyses of patterns of academic performance in lieu of a cumulative grade point average offers a different procedure for evaluating student progress and the effects that different experiences have on this scholastic performance. Some of the techniques employed for measurement of the behavioral variables (i.e., the Activities Index) also present

a relatively new way of viewing the student sub-culture. In these respects, the importance of the study basically lies in its method of investigation. It is important because it is suggesting a new approach to an old problem and denotes a further contribution of research to our body of knowledge. This study may not provide clear-cut information of practical meaning to anyone, but if it serves as a "springboard" for allied research, then its importance is recognized.

But its importance can also be illustrated through consideration of the implications this research holds for both the students and the university. While it is agreed that research need not be of a pragmatic nature to be meaningful, it is also felt that an understanding of some of the applications of the findings may lend more significance to educational research.

In terms of the student, analysis of factors associated with academic performance patterns may yield discoveries having various implications. Students experiencing difficulty in maintaining a stable pattern of achievement, but who are unable to understand the reasons for their inconsistency, might be better able to appreciate their personal situation. Existing research, for example, indicates that participation in extra-curricular activities has little or no effect on the

scholastic achievement of college students (74). If, however, it is revealed that periods of peak activity in the various campus organizations are associated with a downward trend in the student's level of performance, then appraisal of one's outside-of-class activities may be pertinent.

In terms of the university, the research related to students' performance patterns has multiple implications. Better counseling could be provided those students who are beset with difficulties related to negative fluctuation of their academic performance. If it is revealed, for example, that personality rigidity is a factor associated with students whose pattern of attainment is somewhat of a "roller-coaster" type, then it is conceivable that a more direct approach to resolving the situation could be available.

Finally, those involved in student personnel administration might find the results of this study meaningful and helpful as guidelines in the establishment of various policies regarding student housing, fraternities and/or sororities, participation in out-of-class activities, student employment and the like.

A critical reivew of the literature related to this study will be presented in the following chapter. The findings of

previous investigators will be reported and discussed. In Chapter III an account of the methodology of the study is presented, including a description of the sample, a discussion of the instruments used, procedure for gathering the data, and the processing and analysis of the data. In the fourth chapter the results of the analysis are presented, and the fifth and final chapter of the thesis contains the summary.

CHAPTER II

A REVIEW OF LITERATURE

While it is true that research on college students has increased notably in the past decade, it is also true that there is a great need for more which is of high quality. This is especially true in the area of college students' academic performance patterns. As suggested earlier, the current literature is addressed primarily to the "pre-" and "post-" points, and tends to overlook completely the pattern during college.

The present chapter is the result of an attempt to review that research which has some bearing on the thesis. It discusses both the findings regarding the "factors" under examination and also the various instruments used.

General Overview

Prediction studies and drop-out studies have proven to be the paths most often chosen by those interested in exploring the area of college students' academic performance. Although not directly related to an analysis of changes in

performance patterns, a number of these investigations shed considerable light on the over-all problem of student achievement and many of the variables involved.

Probably the most comprehensive report on student withdrawal at the time of this writing, is a census study by Robert Iffert (42). Sponsored by the United States Office of Health, Education and Welfare, Department of Education, Iffert surveyed nearly 150 colleges and universities in 1950. Foremost in his findings were the revelations that approximately 50% of a college's student body departs from school within four years after beginning, about 40% graduate "on schedule," and roughly 20% go on to graduate from some college some day. In this regard, Iffert's study is supported by investigations of others (58,76).

College drop-outs apparently do not differ significantly in sex (46,63,75), or age (18,77), but can be distinguished on the basis of certain socio-economic characteristics such as father's occupation (75), parents' education (64) and size of hometown (22). Almost all studies of drop-outs have revealed significant differences in high-school performance, early college achievement and scores on various measures of aptitude or ability, with the drop-outs being lower in all three instances.

Of the wealth of information garnered from drop-out studies, that which has the most relevance for the present investigation may well be found in the area of motivation. That various motivational factors are extremely important in the evaluation of patterns of scholastic performance is a fact highlighted by most of the studies which consider motivation. Iffert's study (42) revealed that of 1450 withdrawals, 48% of the men and 33% of the women report disinterest in their studies as a primary reason for dropping out. Freedman (24) and Farnsworth (18) also report lack of motivation as being an important reason for withdrawal.

Vocational motivation is even more obviously related to scholastic performance. A number of investigators have shown, for example, that students who have made definite vocational choices are more likely to be successful college students academically (23,42,69,81).

Generally, however, drop-out studies have been far from satisfactory in terms of answering questions regarding college students' ongoing performance. They have had some influence, however, on our understanding of a terminal point in one's collegiate career.

Attitudes, Values, and Scholastic Performance

Not previously considered as factors having any bearing on academic performance, there has been a recent growth in the amount of research attempting to relate attitudes and values to academic performance in college.

Heist and Williams (35), in a study of the freshman class at California Institute of Technology, attempted to determine some of the correlates of different levels of achievement within a relatively homogeneous group of high ability students.

Dividing the all-male group into three achievement groups (high, medium, and low) on the basis of their freshman year grade point average, they then obtained the students' scores on various inventories, including the Omnibus Personality Inventory, the Strong Vocational Interest Blank, The Allport-Vernon-Lindzey Study of Values, and two specific biographical items relating to student interests and expectations.

They found that the primary distinguishing feature among the groups was a tendency on the part of the high achievers to value more highly a strong orientation toward inquiry, and

speculative and creative thought.

Ehrlich (16) explored the relationship between students' degree of dogmatism and their academic achievement. Using Rokeach's instrument to measure dogmatism, the author hypothesized that if dogmatism implied a "closed cognitive structure," then this would have some effect upon one's capacity to learn, independent of academic aptitude. The results confirmed Ehrlich's hypothesis.

Lehmann (53) examined the relationships between various cognitive and affective variables to student performance in common courses. The cognitive and affective variables in this case were six in number: the Inventory of Beliefs, A Test of Critical Thinking, Rokeach's Dogmatism Scale, Prince's Differential Values Inventory (affective measures), and the College Qualification Test and Michigan State University Reading Test (cognitive). The dependent variable of student Performance was designated as achievement in the required freshman courses of Communication Skills and Natural Science, as well as the first term grade point average.

For the most part, Lehmann was unable to establish a relationship between the affective variables and the criteria of scholastic performance. The correlation of greatest

magnitude for the Differential Values Inventory, for example, was .11 with freshman year g.p.a., while the others using this variable were in the neighborhood of .05. The correlations between Rokeach's Dogmatism Scale and academic performance were of a somewhat higher magnitude.

The author concludes that while the affective measures used did not result in any significant relationships with academic performance, the inclusion of affective measures can increase multiple correlations between cognitive variables and academic performance.

Findings somewhat contradictory are reported by Neel (62). Using the F-scale, a measure used by Adorno, Brunswick, et al., in their study of the Authoritarian Personality (1950), Neel attempted to analyze the relationship between degree of student prejudice (subsequently labelled "authoritarianism") and classroom performance. Her findings suggest that authoritarianism is related to certain kinds of learning, and that authoritarian subjects would experience difficulty in absorbing subject matter which is of a humanitarian nature, such as social science.

Howard and Warrington (40) found a relationship between student beliefs and academic performance. They administered

the Inventory of Beliefs to students at the beginning of their freshman year, at the end of their freshman year, and once again at the end of their senior year. For the females, there was a significant positive relationship between the Inventory of Beliefs and senior grade point average. However, there was not a significant correlation between test score and grade point average for the males. The authors also report that the grade point average did not correlate significantly with gain scores on the Inventory of Beliefs.

Using a modified form of the Semantic Differential to measure values, Winter (85) attempted to guage the similarity in values between a group of college students and their instructor, and to relate this similarity to their academic achievement in his class. The Semantic Differential, as described by Osgood, is designed to elicit responses regarding three concepts: value, strength, and activity. Winter's study, however, was concerned with the value dimension, and only those adjectives with highly-intercorrelated value concepts were included.

Administering the Semantic Differential to 34 freshmen men enrolled in a required course in general psychology, Winter compared their obtained scores with their instructor who had earlier taken the same inventory. The students were

also asked to predict how they thought their instructor would answer the same items.

Winter's findings suggest that the more similar in values a student was to his instructor, the higher was his achievement in class. The investigator suggests that since the professor is generally a scholarly person, a student with discrepant values would be a non-scholar, one who is not motivated to read and study. In any event, the findings do indicate the importance of non-intellectual factors, especially values, in college achievement.

Just a little more than a year after Winter's study was reported, he once again published the findings of research related to student values and academic achievement (84). In the latter investigation, Winter used a slightly larger sample of students enrolled in two general psychology courses, and two special procedures: the first involved ranking fifteen different concepts as to their value for the individual making the ranking, and the second involved re-ranking these concepts as the student thought his instructor had ranked them. These "concepts" were play, professor, college, cheating, good time, easy money, work, studying, homework, books, grades, athletics, tests, social activities, and research. Once again, Winter concludes that grades in psychology were

correlated with the degree of similarity in values between a student and his teacher. On the basis of his findings in the more recent study, however, he also concludes that academic performance is related to the degree of democratic, non-ethnocentric values the student holds.

Red, McCary and Johnson (67) conducted a study attempting to determine the degree of relationship between some measures of aspiration and academic achievement. Tests administered in the investigation included an adaptation of Cassell's Level of Aspiration Test, Otis Quick Scoring Mental Ability -- Gamma, and Revised Beta. These three instruments were given to 101 freshmen and sophomore students and their scores on these measures were compared to their grade point averages. The investigators report that all correlation coefficients and comparisons between measures of academic achievement and measures from the aspiration tests show little or no relationship between the two variables. Unfortunately, however, the description of methodology employed in this study was all too brief. Although the reader is informed that the correlations between measures of aspiration and measures of academic performance are insignificant, no correlations are presented for the reader's appraisal.

In an interesting piece of research regarding conformity and achievement in college, Erb (17), has attempted to develop a technique for measuring conformity and to relate this measure to college grade earning ability. Conformity and non-conformity were determined by a procedure similar to that used in a Rorschach ranking test. The subjects, who were 25 males and 25 females scoring immediately above and below their respective medians on the School and College Ability Test upon entering college, were asked to respond to a series of statements dealing with their self-concept. Conformity or non-conformity was then based on pupular versus infrequent placement of the items in a Q-sort. Popular placements were interpreted as conformity, while idiosyncratic placements were used as indices of non-conformity.

Erb found that the higher conformity females achieved better than low-conformity females at beyond the .05 level of confidence. The mean grade point average for the lower conformity females was 2.16, while the mean g.p.a. for the higher conformity females was 2.61. For the males, however, no differences were found. The mean grade point average for the lower conformity males was 1.77 as opposed to 1.49 for the higher conforming males. While this difference was not demonstrated to be more than a chance occurrence, it is

interesting to note that the conformity-achievement pattern nevertheless reverses itself for the males.

Although Erb's analysis is subject to several methodological shortcomings (i.e., no statement of theory, failure to state rationale used in sample selection and size, incomplete information regarding the Q-sort procedure, and a confusing report), his findings nevertheless suggest that conformity, which is essentially a value regarding adherence to norms, might be a meaningful factor to consider when analyzing the complex pattern of scholastic performance.

Many other studies have been reported which have examined the relationship between non-intellective factors and scholastic performance in college. For the most part, however, these investigations have concerned themselves with measures of personality characteristics which are more temperament-oriented rather than attitude or belief directed. An interesting attempt at developing an instrument which sides with the latter approach has been reported by Fricke (27). Essentially a device for measuring achievement motivation, Fricke's instrument, The Opinion, Attitude, and Interest Survey, has been demonstrated to correlate .40 with grade point averages using a sample of 209 students. For the most part, however, existing inventories or "tests" lie in areas other than the

attitude or value domain. Descriptions of the instruments used in this investigation will be reported in Chapter III.

Tests of Aptitude and Academic Performance

The relationship between intellectual ability or academic aptitude and scholastic performance in college has been explored by many investigators.

A study at the University of Wisconsin by Lins and Pitt (56) involved a group of nearly 2,000 freshmen. Using number of semesters in school as the criterion of academic performance, the authors noted that the higher the percentile rank of a student on the American Council on Education Psychological Examination, the more semesters he was likely to remain in school. The relationship was not as large as we might expect, however, as the examiners reported a correlation coefficient of .29.

A study at the State University of Iowa (44) reveals a definite relationship between percentile rank on the S.U.I. Placement Tests and persistence in college. Using a procedure nearly identical to that employed by Lins and Pitt, the Iowa investigators found that a much greater percentage of high-ability students go on to receive a college degree. For

example, of 319 students whose composite placement scores were below the 30th percentile, only 71 received degrees, while of 341 students above the 70th percentile, 173 received degrees.

Both of the foregoing have a great deal of support. Summerskill, in a review of the research in this area (76), found 19 studies of scholastic aptitude and its relationship to college attrition rates. He reports that average scholastic aptitude scores were found to be lower for drop-outs than for graduates in 16 of those studies.

A study dealing with student performance rather than the withdraw-remain dichotomy, is reported by Juola (47). Following an entire entering class at a large university through their first two years of college, correlations were computed between scores on the orientation tests (made up of an English Test, Arithmetic Test, Reading Test, and The College Qualification Test) and term-by-term grade point averages over the two year period. In discussing his findings, Juola concludes that while aptitude tests do bear considerable relationship to academic performance, the measures used in this study became substantially less precise as predictor variables beyond the first term. The trend suggests that predictive validities decrease from .60+ the first quarter to .30 and less the sixth term. There was also data presented

to show that this same pattern appears to function whether specific course grades are used or whether the grade point average is considered.

In a later study designed to examine the relative "predictability" of five college-level academic aptitude tests, Juola administered the College Qualification Test, Form B, the School and College Ability Test, Form A, the A.C.E., the Ohio State Psychological Examination, and the Scholastic Aptitude Test, to differing samples of college freshmen (48). Using the freshmen grade point average as the criterion of academic achievement, correlations were computed between students' scores on the five measures of academic aptitude and their early college performance. The resulting matrix led Juola to conclude: 1) the coefficients obtained from the five different instruments were almost the same, 2) the correlations were higher for the females, 3) total scores on all the tests were generally as good an index of attainment as the most relevant sub-score, and 4) the College Qualification Test seemed to have more applicability for the male population and the SCAT for the female population.

In a third investigation of the applicability of aptitude tests for prediction of college attainment (49), Juola examined only the College Qualification Test, but analyzed

its relationship to performance in diverse curricular areas. Using both zero-order and multiple correlations, and students divided into six samples according to their curriculum, the criteria used as level of academic attainment were the first quarter grade point averages. On the basis of his analysis, Juola concludes that the total CQT battery seems to be as efficient as optimal weighting of subscores in multiple regression when predicting attainment of students in the non-technical areas,but that multiple correlations using the sub-scores yields coefficients of greater magnitude when predicting grades in the technical curricula.

John L. Holland (37) performed a study testing the use-fulness of combining a personality test with an aptitude test in predicting scholastic success. Using the California Psychological Inventory and the Scholastic Aptitude Test, Holland analyzed their relationship, both separately and combined, for a sample of exceptionally talented college freshmen attending 291 colleges and universities.

