A MULTIVARIATE ANALYSIS OF THE RELATIONSHIP OF ACADEMIC APTITUDE, SOCIAL BACKGROUND, ATTITUDES AND VALUES TO COLLEGIATE PERSISTENCE

Thesis for the Degree of Ph. D.
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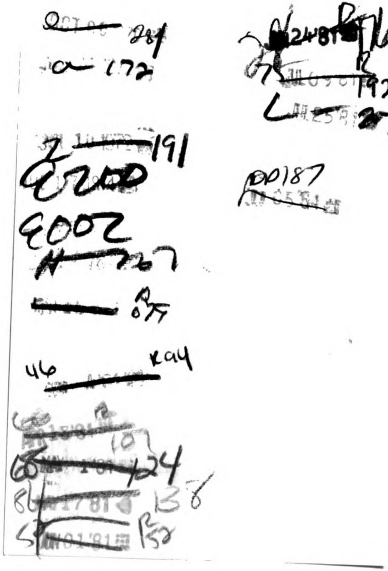

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By

Stanley O. Ikenberry

A THESIS

Submitted to the School for Advanced Graduate Studies
of Michigan State University of Agriculture and
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The study reported herein was part of a larger investigation of "Critical Thinking, Attitudes, and Values in Higher Education," sponsored jointly by Michigan State University and the United States Department of Health, Education, and Welfare, Office of Education. The collection of data on the scale required by the design of the study would have been impossible without the support of these two groups. The writer is grateful to Paul L. Dressel, principal investigator and Irvin J. Lehmann, research associate, of the "C.T.A.V." study, for initial encouragement to explore the problem of student withdrawal from college and for continual guidance.

A MULTIVARIATE ANALYSIS OF THE RELATIONSHIP OF ACADEMIC APTITUDE, SOCIAL BACKGROUND, ATTITUDES AND VALUES TO COLLEGIATE PERSISTENCE

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AN ABSTRACT

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Approved _____

Stanley O. Ikenberry

ABSTRACT

The purpose of this investigation was to contribute to the knowledge about students who withdraw from college prior to the completion of the freshman year. In addition to differentiating between students who remained and students who withdrew from college, the study was designed to differentiate between withdrawals of above and below average first term achievement, and between male and female withdrawals.

The population of the study consisted of full-time, native born, new entering freshmen at Michigan State University, fall, 1958. From the 2,746 students in the population, the 303 students who withdrew prior to the completion of the 1958-59 academic year formed the sample of "withdrawals" for the study. A random sample of 250 students was drawn from the remainder of the population for purposes of comparison, and formed the "enrollee" sample for the study. A further classification by first term achievement and sex was made in both the withdrawal and enrollee samples. This classification scheme yielded ten groups.

The following measures were used in the study: (1) The College Qualification Test; (2) Test of Critical Thinking, Form G; (3) Michigan State University Reading Test; (4) The Inventory of Beliefs, Form I; (5) Rokeach's Dogmatism Scale, Form E; (6) The Differential Values Inventory; and (7) A social status index. The first three measures dealt with various aspects of intellective ability; the fourth and fifth were measures of attitudes of stereotypy and dogmatism; the sixth

was a measure of traditional Protestant ethic values; and the final index was a combination of the social background variables of father's and mother's educational level and father's occupational prestige. All testing was completed during the first week of the fall term, 1958.

Multiple discriminant analysis, a statistical technique of defining linear combinations of variables which maximize differences among groups and minimize differences within groups, was used to analyze the data. The first linear combination, or discriminant function, maximizes the dispersion among groups, and subsequent functions maximize dispersion among groups with the effects of previous functions removed.

The analysis of data yielded three significant discriminant functions and thus the null hypothesis, "There is no difference in intellective ability, social background, attitudes, and values among groups of students classified by collegiate persistence, first term grade point average, and sex," was rejected. The first function accounted for over 60 per cent of the variance as defined by the variables, and was primarily an intellective function. The second function accounted for approximately 25 per cent of the total variance and was interpreted as a social-cultural function, maximizing sex differences. The third function accounted for about 5 per cent of the total variance and was interpreted to be a social background function, with the usual correlates of intelligence and sex removed.

Within achievement and sex categories enrollees were consistently higher than withdrawals on the intellective function. This function,

however, discriminated primarily between above and below average achievement groups. When collegiate persistence groups were classified by achievement level and sex, withdrawals were heterogeneous in intellective ability.