After analysis of his findings, Holland concludes that both the CPI and the SAT are useful in predicting college freshman grades for a sample of high aptitude high school seniors, but that combining the two instruments and using a multiple regression procedure results in a coefficient that

is two or three times as large as the zero-order correlations. Unfortunately, Holland neglected to include the figures for the multiple-correlation in his report, and the reader is left with no basis on which to make a personal judgment.

Reporting findings consistent with those presented by Juola in an earlier study reviewed, Seashore (71) presents data leading to the conclusion that in terms of their collegiate academic performance, women are more predictable than men. He presents evidence acquired by utilization of both the Differential Aptitude Test battery and the College Qualification Test, and points out that of all the correlations developed between aptitude and academic performance by use of these two measures, by far the greater number favor the women. In fact, of those correlations revealing significant differences, 71% favor the women. As Seashore suggests, such findings probably raise more questions than answers, and the first question which comes to mind at this point is how do the performance patterns of men and women compare?

In order to examine the validity of the General Aptitude Test Battery as a predictor of college success, Sharp and Pickett (72) analyzed the relationships between the various aptitudes measured by the G.A.T.B. and grade point averages of 262 college juniors and seniors. Each of the nine

"aptitudes" were correlated with the grade point averages of the entire sample and also with the performance of students' categorized into engineering, business administration, education, and physical education. The investigators found many of the correlations to be significantly greater than zero, but none exceeded .50. Those students who were successful in Engineering course work ("successful" meaning their cumulative grade point average was above 2.10) scored significantly higher in verbal, numerical, spacial, general "intelligence" and form perceptual aptitudes, while scoring somewhat lower in the manual dexterity aptitude when compared to Engineering students whose cumulative g.p.a. was below 2.10.

Combining high school performance with the School and College Ability Test, Klugh and Bierley (50) attempted to determine the validity of the SCAT against a criterion of first semester grades in college, and also to determine whether a significant improvement in prediction could be obtained by using the student's high school grade point average in conjunction with the ability test. Their obtained intercorrelations indicate that the SCAT is definitely a valid predictor of early college achievement, as the r's range from .51 to .67 for different years and sexes. Combining the high school grade point average with the SCAT score, however,

strengthened the correlation even more. The multiple regression figures using both the SCAT and high school performance ranged from .66 to .78, in each case being significantly higher than the correlation obtained by using only the ability test.

Attempting essentially the same thing with a different predictor variable, Hansmeier (31) examined the relationship between the Iowa Tests of Educational Development and college first year grade point averages. Using as the sample 401 students (102 men and 299 women) who enrolled at a midwestern teacher's college in 1954, zero-order correlations were computed between the ITED composite score and freshman grade point averages. This relationship was .71. The nine individual tests of the ITED were also correlated with freshman achievement, as the regression figures for these ranged from .49 to .63.

Of all the multiple aptitude batteries, probably the most research has been performed with the Differential Aptitude Tests (DAT). There is an abundance of validity data available for the DAT, with the general reports indicating high validity coefficients when using college achievement as the criterion variable (2).

Much more published research is available which points to the relationship between various aptitude or ability tests and achievement in college. But review of more relevant research studies at this point would not add to the information already gathered. The bulk of the research in the area of aptitude or ability tests and academic performance in college indicates that: (a) there is a definite positive relationship between most of the currently popular tests of ability or aptitude and college achievement; (b) the relationship decreases steadily from the early stages of college attainment through the senior year; (c) females are more predictable than males; and (d) multiple correlation procedures, especially when adding performance in high school, add to the magnitude of the correlation between ability or aptitude and college achievement.

The Behavioral Variables and Academic Performance

Only recently have there been indications of an awareness of the relationship between academic performance and such behavioral variables as employment, marital status, membership or non-membership in a fraternity or sorority, and the like. The literature seems to be gradually accounting for the influence of the behavioral variables and, hopefully,

this trend will prove fruitful.

In an attempt to explore the relationship between outside employment and achievement in college, Trueblood (79) 1951 utilized a sample of students in the school of business at a large midwestern university. Classifying students according to the amount of outside work and class credits being carried, Trueblood calculated the relationship between amount of work and the criterion variable of grade point average. His findings suggest very little relationship, with obtained coefficients being either slightly negative or positive.

Criticizing Trueblood's study for failure to account for individual student potential, Dickinson and Newbegin 1954 (13) selected for analysis a sample of all entering freshmen students at a large western university in 1957. Here again, students were categorized according to amount of work and class credits. The criterion variable in this case, however, was <u>expected</u> achievement, an index arrived at by means of a multiple regression procedure utilizing scores on entrance examinations and other data. The students in this sample were also classified according to age and marital status. Interestingly, the investigators report an increase in relative achievement with an increase in amount of work hours per week. For example, the mean achievement index for students

indicating a 0-4 work bracket was 0.19, while the mean achievement index for those students working 25 hours or more per week (with the same number of credit hours!) was 0.32. In spite of these rather interesting aspects of their study, however, a significant relationship (correlation) between amount of work and achieved grades was not found.

Although all other studies turned up during the review of literature were quite old, their findings lend support to the conclusions of the more recent investigations. Harris (32) and Wrenn (86) for example, both demonstrate no clear relationships between amount of employment during school and academic performance.

Turning now to the area of fraternity membership and its effect on college academic performance, we find a little more research evidence available. Iffert (42) reports that men who graduated from college and were members of social fraternities, received slightly lower grades than men who were not members of fraternities. These differences were not significant, however, and it should be pointed out that Iffert admittedly made no attempt to equate the two groups. His was a simple survey report.

In an investigation made at the University of Utah, Crookston (12) found that an opposite pattern was taking place, that is, the fraternity members were achieving slightly better than non-fraternity members. Once again, the difference was not statistically significant. Crookston used a sample of 112 fraternity pledges and 112 non-fraternity pledges. Data were collected on the two groups regarding their obtained grade point average, their predicted grade point average, and number of credit hours carried. The mean grade point average and mean predicted grade point average for the fraternity pledges were 2.23 and 2.46 respectively, as compared with 2.49 and 2.17 for the non-fraternity pledges. Crookston's findings suggest that, at the University of Utah at least, fraternity members perform pretty much the way they were predicted to perform before they joined a fraternity.

In an investigation designed to determine if fraternity and residence hall living environments differentially affect or influence the attainment of college students, Buckner (6) used as his sample 216 first semester freshmen pledges living in their respective fraternity houses and 266 first semester male freshmen non-pledges who lived in the University of Missouri residence halls. Using scores on the Ohio State University Psychological Examination and their high school

achievement as predictor variables, Buckner grouped the students according to their expected level of achievement. The first semester mean grade point averages of the two groups of subjects falling at each level of potential were then independently compared. No significant differences were found between the mean grade point averages of the two matched groups by analysis of variance. In fact, the averages were nearly identical for the two groups at each of the various levels. Buckner concludes that neither residence halls nor fraternity houses have a differential effect upon the attainment of freshman students at the University of Missouri.

Willingham (83) examined the relationship between fraternity membership and three indices of scholastic performance: freshman attrition rates, freshman grade point average, and senior grade point average. Willingham used chi-square to analyze the differences between fraternity and "independent" men in terms of first year drop-out rates, and found that a significant difference exists in favor of the fraternity members. That is, significantly more non-fraternity men drop out of college (Georgia Tech, in this case) during or at the end of the freshman year.

For those students completing one full year of college, a comparison was made on grade point averages. Obtaining a

corrected freshman year g.p.a. of 2.12 for the fraternity members and 2.04 for the "independents" (by means of analysis of covariance), Willingham noted that this difference would occur by chance only one or two times in a hundred, evidence suggesting a positive influence of fraternity living on one's academic performance. No mention is made by Willingham of the place of residence of the two groups, however, and it is quite possible in this case that the living situation of the two groups was not actually different.

Finally, Willingham compared the senior grade point averages of the two groups. Once again correcting the averages by means of analysis of covariance, grade point averages of 2.28 and 2.30 were obtained for the fraternity and independent groups respectively, suggesting a slight reversal from the trend established during the freshman year. The senior g.p.a.'s are not statistically significant, however, and it must be concluded that little or no difference actually exists.

In a study designed especially to investigate the relationship between place of residence and academic achievement, Diener (14) reports a negative influence of living in a fraternity. Using a sample of 138 over-and-under-achievers at the University of Arkansas, Diener defined the over-achievers

as those students whose T-scores for cumulative g.p.a. were 15 or more points above the T-score for their ACE Psychological Examination, taken during their freshman year. Under-achievers, on the other hand, were those whose T-scores for cumulative g.p.a. were 15 or more points below their ACE scores. For both the over-achievers as a whole and over-achieving males, dormitory was listed first as place of residence. With both the under-achievers and under-achieving males, the fraternity house was ranked first as a place of residence. Diener's sample of female students was too small for analysis.

In searching for literature dealing with the association of participation in extra-curricular activities with academic performance, studies of student leadership proved to be the most fertile area to explore. Isolating student leaders by the methods of student ratings, faculty ratings, and leadership records, Hunter and Jordan (41) studied a sample of 82 "leaders." Drawing a sample of non-leaders who were stratified by year in school so as to equal the leaders, the two groups were then administered a number of instruments, including: (1) the ACE Psychological Exam, (2) Strong Vocational Interest Blank, (3) Bernreuter Personality Inventory, and (4) The Test of Social Attitudes. College grades were obtained from the Registrar's records for the two groups.

The findings reported by Hunter and Jordan bearing relevance to the present study are: (1) 80% of the leaders and 48% of the non-leaders were fraternity members, and (2) leaders made significantly higher grades on courses completed the year immediately previous to the study than did non-leaders, and their over-all grade point averages were considerably higher also.

In another study dealing with participation in extra-curricular activities, Stright(74) administered an 11-item questionnaire, aimed at measuring participation in student activities, to a group of 200 college sophomores. Using a tetrachoric correlation technique (the items called for a simple "yes" or "no" answer regarding participation in a specific activity), Stright attempted to measure the relationship between student participation and academic achievement. He found, for the males, that fraternity membership had a negative correlation of -.16, being an officer in various campus organizations a correlation of .04, but that participation in campus organizations in general yielded a .33 correlation. For the females, sorority membership related to academic achievement very positively (.63), being an officer not quite as high (.41), and participation in extra-curricular activities in general yielded a .44 correlation.

In suggesting some reasons for the rather high positive correlations for the females and opposite pattern for the males, Stright explains that the male population of students was not typical at the time of the study due to the war period. In any event, when combining males and females and comparing extra-curricular participants with non-participants, regardless of sex, the participants were reported to have received higher grades.

In another study comparing campus leaders and non-leaders, Hodges (36) used four criteria of leadership: (1) past or present presidency of a fraternity, (2) member of "Blue Key," (3) representative on the campus Inter-fraternity Council, and (4) elected membership in the campus honorary service club. This resulted in a sample of 100 "leaders" against whom a randomly drawn sample of 100 male non-leaders were compared on the basis of their answers to biographical data questionnaires. A chi-square technique was used to analyze the responses, and the results having relevance for this investigation were that the leader is generally a more superior student than the non-leader. According to a grade-point system in which C=1, B=2, and A=3, the leaders mean g.p.a. was 1.55 compared with 1.33 for the non-leaders, a difference which Hodges reports as being significant at the .05 level of

confidence. No ability-equating process was performed, and nothing was mentioned about the expected performance of the two groups which were studied.

Studies dealing with the comparative performance patterns of married vs. single students are conflicting. In a study of 598 married students at the University of California, Santa Barbara, Lantagne (52) asked the students to indicate the effect of marriage on their academic achievement. They indicated that 80% of the men and 62% of the women had positive trends in academic performance following their marriages. The grade point averages of the students were then analyzed upon graduation, and Lantagne reports that married women's g.p.a. was much higher than the single women's (2.81 vs. 2.54) and that the married men's achievement level was slightly higher than the single men's (2.45 vs. 2.41). The mean grade point average for all single students in the graduating class was 2.47 as compared to the mean grade point average of 2.56 for the married students. Unfortunately, the results have little value for the researcher. Asking students what direction their performance patterns took after marriage is hardly a technique that is very reliable, and the comparison of cumulative grade point averages was done with the student body as a whole, without any classification as to age, curriculum,

aptitude or ability, etc.

Another study reporting superior performance for married students is offered by Aller (1). Using a sample of 100 married student couples at the University of Idaho, Aller found that grade point averages of student husbands and wives were higher than the over-all g.p.a.'s of men and women in general. Student parents earned slightly higher averages than did non-parents in the study, and student wives earned higher averages than did the husbands. Once again, this is simply reporting of a gross average, and suffers from the same methodological limitations as the study reported by Lantagne.

Jensen and Clark (45) report findings somewhat different than those already mentioned. Matching a sample of 36 married men with 36 single men according to age and scores on the ACE Psychological Examination, they found that the single men obtained the higher grade point averages. The obtained difference was not statistically significant, however, and there is no basis for concluding that married students achieve at a higher level than single students.

A second study which utilized a matching procedure is reported by Samenfink and Milliken (70). Equating groups

of married and unmarried students on the basis of ability (ACE scores), they found that there was no difference in academic achievement over the four years of college work for the two groups. It is interesting to note that the two studies presented here which included no ability grouping, report higher achievement for the married students, while the two studies which equated the students on their ACE scores report no difference between the single and married students.

Changes in Scholastic Performance

Evidence that academic achievement is regarded as an unwavering, ultimate index of performance rather than an ever-changing, temporary level of attainment, is easily found in the literature. Frequently used as a criterion variable of one sort or another, the grade point average is seldom considered to be part of a pattern.

One of the few reports taking exception to this view is presented by Fisher (20), who studied the trends in scholastic performance of college students. Examining the annual grade point averages of students over a four year period (and thereby excluding those who withdraw from school), Fisher wished to test the hypotheses that the average grade point for a given class of students will steadily increase from

year to year and that individual variation in achievement is of very low magnitude.

Using the entering students at Hampton Institute as subjects, (the sample size was not mentioned) Fisher found that mean g.p.a.'s do increase steadily with each successive year, but that the greatest increase is made from the freshman year to the sophomore year, the next greatest increase is made from the sophomore year to the junior year and so on. If students dismissed from college for academic reasons are excluded from the sample, then the year-by-year increase drops off markedly.

Of those students who were able to continue in college for three academic years, the changes in achievement from one year to the next were slight, with grade point average fluctuations of 0.50 occurring in approximately one out of every five cases.

Unfortunately, Fisher's criterion of change is an arbitrary .50 grade points. The important criterion -- one's standing in the class relative to the other students -- is ignored. She demonstrated that the mean g.p.a. for the class increased each year. Yet she would claim that one whose individual g.p.a. remained the same is not a "changer," even

though his or her standing relative to the rest of the class would be taking a downward turn for each successive term.

Another report dealing with patterns of academic performance is presented by Young (87). Following the 1,924 entering male freshmen through their first four consecutive semesters at the University of Wisconsin, Young, like Fisher, reports a steady increase in the grade point average of the students. The percentage of the group receiving a grade point average between 3.00 and 4.00 moves from 18.0 for the first semester, to 18.5, 25.4 and 29.6 for the next three successive semesters through the sophomore year. On the other hand, the percentage of students receiving a grade point average between 0.00 and 1.99 moves from 37.2 for the first semester, to 32.1, 21.1 and 14.0 for the next three successive semesters through the sophomore year.

Changes in individual performance are not reported by Young, who calls his developed charts "scholastic progress patterns," and encourages their use in academic counseling situations.

Summary

The foregoing review of the literature consisted of presentations and critical examinations of some of the research which has been published dealing with variables thought to have some association with academic achievement in college. Beginning with the relationship between attitudes and values and academic performance, and moving through tests of aptitude and the behavioral variables, the attempt has been made to demonstrate the information presently available regarding some of the instruments and variables used in the present study, and how they are associated with scholastic performance in college. From this review of the literature, the following conclusions are suggested:

1. Long over-looked as factors associated with academic performance in college, non-cognitive-personality variables such as attitudes and values have recently been used in a growing number of studies exploring this area. The findings at this point are typified by inconsistency, but enough evidence has been gathered to justify further consideration of attitudes, values and beliefs as correlates of academic performance.

2. Tests of aptitude and ability have repeatedly demonstrated a relationship to scholastic performance in college. Multiple aptitude batteries seem to be most applicable, and the instrument used in this study -- The College Qualification Test -- is one of those indicating consistent relationship to the criterion of college grades.

3. Behavior variables are also being examined in the research with greater frequency. Unfortunately, many of the studies in this area have lacked adequate methodology, and many of the findings are contradictory.

4. Research utilizing changes in academic performance patterns as a variable is literally non-existent. Cumulative indices of achievement -- not achievement patterns -- have been generally used.

5. No definite direction has been forthcoming as a result of the review of the literature. As shown, the variables used in this study have been the objects of considerable research effort. Unfortunately, however, their previous appearance has been in designs quite different from that employed in this investigation.

CHAPTER III

THE METHOD OF INVESTIGATION

Definition of the Population

The population being studied consisted of all freshmen entering college for the first time in the fall of 1958 and who were enrolled in school during each fall, winter and spring quarter until spring of 1962. Students who had transferred to Michigan State University from another institution were not included in the study and students dropping out of school for any term were likewise eliminated. Thus the final population consisted of 1,085 students, 690 males and 395 females. From this 1,085, cognitive and non-cognitive personality data were avilable for 1,041 students (96%) made up of 655 males and 386 females. Data pertaining to the behavioral variables were not collected until the students' senior year, at which time information was gathered from 674 students (255 females and 419 males) or 62% of the population being studied.

Classification of the Sample as to Change

Academic performance changers were designated by a procedure outlined in detail in Chapter I of this thesis, under the heading "definition of performance change." Essentially, students were classified as performance changers if their obtained grade point average deviated by specified, arbitrary levels from the point at which they would normally be expected to perform as determined by a regression formula.

The method used to classify the students according to their direction of performance change, resulted in three change groups (positive, negative, and "freeze" or no-change) for each ability grouping for the year. These groups were then compared on the basis of the following instruments.

Instrumentation

The College Qualification Test consists of three ability tests which may be combined to yield a comprehensive total score. The three areas included are verbal facility, numerical ability, and general information, all of which were designed to be predictive of academic achievement in college. The verbal test consists of 75 vocabulary items, 50 which require identification of synonyms and 25 which require identification

of antonyms. The time limit for the verbal test is 15 minutes. The numerical ability test contains 50 items designed to measure one's conceptual skill in the areas of arithmetic, algebra and geometry. This part of the College Qualification Test has a time limit of 35 minutes. The general information test is composed of 75 items chosen from a broad range of subject matter areas, half of the items dealing with the physical, biological and chemical sciences, and half of the items dealing with social studies such as history, economics, geography and government. The time limit for this test is 30 minutes. The total score of the CQT consists of the sum of the three sub-tests previously discussed. Although each of the sub-tests may be used independently, available research suggests that the predictive power of the test is as high when the total score is used as when sub-scores are weighted in optional ways (e.g., multiple correlation). The total score was used for this study.

Estimates of the reliability of the College Qualification Test are reported in the test manual (4) and include coefficients of .97 and .96 for males and females respectively. These reliability coefficients were determined by a split-half method whereby a comparison was made between scores on the odd and the even items of the test. This technique

results in a somewhat higher coefficient of reliability than would be obtained using a stability method (i.e., test-retest).

The validity of the College Qualification Test has been examined frequently. Lehmann and Ikenberry (54) report validity coefficients ranging from .34 to .66 when using grades in required freshman couses as the criterion. Further evidence of the predictive quality of the College Qualification Test is provided in the studies reviewed in the second chapter of this paper. Correlations in the neighborhood of .50 to .70 seem to be the usual findings when relating the College Qualification Test total score to early college performance, but the magnitude of the coefficients drop off with each succeeding year.

The Test of Critical Thinking, Form G, was developed as a part of the Cooperative Study of Evaluation in General Education (11). In order to reduce critical thinking ability to a measurable entity, emphasis was placed on problem solving ability. Questions were designed to measure the ability to recognize the existence of a problem, to define the problem, to select information pertinent to its solution, to recognize assumptions, to make hypotheses, to draw conclusions, to judge the validity of the conclusions, and to evaluate the conclusions in life situations (11).

While it is perhaps debatable that grades serve as the best criteria for testing the validity of a measure of critical thinking, the validity of any test is defined in terms of the purpose for which it is used. As an indicator of academic ability, the Test of Critical Thinking seems to be very appropriate. Correlations between this measure and grades in Communication Skills and Natural Science courses as well as cumulative grade point averages, range from .21 to .57 (54), indicating a clear relationship between the instrument and achievement in college.

The manual for the Test of Critical Thinking reports estimates of reliability of the instrument ranging from .71 to .89 (11), and a reliability coefficient of .79 was found when the Kuder-Richardson formula 20 was applied to the Test of Critical Thinking scores of a smaller, restricted sample used in a recent investigation (43).

The Michigan State University Reading Test was developed by the Office of Evaluation Services of Michigan State University, and consists of 45 items designed to measure the subject's ability to comprehend thoughts expressed in reading passages. The items and passages were selected on the basis of the relationship of the items to academic success and how well they covered the textual materials found in several academic areas.

The reliability of the M.S.U. Reading Test has been estimated by the Office of Evaluation Services of Michigan State University on various occasions and has been found to be approximately .80. In a doctoral thesis done at Michigan State, Ikenberry (43) found the reliability to be .79 by means of Kuder-Richardson formula 20.

The validity of the Reading Test has likewise been tested frequently. Using academic performance as the criterion, obtained coefficients have ranged from .36 to .65 for the males and from .34 to .60 for the females. Once again, the magnitude of the relationship is greater when the criterion is performance in courses taken during the first term in college, and in the case of the Reading Test, is greater also for courses requiring a mastery of verbal materials.

The Inventory of Beliefs was developed by the Inter-College Committee on Attitudes, and Personal Adjustment of the Cooperative Study of Evaluation in General Education. The fundamental assumption underlying this instrument is that "...the objectives of general education can serve as a base from which may be inferred the model organization characterizing the personalities of those most adaptable to the purposes of general education" (10). The present form consists of 120 pseudo-rational, cliche-like statements to

which students are asked to respond by means of a four-element scale: strongly agree, agree, disagree, and strongly disagree. The score is based upon the number of items with which the subject indicates disagreement or strong disagreement, and may range from 0-120. Subjects who accept a large number of statements, achieving a low score on the test, are regarded as being stereotypic in their beliefs, resistive and defensive, and possessive of tendencies toward authoritarianism. Conversely, individuals with high scores rejecting the majority of the statements are characterized as flexible, adaptive, and non-stereotypic in their beliefs.

The reliability of the Inventory of Beliefs, as reported in the manual (10), range from coefficients of .69 to .95 with a median coefficient of .86. Ikenberry (43) applied the Kuder-Richardson formula 20 to test score data of a restricted population and obtained a reliability coefficient of .84.

The validity of a measure such as the Inventory of Beliefs, of course, is considerably more difficult to establish. Concurrent validity coefficients range from .63 (negative) for the relationship between the Inventory and the Rokeach Dogmatism Scale, to .28 for the relationship between the Inventory and the M.S.U. Reading Test for females. Face

validity and construct validity evidence are also presented in the manual.

Thus, it can be seen that while the Inventory of Beliefs does seem to be related to cognitive measures to some extent, it is nevertheless measuring characteristics more closely related to factors measured by the dogmatism scale, an instrument supposedly measuring an attitude or personality trait similar to that of stereotypy.

The Differential Values Inventory was developed by Richard Prince at the University of Chicago (66), and was designed to measure the "traditional" and "emergent" value categories as previously established by Spindler (73). Some value categories outlined by Spindler were combined by Prince to formulate four "traditional" value categories -- puritan morality, individualism, work-success ethic, and future-time orientation -- and four "emergent" value categories, which include sociability, conformity, relativistic moral attitudes, and present-time orientation. These were the categories originally set forth by Spindler, except that Spindler included "achievement orientation" in the group of traditional values and "consideration for others" in the emergent value area, both of which were eliminated by Prince in the development of the Differential Values Inventory.

The scale consists of 64 pairs of forced-choice items. Each pair has a traditional value statement ranked against an emergent value statement. The subject chooses either traditionally oriented items or emergent value items in each of the 64 pairs, with one point scored for each traditional choice.

A subject receiving a high traditional score is described as placing high value on personal respectability, thrift, self-denial, respect for elders; as valuing hard work as good in itself and necessary for success; as placing his individual desires and ideas equal to or above the desires and ideas of the group; and as being oriented toward the future to the extent that present needs should be sacrificed for future satisfaction and reward. On the other hand, the person oriented toward the emergent value system is most concerned about getting along with people, group-determined morality standards, consideration for the group and their feelings, and emphasis on the present.

A Kuder-Richardson formula 20 was used to estimate reliability and resulted in a coefficient of .75 (43), while test-retest procedures have yielded stability coefficients of .60 and .61 (54).

Once again, the validity difficulty presents itself. Although Prince has found some theoretically sound patterns emerging from scores on the inventory, no empirical validity investigations have been conducted. It has been demonstrated, for example, that both teachers and students in parochial high schools receive more traditional scores than teachers and students in public high schools (66); that students aspiring toward more than four years of college education are more traditional in values than students aspiring to four years or less of college; and that college students coming from rural areas tend to be more traditional in values than students coming from urban centers (54). These findings are in general agreement with what is known about differences in values among various social and cultural groups, and hence, it would appear that the Differential Values Inventory is measuring characteristics similar to those described by Prince in the purpose of the inventory. Nevertheless, evidence of validity is lacking, for those who might hope to use the instrument for predictive purposes. Rational content is present, and it is largely on this factor that the instrument is presently being regarded as promising.

Rokeach's Dogmatism Scale, Form E, was developed by Milton J. Rokeach at Michigan State University as a measure

of general authoritarianism, general intolerance, and openness of belief systems. Form E of the Dogmatism scale consists of 40 dogmatic statements with which the subject is asked to indicate agreement or disagreement on a six point scale ranging from "agree very much" to "disagree very much."

Rokeach defines dogmatism as representing a total ideological defense against threat and at the same time a cognitive framework for satisfying one's need to know and comprehend the world one lives in. He argues that dogmatism allows one to ward off threatening aspects of reality and at the same time receive the satisfaction of feeling that one understands it (68).

Plant, Minium, and Myers reported odd-even reliability coefficients for the Dogmatism Scale of .84 for the males and .85 for the females (65), while Ikenberry (48) obtained a reliability coefficient of .76 by using an internal consistency method.

As typical of measures of its kind, the Dogmatism Scale has failed to demonstrate consistent evidence of validity. It does, however, bear a negative .63 relationship[1] to the

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[1]The negative correlation between The Inventory of Beliefs and Rokeach's Dogmatism Scale are resultant from the scoring procedure. The concepts of stereotypy and dogmatism are positively related.

Inventory of Beliefs, and since these two scales were constructed independently to measure theoretically related phenomena and are correlated to such a degree, the coefficient tends to support claims for validity for both measures (43).

The Experience Inventory was used to ascertain various aspects of the students' "behavioral" characteristics. Only the last section of the inventory, consisting of 43 items, was used in this study.

Developed by the investigator, the items can be classified into four areas, those dealing with (1) amount of weekly employment during the school year, (2) degree of involvement in extra-curricular activities, (3) place of residence, and (4) various personal factors.

The employment section simply asked the students to indicate, by checking in provided columns, the number of hours they were employed during each week of the school year. Thus, frequencies were obtained for the number of students falling into hours-worked ranges of (1) over 20, (2) 11-20, (3) 1-10, and (4) didn't work.

The place of residence and personal factor items were listed and the students were asked to indicate, by using codes representing the academic terms, which items applied

to the students during which term or terms. For example, one item reads "became engaged" and the students were to indicate the term or terms this particular item applied to them, if at all. In this way, frequencies were obtained for the year-to-year place of residence and applicability of various personal factors.

The index of participation in extra-curricular activities was developed in a somewhat different fashion. All the possible student activities were listed, with the assistance of a representative of the Dean of Student's Office. The students were then asked to indicate if they participated in this activity, and, if so, what specific position they held or function they performed and what term or terms they did each. Next, particular values were assigned the positions and activity according to the estimated amount of time required by each activity. These values were "experts' ratings" made, once again, with the assistance of the Director of the Men's Division of Student Affairs. The result was a "scorecard" such as that presented in illustration 2 on page 70. The value was then multiplied by the number of terms the student indicated it applied during a given year, to get an annual weighted score for activities participation.

Figure 2. Grid used for weighting student activities and specific positions of functions in that activity.

	A.U.S.G.	Other Govern. Groups	Residence Halls	Other Living Units	Hon. Organ.	Publications	College or Depart. Clubs	Class Councils	Varsity Athletics	Intra-murals	Religious Clubs	Other
8	President	President				Editor of S'News or Wolverine						
7	V.P. & Speaker V.P. (Exec) V.P. (Admin)	Other officers	President			Adv. Mgr. Managing Ed. (S'News) Bus. Mgr. (Wolv.) Circ. Mgr. City Ed. (News) Sports Ed. " Nighted "						
6	Treas. Spkr. P.T. Chief Justice C.J. (Traffic)			President					All			Band (activity & marching)
5	Sec'y	Comm. Chain	Other officers Prog. Chairm. News Ed.			Ed other Pub. Photographer (W & N)		Pres.				
4	Comm. Chairm. (Elections Etc.)	Member	Comm. Chairm. (All Hall) Pct. Offs	Other Off.	Pres		Pres	Other Offs		Green Splash Chairm.	Pres.	Pres. Bound (other)
3	Represn-tative		Council Rep. (All Hall) Comm. Mem. (All Hall)	Chairm.	Other Off. Sgt. at Arms	Feature Writer	Other Off.	Comm. Chairm. Events "			Other Offs	Other Off. Drums
2			Comm Member (Pct.)	Comm. Mem.	Comm Chain	Reporter Adv Sales	Comm. Chairm. Member	Comm. Chain.			Comm Chairm.	Comm Chairm.
1					Member					Other	Member	Member

As an example, assume student X belonged to several activities during his junior year. According to his experience inventory, he was a member of the junior class council for the entire year, serving as a committee chairman for one term, and he was a reporter for the student newspaper for two terms. His activities index score would be calculated as follows:

Member of Class Council = 2 points x 2 terms = 4 points
Chmn. of Class Committee = 3 points x 1 term = 3 points
Reporter for newspaper = 2 points x 2 terms = 4 points

Total Annual Activities Index . . . . . =11 points

It was found that the distribution of activities index scores obtained by this weighting procedure had a highly skewed distribution, with a large number of students receiving 0, 1, or 2 points for an academic year, and gradually dropping off to a small number of students with high activities index scores. Consequently, no assumptions of normality or linearity were made with the scores, and they were analyzed with a non-parametric technique, as were the other non-cognitive-behavioral variables.