Within achievement and sex groups, enrollees were higher on the second, social-cultural, function than withdrawals. The main discrimination of the second function was, however, between sex groups, females being higher than males. The third function, a social background function with sex and ability factors removed, discriminated between students who withdrew from college and students who remained enrolled, regardless of achievement level or sex. This function may have represented an indirect measure of social-psychological motivation and other circumstantial factors resultant from different social backgrounds or environments and related to college attendance and persistence.

CHAPTER I

THE PROBLEM

During the past decade an increasing volume of educational research has been directed toward the study of students who withdraw from school. While the major portion of the research has been concerned with withdrawal from secondary school, an increasing number of researchers have directed their efforts toward the examination of students who withdraw from college.

From previous research it is possible to define certain educational levels at which disproportionate numbers of students withdraw. The freshman year in college is one such period. Various studies have indicated that approximately ten to fifteen per cent of an entering freshman class may be expected to withdraw from college sometime during the freshman year. An additional ten to fifteen percent may be expected to withdraw during the summer vacation.[1]

The research reported herein was directed toward the study of students who withdraw from college between September and June of their first academic year.

Importance of the Problem

The importance of the study of student withdrawal from college is best illustrated through consideration of the implications of withdrawal

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[1]Robert Iffert, Retention and Withdrawal of College Students, U.S. Department of Health, Education, and Welfare, Office of Education Bulletin, 1958, No. 1. Washington: United States Government Printing Office, 1957, p. 16.

for the individual student, for society, and for the functioning of the educational institution.

The Individual Student

It is possible to suggest only a few of the many possible implications the act of withdrawal from college may have for individual students. The total significance of withdrawal from college is to a degree unique for each student. Some broad implications, however, may be advanced.

Increasing numbers of vocations in American society require college attendance and/or graduation as a minimal qualification for entry. In other vocations, aspirants purportedly attend college because of an alleged advantage of the college graduate in advancing in the particular vocation. While many thoughtful educators are critical of the excessive vocationalism present in collegiate curricula, the evidence of such an emphasis is well established.[2] If the current trend in the direction of increased educational requirements for vocational entry continues, and if the role of colleges and universities in vocational training does not decline, it is likely that the vocational implications of withdrawal from college will continue to be of appreciable significance for individual students.

Equally, if not more important, are the implications of withdrawal from college for the non-vocational life of students. The educational experiences of a college education are designed to broaden and deepen understandings and interests considered by scholars through the ages to

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[2]Earl J. McGrath and Charles H. Russell, Are Liberal Arts Colleges Becoming Professional Schools?, New York: Institute of Higher Education, Columbia University, 1959.

be important to the full development of human potential. It is difficult to weigh such outcomes of a college education, especially those more important and lasting effects which are further developed and modified over the years subsequent to graduation from college. It can be stated, however, that early withdrawal results in student forfeiture of college experiences designed to increase understanding and appreciation of the cultural heritage imbodied in the physical, social and aesthetic world. The research findings of this study should assist in obtaining a clearer understanding of the student who withdraws from college and may be useful in helping such students obtain maximum benefit from the college experience.

The Society

Colleges and universities are social institutions and the functions performed by such institutions must be viewed in relationship to the characteristics and needs of society. American society has for many years been moving in the direction of a non-agrarian, industrialized and specialized economy. There is an increasing demand for greater numbers of individuals with more advanced skills and knowledge. It is evident from examination of current national and international problems that the need for a highly educated citizenry has never been greater. Students who are capable of additional educational development but withdraw from the experiences specifically designed to assist and direct such development represent a loss to society. Research concerning student withdrawal may contribute to the reduction of student attrition and thus increase the quantity and quality of the educated citizenry.

The Educational Institution

The study of student withdrawal from college is important to colleges and universities for several reasons. First, it is important because of the responsibilities of the institution to the individual student and to society. Secondly, student attrition represent an indirect but general criteria of success of the educational program. That is, a high proportion of student attrition may be reflective of inadequate admission programs, inappropriate curricular offerings, poor orientation programs, or to any number of factors resultant from institutional malfunction. The study of student withdrawal from college may contribute to the improvement of one or more of these institutional functions.

The third, and increasingly more important reason why the study of student withdrawal from college is important, is that of institutional efficiency. As increasing numbers of students make application for admission to American colleges and universities, the efficient use of the human and physical resources of the institution will become more and more important.[3] The need for efficiency would imply that colleges and universities have effective admission and selection programs designed to admit those students most likely to profit from and succeed in the educational program.