One of the obvious limitations of the Activities Index was its necessary reliance on memory. Students were asked to recall not only what activities they participated in and what functions they performed, but also what terms they did each. Nevertheless, the procedure was probably better than going to

the individual student records, since information of this kind is not complete and often inaccurate.

Procedure for the Collection of the Data

During freshman orientation week in the fall term, 1958, a battery of instruments was administered to 2,973 entering freshmen at Michigan State University. The test battery included The College Qualification Test, The Michigan State University Reading Test, A Test of Critical Thinking, the Inventory of Beliefs, The Differential Values Inventory, and Rokeach's Dogmatism Scale. Complete and usable test data were gathered for each of the 1,085 students who maintained continuous attendance for the next four years.

In May, 1959, or one academic year later, a similar testing program was completed. At this time, The Inventory of Beliefs and The Differential Values Inventory were administered, and usable data were obtained from 1,041 students who were to maintain continuous attendance.

Finally, a third testing program was conducted at the end of the students' senior year in college in May, 1962. At this time, the students were administered The Differential Values Inventory, The Inventory of Beliefs, Rokeach's Dogmatism

Scale, and The Experience Inventory. Usable data were gathered from 674 students at this time.

The annual grade point averages for the students were obtained from the cumulative summary records of the Record's Office of Michigan State University. These records of student attainment are recorded on a term-to-term basis with the cumulative information also indicated. Calculating the students' annual grade point average was simply a matter of adding the term totals for a given academic year, and dividing annual points earned by the annual credits carried. This calculation was done on the IBM 604, operated by the Michigan State University Data Processing Center.

Procedure for Analysis of the Data

The students' scores on the various instruments of the test battery were coded and key-punched into IBM cards. The achievement information obtained from the Record's Office was already on IBM cards, and consequently all the data relevant to the study was processed by machine, with each card containing the student number, sex, and curriculum as the identification characteristics.

Because of the nature of the data gathered, it was impossible to use a single statistical technique for the analysis. Some of the data, for example, is discrete, and hence could not be analyzed by techniques which assume normality of the population distributions, while other variables met the necessary assumptions for parametric analysis. It was therefore decided to use analysis of variance in examining the data relating to hypotheses one and two (i.e., the non-cognitive-personality and the cognitive variables), and chi-square for the data relating to hypothesis three (or the behavioral variables).

The calculations necessary for the analysis of variance were performed on the IBM 604, while the facilities of the Michigan State University Computer Center were used for both determination of the scholastic change groups and the chi-square analysis for the behavioral variables (MISTIC).

CHAPTER IV

ANALYSIS OF THE DATA

The data gathered by the procedure discussed in the preceding chapter was analyzed in various ways, depending on the nature of the data and variables in question. It will be the purpose of this chapter to present in detail the analysis of the data, as well as some of the inferences such analyses make possible.

The analysis of the data will be presented in four parts: (1) a description of the sample of students involved in terms of the variables being studied, (2) Hypothesis I, (3) Hypothesis II, and (4) Hypothesis III.

A Description of the Sample

In Chapter I it was mentioned that students were classified into achievement groupings on the basis of their obtained grade point averages, by simply dividing them into upper, middle, and lower thirds of equal size. The resulting grade point average ranges are presented in Table 1.

Thus, it can be seen that if a male student's first year grade point average was above 2.60, he would have been classified as a high achiever, or if 2.16 or below, he would have been classified as a low achiever.

TABLE 1: Grade point average ranges for achievement groupings.

Achievement Groups	Classification Points					
	Freshman		Sophomore		Junior	
	Male	Female	Male	Female	Male	Female
High	2.60-above	2.70-above	2.59-above	2.71-above	2.68-above	2.82-above
Medium	2.17-2.59	2.28-2.69	2.19-2.58	2.27-2.70	2.26-2.67	2.36-2.81
Low	2.16-below	2.27-below	2.18-below	2.26-below	2.25-below	2.35-below

The ranges differ for males and females (with the latter typified by higher grade point averages) and from year-to-year. For example, a grade point average of 2.63 would result in a high achievement classification for the males during the freshman year, but only a medium achievement grouping for females. Moreover, the same grade point average deserved a medium achievement placement for both males and females during the junior year.

A better understanding of this situation might be provided by Figure 3,which indicates the annual increase in grade point averages from year to year for both males and females, but with female averages always being somewhat higher. Figure 3 is located on page 78.

A final description concerning the grade point averages is presented in Table 2, where it is shown that the relationship between annual grade point averages decreases as the time lapse increases. For example, for the females (below the diagonal) there is a .79 correlation between freshman g.p.a.'s and sophomore g.p.a.'s. However, the correlation between freshman averages and the senior averages drops to .56.

It has been previously indicated that a standard error of estimate of .50 was used in selecting the performance changers. The rationale for the .50 standard error was presented on page11 of the first chapter. The actual grade point average discrepancies which resulted from this figure are presented in Table 3.

Figure 3: Progressive mean grade point averages, male and female, for group maintaining continuous enrollment, fall,1958, to spring, 1962.

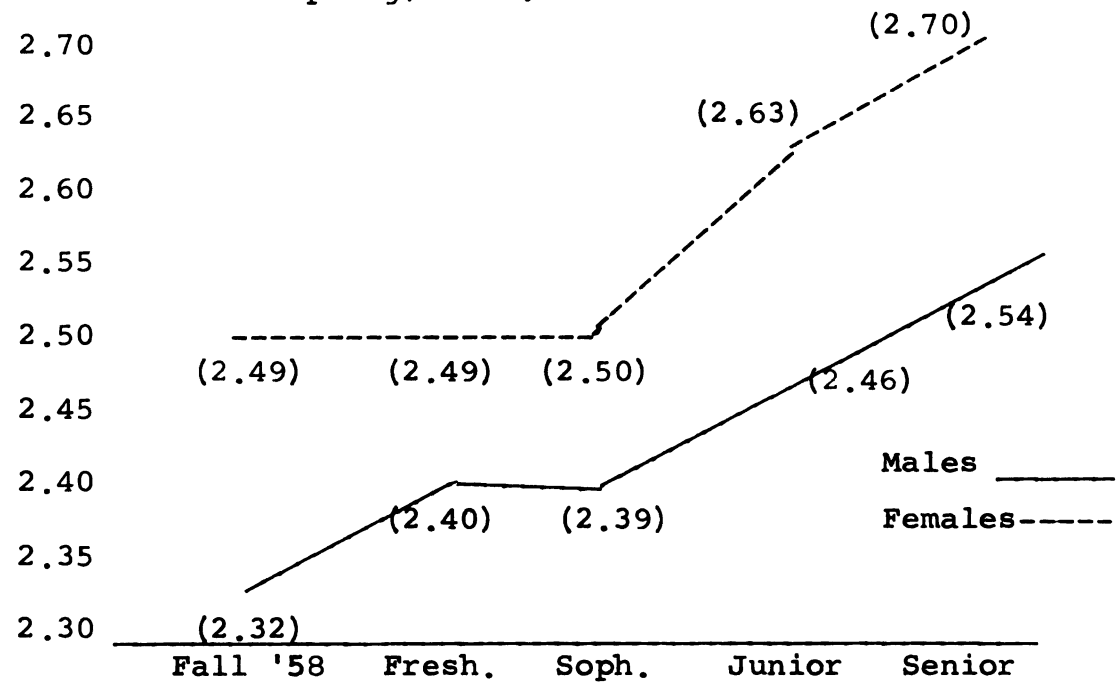

TABLE 2: Intercorrelations of annual grade point averages, male and female, for group maintaining continuous enrollment, fall, 1958, to spring, 1962.

	Fresh.	Soph.	Junior	Senior
Freshman		.73	.55	.54
Sophomore	.79		.67	.64
Junior	.64	.71		.70
Senior	.56	.61	.68	

(Male correlations above the diagonal, females below.)

TABLE 3: Grade point average discrepancy equivalents of the .50 standard error of estimate reported for sophomore, junior, and senior change points.

	Male	Female
Sophomore	.1978	.1715
Junior	.2064	.1840
Senior	.2001	.2010

Consequently, if a student's sophomore grade point average was .1978 points above or below his expected sophomore level of achievement (or .1715 if the student were female) he or she would be classified as a performance changer. As the table reveals, a discrepancy of greater magnitude would be necessary for change classification during the junior and senior years.

The size of the group being studied is varied. For analysis of the variables pertaining to the first two hypotheses, data were available for 655 males and 386 females. For analysis of the behavioral variables, data were available for 419 males and 255 females. These groups were further divided into achievement groups and change groups, so that in some cases, especially for the behavioral variables, the specific

number of students in a particular grouping became quite small. The specific group sizes are included in the tables presented in the analysis of the data pertaining to the hypotheses.

Descriptive data pertaining to the variables used in the investigation are presented in Tables 4 and 5 which appear on pages 81 and 82 respectively. In later tables dealing with analysis of data pertaining to the hypotheses, mean scores revealing characteristics of the entire group are omitted. This information is presented here so that the reader has some awareness of the entire group's status on these variables before being divided by level of achievement and direction of performance change.

Table 4 contains the means and standard deviations for the entire group's scores on the measures used for the cognitive and non-cognitive-personality variables, as well as the means and standard deviations found for the entire entering class in 1958 on these same measures. The sample being studied here is a part of the larger group, and therefore data for the larger group is presented for purposes of comparison.

TABLE 4: Means and standard deviations on instruments used for ability-aptitude and attitudes-values variables, with comparative data for entire sample of students entering Michigan State University in fall, 1958.

	MALES				FEMALES			
	Present Sample		Entire Class Entering 1958		Present Sample		Entire Class Entering 1958	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Ability and Aptitudes:								
C.Q.T.	132.35	24.33	126.46	26.28	122.63	23.49	116.47	24.65
Reading	28.35	6.02	27.04	6.40	29.39	5.36	28.14	6.37
Crit. Think.	32.84	6.98	31.51	7.18	32.54	6.51	31.29	7.18
Attitudes and Values:								
I.B.	64.06	14.16	62.86	14.08	65.55	12.50	64.77	12.84
D.V.I.	35.01	6.84	34.67	6.93	33.92	6.99	33.59	6.99
Dogmatism	166.72	25.22	168.19	25.36	162.89	24.38	163.56	25.47

TABLE 5: Descriptive break-down of students by behavioral variables during sophomore, junior and senior years.

	(N=674) Sophomore		(N=664) Junior		(N-662) Senior	
ACTIVITIES:	N	%	N	%	N	%
Much	210	31	244	37	181	27
Some	237	35	210	32	225	34
Little or None	225	34	210	32	256	39
		100		101		100
Place of Residence						
Residence Halls	262	39	211	32	153	23
Fraternity or Soror.	98	15	111	17	109	16
Co-ops	87	13	94	14	86	13
Married Housing	83	13	83	13	100	15
Off-Campus	134	20	165	25	214	33
		100		101		100
Employment						
Over 20 hrs. per week	79	12	80	12	103	16
Between 10 and 20	148	22	144	22	120	18
Between 1 and 10	102	15	105	16	175	26
None	345	51	335	50	264	40
		100		100		100
Personal						
Made 1st choice of major	89	13	34	5	7	1
Changed major field	161	24	84	13	29	4
Pledged fraternity or soror.	91	14	22	3	9	1
Became "active" in F. or S.	93	14	55	8	20	3
Became engaged	39	6	65	10	108	16
Got married	12	2	31	5	58	9
Became "pinned"	57	8	95	14	80	12
Began "going steady"	85	13	68	10	39	6

Considering for the moment, only those students who are part of the present study, it can be seen from Table 5 that the males and females are quite similar with respect to the variables under consideration. Males appear to have higher College Qualification Test scores and higher Dogmatism scores, but other differences are minimal.

When compared to the original entire entering class, it is evident that the present sample has higher mean scores on the measures used as indices of ability and/or aptitude. This is to be expected, since drop-outs and withdrawals are not included in the present sample of students.

Table 5 presents the number and percentage of students for whom the various behavioral variables were applicable. Table 5 is interesting in several respects. The most noticeable characteristics of the entire group are:

1) Participation in extra-curricular activities drops off markedly during the senior year,
2) The number of students living in residence halls drops off sharply from the sophomore through the senior years, while the number of students living in off-campus housing increases,
3) The amount of weekly employment increases during the senior year, and

4) Engagements and marriages show steady increases from the sophomore through the senior year.

It should be pointed out here that while the percentages reported under the activities, place of residence, and employment sections always total 100%, such a total is not to be expected from the items under the personal category, since these items are independent of one another.

Hypothesis I

It is possible to differentiate among groups of students classified by direction of academic performance change, on the basis of their scores on ability and aptitude measures.

After classifying the students according to freshman achievement level and sophomore direction of performance change (as outlined in Chapter I), the analysis of variance technique was employed to ascertain whether the differences between the change groups and their scores on the cognitive variables were large enough to be more than simply chance occurrences. The .05 level of confidence was chosen as the confidence level for the hypothesis, and was the critical level used throughout the entire dissertation. Data for the males and females were analyzed separately on the cognitive data because of the initial sex differences found to be associated with their performance on these particular tasks.

Male Students

Table 6 shows the results of the comparison of the change groups on the ability and aptitude variables for the males during the sophomore year. The cognitive variables were examined at the end of the students' second year (or their first change point), while the measures used to obtain the data were administered during the fall term of the students' first year in college. In this sense, then, the analysis is post facto. The low, middle, and high categories, indicates the student's standing relative to the rest of his group in terms of his academic achievement during his freshman year. This separation was particularly relevant when analyzing the ability and aptitude data, since academic performance and the instruments used as measures of a cognitive trait have been demonstrated to be related (47).

Table 6 reveals the expected pattern of scores for the groups who are classified according to their first year scholastic performance. The highest scores on the ability and aptitude measures were obtained by those falling in the top third of the grade point distribution, followed in order by the middle third and the low third. This difference between groups was expected, and, in fact, was the major rationale for the division of the sample into this three-dimension type of arrangement.

TABLE 6: Ability and aptitude mean scores of male students classified by freshman grade point average and direction of performance change during the sophomore year.

	LOW				MIDDLE				HIGH			
	—	0	+		—	0	+		—	0	+	
N	(64)	(84)	(67)	F	(75)	(80)	(58)	F	(59)	(89)	(79)	F
C.T.	29.83	29.43	29.13	0.23	31.83	31.47	32.88	0.89	37.20	36.98	36.43	0.25
C.Q.T.	122.28	114.94	121.09	2.74	128.91	128.05	129.16	0.06	147.83	146.06	151.49	1.32
M.S.U.R.	24.69	23.93	25.85	2.50	27.08	27.45	29.36	3.03	31.54	32.10	32.87	1.44

None of the above F-values are significant beyond the .05 level of confidence.

This table will serve as a model for many of the subsequent tables. Here, and in the tables that follow, the following abbreviations and symbols will be used: C.T.=Critical Thinking, C.Q.T.=College Qualification Test, M.S.U.R.=Michigan State University Reading Test, the sign "-" = negative changers, the sign "0" = no change, and the sign "+" = positive changers. The words "low," "middle," and "high," of course, refer to the achievement groupings, and numbers in the parentheses above the columns refer to the sample size ("N") for each change group.

See Tables 6.1, 6.2, and 6.3 in the Appendix for data regarding source of variation, sums of squares, degrees of freedom, mean squares, and the criterion values of the F-values listed in Table 6 above.

Within the groups, however, there are still no differences. That is, changes in performance pattern do not seem to be related to any of the ability and aptitude measures employed in this study. Although there does seem to be a rather consistently higher mean score on all three variables for those whose performance has changed positively, this consistency is not borne out to be more than a chance occurrence at the .05 level of confidence.

Female Students

Table 7 shows the results of the comparison of the change groups on the ability and aptitude variables for the females during the sophomore year. As was the case with the male data, those in the top or high third of the grade point distribution during the freshman year tend to obtain higher scores on the cognitive variables. In fact, in every case where a mean score is presented, the higher the achievement grouping, the higher the females' score on the cognitive variable in question.

Once again, however, the differences occurring within the three achievement groupings are small. Though relative consistency seems to prevail, with the positive changers tending to score somewhat higher than the negative or downward changers, only one F-value exceeds the established critical

TABLE 7: Ability and aptitude mean scores of female students classified by freshman grade point average and direction of performance change during the sophomore year.

	LOW				MIDDLE				HIGH			
	—	0	+		—	0	+		—	0	+	
N	(44)	(52)	(35)	F	(47)	(45)	(35)	F	(31)	(56)	(41)	F
C.T.	27.95	29.54	29.09	0.92	32.70	31.80	33.11	0.57	36.94	34.68	38.10	4.46*
C.Q.T.	104.54	108.23	111.49	1.39	121.55	121.95	122.37	0.02	141.32	136.00	139.63	0.66
M.S.U.R.	25.09	26.08	26.57	1.07	28.02	29.89	29.89	2.46	33.48	32.36	34.02	2.00

*Significant beyond the .05 level of confidence.

See Tables 7.1, 7.2, and 7.3 in the Appendix for data regarding source of variation, sums of squares, degrees of freedom, mean squares, and the criterion values of the F-values listed in Table 7 above.

level. In this particular case, the females in the high achievement group whose performance pattern for the sophomore year changed upward, have a significantly higher score on the test of critical thinking than those whose performance pattern changed negatively. Close examination of the difference in question, however, suggests that the significant F-value is actually a result of the variation between the students witnessing an upward change in grades versus those whose pattern "froze" or did not change during the sophomore year, and caution must be used in drawing conclusions from the significant difference.

Conclusions Regarding Hypothesis I

The measures used to gauge the students' ability to perform tasks of an academic aptitude or ability nature (i.e., a cognitive variable) were administered during the fall term of 1958 only. When analyzed regarding their relationship to changes in performance patterns occurring during the sophomore year therefore, the criterion is nearly a two-year-old index. Such characteristics have been demonstrated to possess a good degree of stability, however, and it seems safe to conclude, on the basis of the data examined, that the cognitive variables employed bear little association with changes in one's scholastic performance pattern. Nine male change groups and nine

female change groups were analyzed on three different measures, and although some consistency is apparent, statistical significance appears only once.

Hypothesis II

> It is possible to differentiate among groups of students classified by direction of academic performance change, on the basis of their scores on attitude and value measures.

The analysis of variance technique was again employed to analyze the data, and the procedure for grouping students the same as that discussed under Hypothesis I. Males and females were again considered separately, owing to previous research on college student populations using these same instruments (54). The instruments used to test Hypothesis II -- The Differential Values Inventory, The Inventory of Beliefs, and Rokeach's Dogmatism Scale -- were administered several times during the students' course of study. Consequently, analysis was possible more than one time. In the case of both the male and female groups, the performance changes taking place during the sophomore year were compared with non-cognitive-personality test scores recorded at two different points: (1) during fall term, 1958, or the beginning of the students' freshman year, and (2) during spring term, 1959, or at the end of the students freshman year at Michigan State University.

Male Students

Table 8 shows how the sophomore year male change groups compare on the basis of their scores on the attitude and value measures taken during their first term in college. As was the case with the ability and aptitude data, differences between achievement groups are more apparent than differences occurring within achievement groups for the performance changers. For example, those in the high achievement group tend to be more flexible and/or adaptive than their counterparts in the low achievement group (as reflected in higher mean scores on the Inventory of Beliefs), have a slightly higher traditional value orientation (suggested by their somewhat higher scores on the Differential Values Inventory), and be somewhat less dogmatic. Ferreting out differences for the performance change groups within the achievement groupings proves to be a more difficult task, however.

None of the male F-values for the sophomore changers achieve a level of statistical significance. Not only is significant variation absent, but consistency is also lacking. Clearly, the measures of a non-cognitive-personality type are not related to direction of change in performance patterns for males, at least when comparing on the basis of freshman test scores, and sophomore performance change.

TABLE 8: Attitude and value mean scores for fall, 1958, testing: male students classified by freshman grade point average and direction of performance change during the sophomore year.

	LOW				MIDDLE				HIGH			
	—	0	+		—	0	+		—	0	+	
N	(64)	(84)	(67)	F	(75)	(80)	(58)	F	(59)	(89)	(79)	F
I.B.	59.52	59.23	62.04	0.83	64.33	62.70	65.74	0.81	66.34	66.52	69.99	1.82
D.V.I.	33.41	35.13	34.04	1.29	35.12	34.28	34.88	0.35	35.12	35.30	37.25	1.99
R.D.S.	172.89	172.13	168.36	0.60	164.64	165.62	169.98	0.80	166.32	163.21	159.49	1.37

None of the above F-values are significant beyond the .05 level of confidence.

Here, and in the tables that follow, these abbreviations will be used: I.B.=Inventory of Beliefs, D.V.I.=Differential Values Inventory, and R.D.S.=Rokeach's Dogmatism Scale.

See Tables 8.1, 8.2, and 8.3 in the Appendix for data regarding source of variation, sums of squares, degrees of freedom, mean squares, and the criterion values of the F-values listed in Table 8 above.

Table 9 shows how the sophomore year male change groups compare on the basis of their scores on the attitude and value measures taken at the end of their freshman year in college. Their scores in this instance, have been altered with exposure to the college environment for one year, whereas the scores used in Table 8 are indicative of the variable present when they came to the university. The make-up of the performance change groups is the same, of course.

Here we find one difference large enough to be more than a chance difference. In the middle achievement group, the positive performance changers are significantly more flexible and/or adaptive than the "freeze" group or negative changers. Although not verified by statistical significance, this variable also seems to favor the positive performance changers in the low and high achievement groups. That is, there seems to be evidence in support of the theory that those whose performance pattern takes a positive turn will tend to be less rigid or compulsive than those who exhibit a downward academic trend.

The Differential Values Inventory fails to differentiate between any of the groups significantly, and really portrays no hint of consistency or trend.

TABLE 9: Attitude and value mean scores for spring, 1959, testing: male students classified by freshman grade point average and direction of performance change during the sophomore year.

	LOW				MIDDLE				HIGH			
	—	0	+		—	0	+		—	0	+	
N	(64)	(84)	(67)	F	(75)	(80)	(58)	F	(59)	(89)	(79)	F
I.B.	53.89	55.68	61.60	2.36	56.07	63.69	66.07	3.97*	63.25	63.11	66.13	0.34
D.V.I.	28.44	30.06	29.58	0.37	28.25	31.90	30.88	2.22	29.80	29.93	31.46	0.39
R.D.S.	Not administered at end of freshman year.											

*Significant beyond the .05 level of confidence.

See Tables 9.1 and 9.2 in the Appendix for data regarding source of variation, sums of squares, degrees of freedom, mean squares, and the criterion values of the F-values listed in Table 9 above.

It should be pointed out here that the difference obtained on The Inventory of Beliefs in Table 8 is consistent with the direction of scores found in Table 9, the scores for the same groups on the Inventory taken at the beginning of the freshman year. Though none of the latter differences achieved the level of significance, the consistency of trend, both on the freshman and sophomore results, may be suggestive of an association between flexibility and constancy of academic performance.

Female Students

Table 10 relates the mean scores for the freshman year administration of the attitude and value instruments to the females. As was the case with the males, the scores on these instruments at the beginning of the freshman year seem to bear no relationship to changes in scholastic performance. The magnitude of difference necessary for high confidence interpretation isn't even approached, and trends in scores toward some consistency are not to be found.

Table 11 considers the attitude and value traits as measured at the end of the freshman year. While the end-of-the-year testing indicates some possible associations for the male group, the females' scores shed no more light on the associative factors than did their scores recorded at the

TABLE 10: Attitude and value mean scores for fall, 1958, testing: female students classified by freshman grade point average and direction of performance change during the sophomore year.

	LOW				MIDDLE				HIGH			
	—	0	+		—	0	+		—	0	+	
N	(44)	(52)	(35)	F	(47)	(45)	(35)	F	(32)	(56)	(41)	F
I.B.	61.41	61.19	60.54	0.04	67.47	65.16	67.97	0.85	69.23	68.23	69.51	0.16
D.V.I.	31.48	33.75	33.34	1.32	34.98	34.00	34.28	0.26	33.39	34.41	35.37	0.68
R.D.S.	168.77	167.71	172.40	0.36	156.83	163.24	156.34	1.06	157.97	161.46	160.20	0.26

None of the above F-values are significant beyond the .05 level of confidence.

See Tables 10.1, 10.2, and 10.3 in the Appendix for data regarding source of variation, sums of squares, degrees of freedom, mean squares, and the criterion values of the F-values listed in Table 10 above.

TABLE 11: Attitude and value mean scores for spring, 1959, testing: female students classified by freshman grade point average and direction of performance change during the sophomore year.

	LOW				MIDDLE				HIGH			
	—	0	+		—	0	+		—	0	+	
N	(44)	(52)	(35)	F	(47)	(45)	(35)	F	(32)	(56)	(41)	F
I.B.	60.00	54.67	61.71	1.17	70.49	64.47	71.54	1.74	71.90	67.86	73.59	0.99
D.V.I.	27.16	28.36	30.37	0.73	33.45	29.62	29.60	2.35	30.03	30.25	32.59	0.96
R.D.S.	Not administered at end of freshman year.											

None of the above F-values are significant beyond the .05 level of confidence.

See Tables 11.1 and 11.2 in the Appendix for data regarding source of variation, sums of squares, degrees of freedom, mean squares, and the criterion values of the F-values listed in Table 11 above.

beginning of the freshman year. None of the differences are statistically significant, and consistency is totally absent.

Conclusions Regarding Hypothesis II

The attitude and value variables bear little relationship to changes in students' academic performance patterns in college. There are literally no associations between scores on such measures and change in performance for the females, and only slight association for the male students. Of the three instruments administered -- The Inventory of Beliefs, The Differential Values Inventory, and Rokeach's Dogmatism Scale -- it appears that The Inventory of Beliefs warrants some consideration as a possible index for this purpose.

The obvious lack of relationship between the attitude and value variables and changes in performance patterns, prompted the investigator to omit further use of these variables in analysis of performance changers. The analysis up to this point points out the random association between the students' scores on the instruments employed and their direction of performance change in college.

Hypothesis III

> It is possible to differentiate among groups of students classified by direction of academic performance change on the basis of the amount of their employment, their place of residence, degree of participation in extra-curricular activities, and various personal factors.

Because the variables to be examined under Hypothesis III do not meet the assumptions necessary for use of a parametric statistic, chi-square was selected as the tool for analysis of the data in this section of the thesis. In only one case -- degree of participation in extra-curricular activities -- the male and female students were analyzed separately. Analysis of the data pertaining to the cognitive and non-cognitive-personality variables was made for only one change point. The present hypothesis was examined at three different change points -- the sophomore, junior, and senior years.

It was the intention of the investigator to examine the association of behavioral variables with performance pattern change at a time of mutual occurrence. That is, behavioral variables were analyzed for relationship during the year the performance pattern change took place. For example, if student X changed negatively during his or her sophomore year, then the behavioral variables relative to this student's sophomore year were examined.

Chapter III presents a more detailed discussion of the procedure followed in investigating Hypothesis III. It should be pointed out here that some of the items had to be omitted because of inadequate size of the sample to which the items applied. For example, students were asked to indicate the term of their getting married. During the early change points, this item did not receive enough checks to be worthy of analysis, whereas for the senior change point it became adequate. Some of the other items were not applicable for any of the three change periods in question.

Sophomore Change

Table 12 shows how the sophomore year change groups, male and female, compare on the basis of their responses to a number of personal factors. The change groups have been divided into three achievement groups according to their cumulative freshman grade point average, and the table lists both the observed and expected frequencies, along with the chi-square value (9).

Of the 24 chi-squares, four are of sufficient magnitude to be significant beyond the .05 level of confidence. Three of these, it is interesting to note, occur for one variable. All three change groups show a significant chi-square for the item asking whether or not they pledged a fraternity or

TABLE 12: Comparison of students classified by direction of sophomore performance change, level of freshman achievement, and applicability of personal factors during the sophomore year.

	-	0	+	x^2	-	0	+	x^2	-	0	+	x^2
Chose major	9 (9)	12(13)	11 (8)	1.04	10 (9)	10(10)	8 (8)	0.04	3 (7)	13(11)	13(10)	3.68
Changed major	13(21)	33(30)	24(18)	6.74*	24(18)	16(19)	12(14)	3.83	9 (9)	20(15)	10(14)	3.07
Pledged F. or S.	7(11)	13(16)	18(10)	9.78*	4(10)	13(11)	13 (8)	7.97*	10 (5)	3 (9)	10 (8)	8.82*
Became "active"	6(10)	14(14)	13 (8)	3.97	11(12)	12(13)	12 (9)	0.91	9 (6)	6 (9)	10 (8)	3.42
Became "engaged"	2 (4)	8 (6)	5 (4)	2.13	3 (3)	2 (4)	6 (3)	4.36	1 (3)	8 (5)	4 (4)	3.36
Became "pinned"	6 (5)	7 (8)	6 (5)	0.35	6 (8)	11 (9)	8 (8)	1.26	5 (3)	5 (5)	3 (4)	1.76
Began "going steady"	15(10)	12(15)	8 (9)	3.23	9 (8)	11(10)	5 (6)	0.93	7 (6)	10 (9)	8 (8)	0.27
Stopped "going steady"	7 (7)	10(10)	8 (6)	0.35	9 (6)	5 (6)	3 (4)	2.72	7 (4)	6 (8)	7 (7)	1.53

(Observed frequencies are not enclosed; expected frequencies are in the parentheses.)

*Significant beyond the .05 level of confidence.

sorority during the sophomore year. The results, however, are inconsistent. For the low achievement group, those whose performance pattern went down during their sophomore year pledged a greek society less than expected. This same situation holds for the middle achievement group, but is altered somewhat by the high achievement group, where we see the downward changers also pledging more than we would expect. This occurrence becomes more understandable, however, if we are familiar with the achievement regulations of the greek society aspirants. Only those with grade point averages above 2.2 are allowed to pledge. Table 1 on page 76 reminds us that a 2.2 grade point average for the freshman males falls somewhere in the middle of the medium achievement group. The g.p.a. restriction would therefore result in fewer numbers from the medium achievement group and eliminate students entirely from the low achievement group. In the case of the females, a 2.20 restriction on pledging also eliminates a sizable portion of the low achievement group.

The other personal factors which apply to the students during their sophomore year really give no evidence of the existence of a common thread or factor which might be considered as being associated with a particular type of performance change.

Table 13 presents the chi-square data, male and female, pertaining to the sophomore changers' amount of weekly employment during the sophomore year. For the low freshman achievement group, the amount of weekly employment seems to be a meaningful idex, although interpretation of the data is difficult. Of the positive changers, fewer than expected

TABLE 13: Comparison of students classified by direction of sophomore change, freshman achievement level, and hours employed per week during the sophomore year.

		Hours Employed Per Week								X^2
		Over 20		10-20		1-10		None		
H	-	9	(8)	15	(12)	7	(7)	22	(25)	
	0	9	(13)	18	(20)	14	(12)	45	(40)	5.41
	+	16	(12)	18	(18)	9	(11)	35	(37)	
		34		51		30		102		
M	-	4	(8)	21	(17)	10	(11)	43	(40)	
	0	11	(9)	14	(19)	12	(12)	47	(43)	7.28
	+	9	(6)	16	(14)	10	(8)	27	(32)	
		24		51		32		117		
L	-	6	(6)	15	(13)	19	(12)	30	(38)	
	0	10	(9)	22	(19)	16	(17)	52	(54)	13.79*
	+	5	(5)	9	(12)	5	(11)	44	(34)	
		21		46		40		126		

(Observed frequencies are not enclosed; expected frequencies are in the parentheses.)

*Significant beyond the .05 level of confidence

worked more than ten hours a week, while more than expected didn't work at all. The negative changers for that group, on the other hand, worked more than expected (had more students working over ten hours per week) and consisted of fewer students than expected who didn't work at all. Although extreme caution must be used here, this does suggest an association between amount of employment and direction of academic performance change in college.

For the high and middle achievement groups, however, the trend is in the opposite direction. That is, more than the expected number of positive changers work over ten hours per week, and fewer than expected did not work at all. Once again, as was the case with the fraternity and sorority pledging, the significant difference obtained with the low group may be a function of their poor freshman year achievement, rather than their change classification at the end of the sophomore year.

A comparison of the sophomore change groups on the basis of their sophomore place of residence is presented in Table 14. As indicated, the chi-square value for the high achievement group is high enough to be regarded as more than a chance occurrence. The largest amount of variation here seems to be contributed to those living in the residence halls and

TABLE 14: Comparison of students classified by direction of sophomore change, freshman achievement level, and place of residence during the sophomore year.

		Residence Halls	Sororities or Frats.	Co-ops	Married Housing	Other Off-Campus	X^2
	-	11 (20)	16 (10)	10 (8)	8 (8)	8 (7)	
H	0	33 (32)	18 (16)	10 (12)	11 (13)	14 (12)	17.60*
	+	37 (29)	7 (15)	11 (11)	15 (12)	8 (11)	
		81	41	31	34	30	
	-	28 (29)	18 (14)	10 (8)	8 (7)	14 (17)	
M	0	30 (31)	13 (16)	9 (9)	9 (8)	23 (18)	4.43
	+	27 (23)	12 (11)	6 (6)	5 (6)	12 (13)	
		75	43	25	22	49	
	-	29 (31)	6 (4)	11 (9)	7 (8)	17 (16)	
L	0	47 (45)	5 (6)	10 (13)	11 (11)	27 (23)	4.99
	+	30 (28)	3 (3)	10 (8)	9 (7)	11 (14)	
		106	14	31	27	55	

*Significant beyond .05 level of confidence.

fraternities (or sororities). It can be seen that a much smaller than expected number of negative changers lived in the residence halls during the sophomore year, whereas the residence halls housed a larger-than-expected number of students characterized by positive performance changes. Conversely, the fraternities and sororities housed a greater-than-expected number of negative or downward changers and a much smaller than expected number of positive performance changers. Differences for those living in the other types of housing appear to be negligible.

The pattern witnessed in the high achievement group for the residence hall students and the students living in fraternities or sororities, can also be seen, though to a smaller extent, in the middle and low achievement groups. This suggests that rises in performance patterns seem to be associated with residence hall living, while decreases or negative changes are associated with fraternity or sorority living. These factors will be examined again at the junior and senior change points.

The final variable examined for its association with sophomore change patterns was the degree of student participation in extra-curricular activities during the sophomore year. As explained earlier, the amount of time required for these activities has been used for the index of activities immersion.

Tables 15 and 16 present the activities data for the males and females respectively for the sophomore year. The classifications of "much," "some," and "very little or none" were derived by simply dividing the range of weighted immersion values into thirds which would most closely approximate an equal distribution of students. The weighting procedure for the activities index is described in Chapter III.

For the males (Table 15), a significant chi-square value was obtained for the middle achievement group, where we find the negative changers participating more than expected in extra-curricular activities (24 are in the "much" category, where only 14 were expected). The positive or upward changers, on the other hand, reflect an opposite pattern. Fewer than expected participated in the "much" end of the scale, whereas more than expected were found in the "none" category. The no-change group is characterized by a minimum of variation in the middle achievement group.

For the females (Table 16), none of the chi-square values surpassed the chance level.

It is interesting to note that both males and females participate in extra-curricular activities according to their achievement level, regardless of their present direction of performance change. Note, for example, that for both males

TABLE 15: Comparison of male students classified by direction of sophomore change, level of freshman achievement, and activities immersion during the sophomore year.

		Degree of Participation						X^2
		Much		Some		Very little or none		
H	-	17	(15)	11	(11)	10	(11)	
	0	20	(19)	15	(14)	14	(14)	0.54
	+	19	(20)	16	(15)	16	(14)	
		56		42		40		
M	-	24	(17)	20	(20)	7	(14)	
	0	15	(17)	20	(19)	15	(13)	11.10*
	+	9	(14)	15	(16)	16	(11)	
		48		55		38		
L	-	11	(9)	17	(14)	14	(17)	
	0	11	(13)	19	(21)	30	(24)	3.62
	+	10	(8)	13	(12)	13	(14)	
		32		49		57		

*Significant beyond the .05 level of confidence

and females, the high achievement group is high on the "much" end of the participation scale, and low on the "very little or non" end of the scale, while the opposite is true for the low achievement group.

Conclusions Regarding Sophomore Change

The association of behavioral variables with performance change during the sophomore year was discovered to be slight but encouraging. Place of residence was the most promising variable, where positive academic performance trends seemed

TABLE 16: Comparison of female students classified by direction of sophomore change, level of freshman achievement, and activities immersion during the sophomore year.

		Degree of Participation						X^2
		Much		Some		Very little or none		
H	-	5	(5)	5	(6)	5	(3)	3.09
	0	16	(14)	16	(14)	5	(7)	
	+	9	(10)	11	(10)	7	(5)	
		30		32		17		
M	-	11	(8)	8	(9)	8	(9)	6.05
	0	10	(10)	15	(11)	8	(10)	
	+	5	(7)	6	(7)	11	(7)	
		26		29		27		
L	-	4	(5)	10	(8)	14	(13)	1.99
	0	9	(7)	10	(12)	21	(19)	
	+	5	(4)	10	(8)	11	(12)	
		18		30		46		

None of the above X^2 values are significant beyond the .05 level of confidence.

to be associated with residence hall students, while those living in a fraternity or sorority were characterized by downward patterns in achievement. Pledging a fraternity or sorority, amount of weekly employment, and degree of participation in extra-curricular activities, all seemed to bear some relationship to the phenomenon of performance change, but the data regarding these variables was typified by inconsistency and great caution must be used in drawing conclusions regarding their value.

Junior Change

The junior change groups were obtained by grouping students into high, middle, and low groups according to their sophomore grade point averages, predicting junior performance on the basis of the sophomore g.p.a., and placing them into change groups according to the discrepancy between their obtained junior grade point average and their predicted junior grade point average. A more detailed explanation of the grouping procedure and isolation of the performance change groups is presented in the first chapter.

Table 17 presents the data relating to the association of various personal factors and students' academic performance change for the junior year. When applied to the sophomore change groups, pledging a fraternity and sorority seemed to be the key personal factor. For the junior changers, however, this variable does not apply. Four of the obtained chi-square values rise above the .05 level of probability and some of the tentative indications revealed by the data in Table 17 are:

1) Downward performance changers are more apt to change their major field, become "active" in a fraternity or sorority, terminate a stable heterosexual relationship, whereas,

TABLE 17: Comparison of students classified by direction of junior performance change, level of sophomore achievement, and applicability of personal factors during the junior year.

	LOW				MIDDLE				HIGH			
	—	0	+	X^2	-	0	+	X^2	-	0	+	X^2
Chose major	4 (4)	6 (6)	6 (5)	0.18	7 (5)	2 (4)	4 (3)	2.96	2 (2)	2 (2)	1 (2)	0.53
Changed major	10 (8)	14(12)	8(10)	1.02	8 (9)	9 (9)	9 (7)	0.56	12 (7)	10(10)	4 (9)	7.21*
Pledged F.or S.	2 (3)	4 (5)	1 (4)	1.24	1 (2)	5 (2)	1 (2)	3.97	3 (2)	2 (3)	3 (2)	0.71
Became "active"	5 (5)	8 (7)	6 (6)	0.02	12 (7)	9 (8)	2 (6)	7.05*	6 (3)	4 (5)	3 (4)	2.25
Became engaged	3 (5)	7 (7)	9 (6)	2.40	9 (9)	6 (9)	12 (7)	4.33	4 (5)	7 (7)	8 (6)	0.89
Became "pinned"	15 (9)	12(14)	9(11)	4.79	16(13)	14(13)	7(10)	2.27	9 (6)	4 (8)	9 (7)	4.53
Broke "pinning"	9 (3)	1 (5)	4 (4)	11.95*	6 (6)	8 (6)	4 (5)	0.70	3 (1)	2 (2)	2 (2)	0.80
Began "going steady"	9 (5)	6 (7)	4 (6)	4.68	12 (9)	8(10)	8 (8)	0.97	5 (6)	5 (8)	11 (7)	5.24
Stopped"going steady"	7 (5)	10 (8)	5 (7)	1.10	8 (9)	15 (9)	3 (7)	7.09*	8 (4)	4 (6)	5 (5)	3.53

(Observed frequencies are not enclosed; expected frequencies are in the parthentheses.)

*Significant beyond the .05 level of confidence.

2) positive performance changers were less likely to change their major field, become "active" in a Greek social society, or break a "pinning" or going "steady" arrangement.

Examination of the junior change personal factor table (Table 17) reveals, by way of supporting the points listed above, that negative performance changers changed their major during the junior year in greater than expected numbers and the positive changers changed choice of major field less than expected (this was significant for the high achievement group); that they became "active" in fraternities or sororities more than expected while the positive changers did so less than expected (significant for the middle achievement group); that they broke "pinnings" and "steady" relationships more often than expected, while the positive changers did not (significant for low and middle achievement groups).

Consistency seems to be present for the significant variables discussed. Although in each instance a significant chi-square value was achieved in only one of the three achievement groupings, similar results, though not as large, were usually the case in the other achievement levels.

Data pertaining to amount of weekly employment as a variable associated with junior year academic performance change is presented in Table 18. As was the case with the sophomore changers, they are classified according to achievement grouping (based on sophomore grade point average), direction of performance change, and amount of hours employed per week during their junior year.

TABLE 18: Comparison of students classified by direction of junior change, sophomore achievement level, and hours employed per week during junior year.

		Hours Employed Per Week								
		Over 20		10 - 20		1 - 10		None		X^2
H	-	12	(9)	12	(13)	10	(9)	27	(28)	
	0	12	(12)	16	(18)	14	(13)	42	(39)	3.26
	+	9	(10)	20	(15)	10	(11)	33	(33)	
		33		48		34		102		
M	-	11	(9)	15	(18)	10	(10)	42	(39)	
	0	12	(10)	17	(18)	13	(10)	37	(40)	5.28
	+	5	(8)	19	(14)	6	(8)	33	(32)	
		28		51		29		112		
L	-	10	(5)	9	(12)	10	(11)	32	(32)	
	0	5	(7)	14	(18)	21	(17)	52	(49)	13.80*
	+	4	(6)	22	(14)	11	(13)	37	(39)	
		19		45		42		121		

*Significant beyond the .05 level of confidence.

For the low achievement group, a significant chi-square value was obtained. Most of the O-E differences contributing

to this large X^2 value seem to occur in the negative and positive change groups. Here we see the downward changers having a greater-than-expected number of students working over 20 hours per week and the upward changers having fewer than expected working over 20 hours per week. It can also be shown that this pattern is the same for all achievement groupings, although the deviation from the expected frequencies is not as great in those cases.

Once again this suggests that the more hours a student is employed during the academic period, the greater is the likelihood that this student will witness a downward change in his or her academic performance pattern. At this point, however, such a conclusion cannot be warranted, and further analysis seems to be called for.

A comparison of the junior changers on the basis of their place of residence during their junior year is presented in Table 19. None of the obtained differences were large enough to be attributable to more than chance occurrences. In each of the achievement groups, those who lived in the residence halls seemed to experience positive performance changes more often than expected, while those living in other off-campus living units placed a fewer than expected number in this category. In any case, the over-all variation was not

TABLE 19: Comparison of students classified by direction of junior change, sophomore achievement level, and place of residence during the junior year.

		Residence Halls	Frat. or Sorority	Co-Op	Married Housing	Other Off-Campus	X^2
	-	17 (19)	16 (12)	9 (8)	7 (7)	12 (14)	
H	0	25 (26)	16 (16)	11 (11)	8 (10)	24 (19)	6.47
	+	26 (22)	11 (14)	9 (9)	12 (8)	14 (16)	
		68	43	29	27	50	
	-	21 (21)	15 (15)	11 (10)	9 (10)	22 (18)	
M	0	20 (22)	16 (15)	10 (10)	11 (11)	22 (19)	4.68
	+	21 (17)	13 (12)	8 (8)	11 (8)	10 (15)	
		62	44	29	31	54	
	-	20 (21)	7 (6)	12 (9)	8 (6)	14 (16)	
L	0	34 (32)	9 (9)	11 (14)	10 (10)	28 (24)	3.11
	+	27 (26)	8 (7)	13 (11)	7 (8)	19 (19)	
		81	24	36	25	61	

None of the above X^2 values are significant beyond the .05 level of confidence.

sufficient to warrant any conclusions regarding the positive or negative effects of any of the living units being considered.

Tables 20 and 21 contain the data regarding the amount of participation in extra-curricular activities during the junior year. Table 20 presents this information for the male students, and Table 21 for the females. For the male high achievement group a significant difference was found, a difference which seems to be due, once again, to the variation occurring in the positive and negative change groups.

TABLE 20: Comparison of male students classified by direction of junior change, level of sophomore achievement and activities immersion during the junior year.

		Degree of Participation						
		Much		Some		Very little or none		X^2
H	-	20	(13)	6	(12)	9	(9)	
	0	21	(23)	22	(20)	16	(15)	10.63*
	+	10	(14)	17	(12)	9	(9)	
		51		45		34		
M	-	18	(17)	14	(14)	17	(16)	
	0	16	(14)	12	(12)	12	(13)	1.03
	+	13	(15)	14	(13)	16	(14)	
		47		40		45		
L	-	15	(14)	9	(10)	14	(12)	
	0	20	(21)	17	(15)	18	(17)	1.08
	+	20	(18)	15	(14)	14	(15)	
		55		41		46		

*Significant beyond the .05 level of confidence.

TABLE 21: Comparison of female students classified by direction of junior change, level of sophomore achievement, and activities immersion during the junior year.

		Degree of Participation						
		Much		Some		Very little or none		X^2
H	-	15	(10)	5	(7)	6	(8)	
	0	12	(10)	5	(6)	8	(7)	8.09
	+	10	(15)	13	(9)	13	(11)	
		37		23		27		
M	-	12	(11)	9	(9)	8	(7)	
	0	16	(15)	12	(12)	11	(10)	0.59
	+	7	(7)	8	(6)	5	(5)	
		35		29		24		
L	-	7	(5)	8	(8)	8	(9)	
	0	8	(8)	14	(13)	15	(14)	1.48
	+	4	(5)	10	(9)	11	(10)	
		19		32		34		

*None of the above X^2 values are significant beyond the .05 level of confidence.

For every level of achievement in both the male and female tables (Tables 20 and 21), it can be seen that the negative performance changers participated in greater-than-expected numbers in activities at the "much" end of the continuum, while in every case but one, the positive performance changers were represented in this category less often than expected. This observed minus expected discrepancy is great enough to result in a significant X^2 value for only the male high achievement group, but it is nevertheless present in every case.

The findings regarding degree of participation in extra-curricular activities are in keeping with the findings at the end of the sophomore year. In both of these cases, there seems to be a tendency for the negative performance change to be associated with a greater-than-expected frequency in the "much" participation category. The opposite pattern is consistently found for the positive performance changers.

Conclusions Regarding the Junior Change

On the basis of the data presented regarding the association of various behavioral variables with academic performance change during the junior year, these trends seem to be present: in comparison with the positive changer, the negative performance changers are more apt to change their major during the year, more likely to become active in a fraternity or sorority, terminate a stable, heterosexual relationship, participate heavily in extra-curricular activities, and hold a job requiring over 20 hours of weekly employment.

Senior Change

The senior change groups were obtained by grouping students into high, middle, and low groups according to their junior grade point averages, predicting senior performance on the basis of this level of attainment, and placing them into

change groups according to the discrepancy between their obtained senior grade point average and their predicted senior average. A more detailed explanation of the grouping procedure and isolation of the performance change groups is presented in the first chapter.

Table 22 contains the data regarding the association of various personal factors with students' academic performance change during the senior year. The first obvious difference between this type of analysis for the senior change group as opposed to the change groups for both of the first two years, is the reduction in the number of personal variables which apply. Such factors as "changed major field," "made first choice of major field," "pledged fraternity or sorority," and "became active in a fraternity or sorority," have all lost application to the students during their senior year in college. On the other hand, such items as "became 'pinned,'" and "became engaged" are characterized by a marked increase in applicability (as evidenced by larger number of students checking them) and the item "got married" now enters the analysis for the first time.

For the middle achievement group there is a significant difference on the becoming engaged factor, where fewer than expected became engaged for the negative change group

TABLE 22: Comparison of students classified by direction of senior performance change, level of junior achievement, and applicability of personal factors during the senior year.

	LOW				MIDDLE				HIGH			
	—	0	+	X^2	—	0	+	X^2	—	0	+	X^2
Became Engaged	6 (9)	18(12)	11(12)	4.09	6(11)	18(11)	8 (8)	7.13*	10(10)	19(16)	12(14)	1.09
Got Married	7 (4)	6 (6)	5 (6)	1.58	5 (5)	5 (5)	4 (4)	0.11	10 (6)	11(10)	5 (8)	3.67
Became "Pinned"	4 (7)	15(10)	10(10)	4.11	9 (9)	11 (9)	6 (7)	0.47	3 (6)	14 (9)	8 (8)	4.24
Began "Going Steady"	5 (3)	7 (5)	3 (5)	1.88	6 (4)	3 (4)	4 (3)	1.13	5 (3)	2 (4)	4 (3)	2.93

*Significant beyond the .05 level of confidence.

and more than expected did so for the "freeze" or no change group. This can hardly be interpreted as evidence that failure to establish stable heterosexual relationships leads to negative performance changes, however. For both the high and low achievement groups, the negative changers are typified by greater-than-expected numbers getting married and beginning "going steady" relationships. The association of these factors, then, seems to be random and sheds no light on the identification of the various types of academic performance changers, at least for those changes occurring during the senior year.

Comparison of the senior change groups on the basis of amount of weekly employment during the school year is presented in Table 23. This variable proved to be a promising one when applied to the sophomore and junior changers, but it yields no meaningful index of association when analyzed for the senior changers. As noticed before, the negative changers, regardless of achievement level, seem to work over 20 hours per week more often than expected, while the opposite is true of the positive performance changers. This consistency is encouraging, but, nevertheless, the differences obtained cannot be claimed to be more than chance occurrences at the .05 level of probability. It can also be pointed out that the relationship between level of achievement and employment still

TABLE 23: Comparison of students classified by direction of senior change, junior achievement level, and hours of weekly employment during the senior year.

		Hours Employed Per Week								X^2
		Over 20		10 - 20		1 - 10		None		
	-	11	(9)	10	(10)	15	(14)	23	(24)	
H	0	14	(14)	15	(16)	20	(21)	39	(36)	1.11
	+	12	(12)	16	(14)	19	(18)	30	(31)	
		37		41		54		92		
	-	15	(12)	16	(14)	17	(20)	33	(33)	
M	0	13	(12)	14	(14)	21	(20)	34	(34)	2.76
	+	7	(9)	9	(10)	18	(15)	27	(25)	
		35		39		56		94		
	-	10	(8)	13	(10)	18	(17)	16	(20)	
L	0	12	(11)	14	(14)	22	(23)	31	(28)	3.35
	+	9	(11)	13	(14)	25	(23)	31	(28)	
		31		40		65		78		

None of the above X^2 values are significant beyond the .05 level of confidence.

holds, with the higher achievement group working more than the middle and low achievement groups who follow in that order.

How place of residence is associated with one's senior year performance change is presented in Table 24. The 21.07 chi-square value obtained for the high achievement group is significant beyond the .05 level of confidence, and is in agreement with the nature of the differences reported for both the sophomore and junior change groups. For every negative change group, regardless of achievement level, there is a

TABLE 24: Comparison of students classified by direction of senior change, junior achievement level, and place of residence during the senior year.

		Residence Halls	Frat. Soror.	Co-ops	Married Housing	Other Off-Campus	X^2
H	-	12 (14)	17 (9)	9 (7)	11 (9)	10 (18)	
	0	18 (21)	12 (14)	10 (11)	12 (14)	36 (27)	21.07*
	+	24 (18)	7 (12)	9 (9)	13 (12)	24 (24)	
		54	36	28	36	70	
M	-	17 (18)	16 (14)	9 (9)	8 (10)	31 (27)	
	0	19 (18)	15 (15)	10 (19)	10 (10)	28 (28)	3.06
	+	14 (13)	10 (11)	8 (7)	11 (7)	18 (20)	
		50	41	27	29	77	
L	-	12 (13)	13 (8)	10 (8)	7 (9)	15 (17)	
	0	17 (18)	11 (11)	10 (11)	12 (12)	29 (24)	7.26
	+	20 (17)	8 (11)	11 (11)	16 (12)	23 (24)	
		49	32	31	35	67	

*Significant beyond the .05 level of confidence.

smaller than expected number of students who lived in the residence halls, and for every positive change group, regardless of the level of achievement, there is a larger than expected number of students who lived in the residence halls. This pattern is reversed for those who spent their senior years residing in a fraternity or sorority, and, once again, this finding is in keeping with what was reported for the sophomore and junior changes. Those living in married housing are also found in the positive change groups more often than expected.

For the high achievement group, the largest O-E discrepancy is found for those living in "other off-campus" housing and occupying the "freeze" or no-change group. Review of the tables for the sophomore and junior change groups will show that those living in other off-campus housing consistently placed more than the expected number of students in the "freeze" or no-change category. Stability of academic performance seems to be their characteristic in this regard.

Tables 25 and 26 present the data regarding the association of participation in extra-curricular activities and direction of academic performance change, for males and females respectively. None of the obtained chi-square values surpass the .05 level of probability.

Conclusions Regarding Senior Change

The factors found to be associated with changes in scholastic performance patterns during the senior year were fewer in number than those associated with sophomore and junior year performance changes. One's place of residence seemed to be the best index, where it was noticed that residence hall living was associated with more than the expected number of positive performance changers, fraternity and/or sorority living during the senior year was associated with more than the expected number of downward performance

TABLE 25: Comparison of male students classified by level of junior achievement, direction of senior academic performance change, and activities immersion during senior year.

		Much		Some		Very Little		X^2
	-	14	(12)	13	(13)	11	(11)	
H	0	14	(16)	17	(17)	18	(15)	1.24
	+	20	(18)	20	(19)	16	(17)	
		48		50		45		
	-	17	(12)	12	(14)	17	(18)	
M	0	13	(13)	14	(15)	22	(19)	6.97
	+	6	(10)	18	(13)	16	(16)	
		36		44		55		
	-	7	(7)	14	(12)	16	(16)	
L	0	11	(11)	16	(16)	25	(23)	0.78
	+	11	(9)	14	(14)	21	(21)	
		29		44		62		

None of the above X^2 values are significant beyond the .05 level of confidence.

TABLE 26: Comparison of female students classified by level of junior achievement, direction of senior change, and activities immersion during the senior year.

		Much		Some		Very little or none		X^2
	-	9	(6)	6	(7)	6	(7)	
H	0	11	(11)	11	(13)	17	(14)	4.73
	+	4	(6)	10	(7)	7	(7)	
		24		27		30		
	-	9	(9)	13	(14)	13	(11)	
M	0	8	(8)	14	(13)	11	(11)	0.54
	+	6	(5)	9	(8)	6	(7)	
		23		36		30		
	-	7	(5)	6	(6)	7	(8)	
L	0	7	(7)	9	(8)	11	(11)	1.63
	+	7	(8)	9	(9)	16	(13)	
		21		24		34		

None of the above X^2 values are significant beyond .05 level of confidence.

changers, and those living in other off-campus units were characterized by achievement stability.

One's involvement in extra-curricular activities, amount of employment during the school year and other personal variables seemed to be of little utility in ferreting out those factors which might have some relationship to dips and rises in the scholastic performance patterns of college students.

CHAPTER V

SUMMARY, CONCLUSIONS, DISCUSSION, AND IMPLICATIONS FOR FURTHER RESEARCH

Summary

Purpose and Procedure

The purpose of this investigation was to explore the relationship between selected variables and changes in the academic performance patterns of students during four years of college. The study was designed to differentiate between students whose performance pattern improved as opposed to those whose pattern of achievement changed negatively. Students whose patterns of performance did not change at all were also compared. The basic purpose was to examine the factors thought to have association with the change in performance at the time the change occurred. If, for example, a student's performance changed negatively during the junior year, then "factors" having relevance for that student during the junior year were examined.

The sample selected for the study was composed of 1,041 students who entered Michigan State University as freshmen fall term, 1958, and were in attendance during each fall,

winter, and spring term through spring term of 1962.

Subjects were classified into change groups on the basis of the difference between their performance predicted from previous year's grade point average (determined by linear regression) and their actual performance. Any discrepancy greater than a confidence band of .50 standard errors of estimate was used as the criterion for change classification. Since the instruments used for measures of the cognitive variables have been demonstrated to correlate highly with academic achievement, the groups were further divided into high, middle, and low achievement groups. This procedure for determination of the performance change groups was conducted separately at the beginning of the sophomore, junior, and senior years. As a result, there were nine groups -- three change groups at each of the three levels of achievement, analyzed at the end of each academic year.

The change groups were then compared on three types of experimental variables. The variables were: (1) ability and aptitude, (2) attitudes and values, and (3) behavior. Used as measures of the ability and aptitude variables were The Michigan State University Reading Test, The College Qualification Test, and A Test of Critical Thinking, Form G. For measures of attitudes and values The Inventory of Beliefs,

The Differential Values Inventory and Rokeach's Dogmatism Scale were employed. The behavioral variables were measured by an experience inventory developed by the investigator.

The instruments used as measures of ability and aptitude were administered only at the beginning of the freshman year. The instruments used as measures of attitudes and values were administered at the beginning of the freshman year (fall, 1958) and at the end of the freshman year (spring, 1959), while the instrument used to gather information regarding the behavioral variables was administered only during the spring term of 1962, which was the last term in school for students who had progressed at a normal rate.

Analysis of variance was used as the basis for determining the significance of the differences between the performance change groups on the first two types of variables, whereas chi-square tests were employed for analysis of the data pertaining to the behavioral variables. Data regarding the ability-aptitude and attitude-value variables were analyzed separately for males and females, while the data pertaining to the behavioral variables were usually not divided according to sex. Throughout the study a .05 level of probability was used in determining statistical significance.

Findings

The instruments employed as measures of ability and aptitude failed to discriminate between male students classified according to level of achievement and direction of performance change, and in only one instance differentiated between these groups for the females. Marked differences were revealed between achievement groupings -- the high achievement group recorded consistently higher cognitive scores than the middle or low achievement groups -- but not between performance changes within a given achievement group.

This lack of association is true also for the attitude and value variables. There were no significant F-values forthcoming from the analysis for the females, and the association between such factors and change in academic performance was suggested on only one occasion for males. In addition to no differences between change groups, differences between achievement levels were also lacking for the personality measures.

The behavioral variables were more helpful in distinguishing between performance changers. Those making a positive change during the sophomore year, for example, were typically those who: (1) pledged and joined a fraternity or sorority during that year, (2) worked fewer hours at part-time jobs

than negative changers, (3) lived in a residence hall (whereas negative sophomore changers tended to list a fraternity or sorority as their place of residence), and (4) participated less in extra-curricular activities. During the junior year, those making positive changes (as opposed to those making negative changes) were characterized by: (1) fewer changes of major field, (2) fewer students becoming "active" in fraternities and sororities, (3) less employment, and (4) less participation in extra-curricular activities. The behavioral variables associated with changes in academic performance during the senior year were not as pronounced as during the sophomore and junior years, but still provided some clues regarding behavioral differences. Positive changers during the senior year more likely lived in residence halls, whereas negative changers more likely lived in fraternity or sorority houses.

Of the three "types" of variables then, it was found that the behavioral variables were most frequently associated with academic performance changes of college students.

Conclusions

It seems evident that, of the variables analyzed in this investigation, some show consistent trends of association with changes in scholastic performance patterns, while others are not associated in any discernible way.

Measures of ability and/or aptitude and measures of dogmatism and values all seem to be typified by this lack of association. Though in some cases related to academic achievement, they seem to be completely unrelated to changes in scholastic performance. Although several F-values obtained from the analyses of variance did reach a level exceeding significance at the .05 level of confidence, the infrequency and inconcistency indicate that these associations are probably random and merely chance occurrences. The only variable which might be an exception to this is the variable of beliefs. Male students in the positive performance change groups consistently recorded higher mean scores on the Inventory of Beliefs. This suggests that the positive changers are those with less rigid personality structures and that this flexibility is somehow related to positive changes for males. The differences reported, however, are not of such a magnitude to be regarded as statistically significant differences, and

it must be concluded that, on the basis of this study, variables of attitude and value or ability and aptitude nature (as described in this investigation) are not associated with changes in scholastic performance patterns of college students.

Behavioral variables, however, show considerable association with scholastic performance change. The type of behavioral variables associated with changes varies from year to year and, in some cases, consistency is lacking. Nevertheless, the behavioral variables certainly warrant consideration as factors being associated with college scholastic performance changes. Some of the conclusions regarding the behavioral variables which seem to be suggested on the basis of the data are:

1) Employment:

   The amount of weekly employment during school is consistently greater for the high achievement group and, except for the sophomore changers, seems to be associated with negative changes in scholastic performance. That is, the more time one devotes to a part-time job while in school, the greater the likelihood that that student's grade point average will drop.

2) Place of Residence:

Dormitory or residence hall living appears to be associated with positive changes in achievement, while fraternity or sorority living seems to be associated with negative changes in academic performance. For each of the three years and for each of the three achievement levels, the negative changers live in fraternity or sorority housing in greater-than-expected numbers, while the positive changers live in residence halls more often than expected. Associations are not as obvious or consistent for the other types of housing, but it does seem that married housing dwellers are typified by positive changes in academic performance, while off-campus students are found in the negative change category more frequently than expected.

3) Activities Immersion:

The degree of involvement in extra-curricular activities, while not as consistent as the place of residence variable, apparently does have some association with change in scholastic performance. Those whose grade point average changed negatively were consistently involved in extra-curricular activities

more often than expected, while positive changers were characterized by a lesser degree of activities immersion.

4) Personal Factors:

The association between scholastic performance change and the personal factors examined in this investigation vary for each of the sophomore, junior, and senior years. During the sophomore year, there is a significantly greater likelihood that those who pledged a fraternity or sorority will be positive changers. During the junior year, this factor loses its applicability, but becoming "active" in a fraternity or sorority takes its place and seems to be associated with negative changes. Junior year negative changers are also more likely to change their major field. These personal factors all lose their applicability during the senior year, where one finds little or no association between scholastic performance change and the personal factors considered.

Discussion

Out-of-class activities have often been overlooked as factors possibly influencing the scholastic attainment

patterns of college students. Organized student activities have generally been encouraged on the basis of the socialization value they hold for the student; part-time employment has been generally accepted as vitally necessary for many, with the apparent assumption made that it seldom affects academic achievement; and the many personal factors affecting each student have usually been regarded as research possibilities only for those interested in group dynamics or other forms of social psychology. The few attempts that have been made to explore any relationships that might exist between scholastic performance and the above variables have generally reported no negative effects of any of these factors.

The findings of this investigation suggest a somewhat different conclusion. Exploring this from the standpoint of changes in patterns of scholastic performance (rather than a cumulative grade point index), the data leads one to the hypothesis that such outside-of-class activities as those mentioned above <u>do</u> affect one's scholastic performance and, further, that this effect is a negative one. To accept this as conclusive would be erroneous, for only associations have been explored and to say that a cause and effect relationship exists would be going beyond the justifiable limits of the data presented. Nevertheless, association between two

variables always suggests the possibility of one causing the other, and in this case, particiaption in various out-of-class activities naturally leads to questions regarding its impact on scholastic performance.

The facts are these: examination of student participation in extra-curricular activities from the standpoint of amount of time required, reveals that negative scholastic performance changers were consistently involved in extra-curricular activities more often than expected. Living in a fraternity or sorority house is also consistently associated with a negative change in scholastic performance patterns, and, though not to the same degree, part-time employment is associated with a downward change.

The basic nature of the relationship between the student's outside-of-class activities and in-class performance is challenged by these data. And since the findings seem to contradict the findings reported by other researchers, one cannot help wondering if the techniques employed in this investigation are not worthy of consideration in future research of this kind. Particularly the pattern analysis approach to achievement seems to be promising.

In any event, factors such as those examined in this investigation must be examined more thoroughly in terms of their relationship to academic performance. Only a fraction of the variance in academic achievement is accounted for by such standard indices as ability, aptitude, and previous performance, and even the relationships between these variables and scholastic achievement diminishes rapidly after one year in college. In fact, little attention has been given to achievement beyond the first one or two years, and it is here that behavioral variables of the kind used in this investigation might prove especially helpful. The steady decrease in relationship between scholastic achievement and measures of ability and aptitude suggests the possibility of other factors contributing to the variance in performance. New demands on the student's time, such as part-time employment, or more involvement in organized activities, could well be the factors in question.

If this is the case -- and the data resulting from this study seem to give this indication -- then a new look at the student out-of-class seems to be in order. Extra-curricular activities, it seems should still be regarded as "extra," and closer examination must be given to the effect they have on the academic performance of those who consider such activity as a major purpose or goal of higher education.

The findings of this investigation suggest continued use of behavioral variables as possible factors in scholastic performance, and indicate that the concept of performance change analysis provides a promising methodological technique for such an endeavor.

Implications For Further Research

An attempt was made in this study to identify factors which seem to be related to changes in the scholastic performance patterns of college students. The variables chosen for this study have by no means exhausted the possibilities in this area. On the other hand, a number of the variables analyzed in this investigation have been demonstrated to lack association. The results of this study, then, suggest the following considerations for further research in this area.

1) A more concentrated emphasis on behavioral variables would be a desirable approach, with the further suggestion of an interview technique to ascertain the factors associated with performance changers.

2) The present investigation considered only associations between various factors and performance change. Ideally a study would be designed to

isolate the causes of the performance change. This is closely related to the first suggestion, since an interview technique would probably be one of the more promising techniques employed in attempting to ferret out the reasons and causes of academic performance change.

3) A replication of the present study or any approach which has a similar purpose, should make a thorough analysis of such factors as repeated courses, credit-hour load, curriculum, and level of courses taken, and control on these variables in the design of the research.

4) Elimination of the achievement grouping would be desirable. This technique was employed in the present study because of the known relationship between some of the variables analyzed and the level of student achievement. In further research, however, since it is likely that ability and aptitude factors would be omitted, the achievement grouping would also be a technique to omit. This would considerably reduce the number of groups to be analyzed, and yield easier interpretation to the data.

5) If possible, a larger confidence band should be used in determining changes in scholastic performance. The standard error of estimate chosen will determine, to a great extent, the nature of the performance change groups. Utilization of a larger standard error would result in larger actual performance changes for those being classified in one of the change groups.

6) Continued use of changes in performance patterns as a methodological technique is encouraged, along with such analyses in the students' later terms in school.

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APPENDIX

TABLE 6.1: Analysis of variance data for high, middle, and low achievement males on fall, 1958, Test of Critical Thinking.

HIGH ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	22.71	2	11.35	0.25	3.89
Within	10,270.89	224	45.85		
Total	10,293.60	226			

MIDDLE ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	69.05	2	34.52	0.89	3.04
Within	8,118.87	210	38.66		
Total	8,187.92	212			

LOW ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	15.86	2	7.93	0.23	3.04
Within	7,323.47	212	34.54		
Total	7,339.33	214			

TABLE 6.2: Analysis of variance data for high, middle, and low achievement males on fall, 1958, College Qualification Tests.

HIGH ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	1,264.12	2	632.06	1.32	3.89
Within	107,104.12	224	478.15		
Total	108,368.90	226			

MIDDLE ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	48.54	2	24.27	0.06	3.04
Within	86,691.75	210	412.82		
Total	86,740.29	212			

LOW ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	2,365.52	2	1,182.76	2.74	3.04
Within	91,545.10	212	431.82		
Total	93,910.62	214			

TABLE 6.3: Analysis of variance data for high, middle, and low achievement males on fall, 1958, Michigan State University Reading Test.

HIGH ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	62.08	2	31.04	1.44	3.89
Within	4,823.46	224	21.53		
Total	4,885.54	226			

MIDDLE ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	189.85	2	94.92	3.03	3.04
Within	6,562.72	210	31.25		
Total	6,752.57	212			

LOW ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	138.10	2	69.05	2.50	3.04
Within	5,851.83	212	27.60		
Total	5,989.93	214			

TABLE 7.1: Analysis of variance data for high, middle, and low achievement females on fall, 1958, Test of Critical Thinking.

HIGH ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	292.18	2	146.09	4.46	3.07
Within	4,089.69	125	32.72		
Total	4,381.87	127			

MIDDLE ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	37.18	2	18.59	0.57	3.07
Within	4,034.57	124	32.54		
Total	4,071.75	126			

LOW ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	61.71	2	30.85	0.92	3.07
Within	4,301.57	128	33.61		
Total	4,363.28	130			

TABLE 7.2: Analysis of variance data for high, middle, and low achievement females on fall, 1958, College Qualification Tests.

HIGH ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	649.44	2	324.72	0.66	3.07
Within	61,730.28	125	493.84		
Total	62,379.72	127			

MIDDLE ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	13.51	2	6.75	0.02	3.07
Within	44,919.70	124	362.26		
Total	44,933.21	126			

LOW ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	950.65	2	475.32	1.39	3.07
Within	43,810.88	128	342.27		
Total	44,761.53	130			

TABLE 7.3: Analysis of variance data for high, middle, and low achievement females on fall, 1958, Michigan State University Reading Test.

HIGH ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	69.97	2	34.98	2.00	3.07
Within	2,183.58	125	17.47		
Total	2,253.55	127			

MIDDLE ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	103.12	2	51.56	2.46	3.07
Within	2,596.96	124	20.94		
Total	2,700.08	126			

LOW ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	46.15	2	23.07	1.07	3.07
Within	2,753.90	128	21.51		
Total	2,800.05	130			

TABLE 8.1: Analysis of variance data for high, middle, and low achievement males on fall, 1958, Inventory of Beliefs.

HIGH ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	647.09	2	323.54	1.82	3.89
Within	39,882.43	224	178.05		
Total	40,529.52	226			

MIDDLE ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	317.14	2	158.57	0.81	3.04
Within	41,250.59	210	196.43		
Total	41.567.73	212			

LOW ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	337.63	2	168.81	0.83	3.04
Within	43,341.55	212	204.44		
Total	43,679.18	214			

TABLE 8.2: Analysis of variance data for high, middle, and low achievement males on fall, 1958, Differential Values Inventory.

HIGH ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	201.29	2	100.64	1.99	3.89
Within	11,314.43	224	50.51		
Total	11,515.72	226			

MIDDLE ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	30.34	2	15.17	0.35	3.04
Within	9,226.94	210	43.94		
Total	9,257.28	212			

LOW ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	113.39	2	56.69	1.29	3.04
Within	9,345.87	212	44.08		
Total	9,459.26	214			

TABLE 8.3: Analysis of variance data for high, middle, and low achievement males on fall, 1958, Dogmatism Scale.

HIGH ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	1,609.50	2	804.75	1.37	3.89
Within	131,609.50	224	585.78		
Total	132,825.07	226			

MIDDLE ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	1,023.98	2	511.99	0.80	3.04
Within	135,119.01	210	643.42		
Total	136,142.99	212			

LOW ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	796.73	2	398.36	0.60	3.04
Within	139,635.20	212	658.66		
Total	140,431.93	214			

TABLE 9.1: Analysis of variance data for high, middle, and low achievement males on spring, 1959, Inventory of Beliefs.

HIGH ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	451.28	2	225.64	0.34	3.89
Within	150,282.80	224	670.91		
Total	150,734.08	226			

MIDDLE ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	3,802.71	2	1901.35	3.97	3.04
Within	100,555.58	210	478.84		
Total	104,358.29	212			

LOW ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	2,181.31	2	1090.65	2.36	3.04
Within	98,078.67	212	462.64		
Total	100,259.98	214			

TABLE 9.2: Analysis of variance data for high, middle, and low achievement males on spring, 1959, Differential Values Inventory.

HIGH ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	128.79	2	64.39	0.39	3.89
Within	37,044.76	224	165.38		
Total	37,173.55	226			

MIDDLE ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	538.11	2	269.05	2.22	3.04
Within	25,401.55	210	120.96		
Total	25,939.66	212			

LOW ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	97.88	2	48.94	0.37	3.04
Within	27,714.75	212	130.73		
Total	27,812.63	214			

TABLE 10.1: Analysis of variance data for high, middle, and low achievement females on fall, 1958, Inventory of Beliefs.

HIGH ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	43.60	2	21.80	0.16	3.07
Within	17,283.64	125	138.27		
Total	17,327.24	127			

MIDDLE ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	190.68	2	95.34	0.85	3.07
Within	14,982.58	124	112.53		
Total	15,173.26	126			

LOW ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	15.49	2	7.74	0.04	3.07
Within	23,573.41	125	184.17		
Total	23,588.90	127			

TABLE 10.2: Analysis of variance data for high, middle, and low achievement females on fall, 1958, Differential Values Inventory.

HIGH ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	69.47	2	34.73	0.68	3.07
Within	6,352.41	125	50.82		
Total	6,421.88	127			

MIDDLE ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	23.51	2	11.75	0.26	3.07
Within	5,661.67	124	45.66		
Total	5,685.18	126			

LOW ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	133.43	2	66.71	1.32	3.07
Within	6,484.62	128	50.66		
Total	6,618.05	130			

TABLE 10.3: Analysis of variance data for high, middle, and low achievement females on fall, 1958, Dogmatism Scale.

HIGH ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	243.96	2	121.98	0.26	3.07
Within	59,001.34	125	472.01		
Total	59,245.30	127			

MIDDLE ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	1,279.03	2	639.51	1.06	3.07
Within	74,950.84	124	604.44		
Total	75,229.87	126			

LOW ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	479.73	2	239.86	0.36	3.07
Within	84,732.80	128	661.97		
Total	85,212.53	130			

TABLE 11.1: Analysis of variance data for high, middle, and low achievement females on spring, 1959, Inventory of Beliefs.

HIGH ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	838.70	2	419.35	0.99	3.07
Within	52,847.52	125	422.78		
Total	53,686.22	127			

MIDDLE ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	1,239.43	2	619.71	1.74	3.07
Within	44,089.63	124	355.56		
Total	45,329.06	126			

LOW ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	1,218.96	2	609.50	1.17	3.07
Within	66,484.58	128	519.41		
Total	67,703.54	130			

TABLE 11.2: Analysis of variance data for high, middle, and low achievement females on spring, 1959, Differential Values Inventory.

HIGH ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	163.20	2	81.60	0.96	3.07
Within	10,591.42	125	84.73		
Total	10,754.62	127			

MIDDLE ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	435.27	2	217.63	2.35	3.07
Within	11,492.60	124	92.68		
Total	11.927.87	126			

LOW ACHIEVEMENT

Component of Variability	SS	df	V	F	Fc
Among	202.63	2	101.31	0.73	3.07
Within	17,766.12	128	138.80		
Total	17,968.75	130			