If the characteristics of the student who withdraws from college during the freshman year can be identified, it is possible that measures

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[3]Clarence B. Lindquist, College and University Faculties, Recent Personnel and Instructional Practices, U.S. Department of Health, Education and Welfare, Office of Education Bulletin, 1959, No. 27, Washington, D.C.: United States Government Printing Office, 1959.

can be taken to assist students who may be likely to withdraw from college in achieving maximum benefit from the educational program. As needless student withdrawal decreases, institutional efficiency should increase.

Purpose of the Study

The purpose of this study, broadly stated, is to contribute to a more complete understanding of the nature of the student who withdraws from college during the freshman year. The study is designed to define some of the major factors which differentiate between those students who remain in college through the end of the freshman year and those students who withdraw during the same period. Moreover, the study is designed to differentiate among different classifications of students who withdraw during the freshman year. Differences between students who achieve at above and below average academic levels prior to withdrawal from college will be studied. Possible differences between males and females who withdraw from college will also be examined.

Rationale of the Study

Researchers have for some time explored the hypothesis that students differ in the extent to which they are capable of performing the kinds of intellective behavior generally required of college students. This capability or intellective ability is assumed to be inseparably related both to hereditary differences and to differences in personal experiences or environment prior to admission to college.

Various instruments have been developed which purportedly measure intellective ability and over the years several of these instruments have been found to positively correlate with success in college as measured by grades.[4]

It is reasonable, therefore, to hypothesize that those students who find it either difficult, or impossible, to perform the kinds of intellective behavior demanded of college students will be more likely to withdraw from college. In attempting to define those factors which differentiate between students who remain in college and those who withdraw, it is especially pertinent therefore to include some measure or measures of intellective ability. One would also hypothesize that intellective ability would be a crucial variable in differentiating between withdrawals attaining high achievement levels and those of low achievement.

In addition to intellective ability there is reason to examine a possible relationship between social background and persistence in college. Hollinshead has presented data which indicate a positive relationship between college attendance and family income.[5] He theorized that the relationship between the various measures of socio-economic background and college attendance reflected three phenomena. First, he suggested that the relationship may reflect a difference in the ability to attain the necessary levels of academic achievement. Secondly, the relationship

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[4]Willard G. Warrington and Joe L. Saupe, "Development and Applications of Tests of General Mental Ability," Review of Educational Research, 29:15-25, 1959.

[5]Bryon S. Hollinshead, Who Should Go To College, New York: Columbia University Press, 1952, p. 37.

between socio-economic background and college attendance may be indicative of a lack of the financial resources necessary for college attendance. The third phenomenon suggested was that the student from the lower socio-economic levels may not perceive college attendance as important to current goals or future aspirations. The adolescent from the middle or upper socio-economic level home may experience pressures from parents, peers, and significant others to attend college. Moreover, his vocational aspirations may require college attendance.

It is possible for the adolescent from the lower socio-economic level home to experience pressures in the opposite direction. The parents of the lower socio-economic home may not have attended college, and may feel it unnecessary for the son or daughter to do so. Many of the peer group of the adolescent may not have attended college. Finally, it may be possible (and in some cases necessary) to achieve vocational aspirations immediately upon graduation from high school without college attendance.

All of the foregoing possibilities suggest that a comprehensive study of collegiate withdrawal should consider the social backgrounds of students as a potentially significant predictive variable.

Some investigators have suggested the possibility that various attitudes and values held by students are related to decisions to withdraw from college. Dressel and Mayhew reported that the rigid, authoritarian student is more likely to withdraw from college than the flexible, non-authoritarian student.[6] It was theorized that the student who is

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[6]Paul L. Dressel and Lewis B. Mayhew, General Education: Explorations in Evaluation, Washington, D.C.: American Council on Education, 1954.

rigid, authoritarian, and is stereotyped in his belief system has difficulty in adjusting to the collegiate environment. The lack of rigid structure in some college courses, the diversity of associates in the residence halls, the presentation of new ideas and new patterns of thought in the classroom, and similar factors may constitute a somewhat unpleasant or even threatening environment to students who are rigid or stereotyped in attitudes and personality development.

In addition to the above dimension, it is suggested by some educators that the failure and/or withdrawal of some college students is due to a lack of seriousness of purpose, dedication to scholarship and academic ideals, or initiative. The assertions are suggestive of possible differences in the value patterns of students.

Spindler has hypothesized differences in American values and character structure revolving around the acceptance of the values contained in the Protestant ethic.[7] Acceptance of such a value system would imply high regard for thrift, morality, religion, achievement and individuality. Many individuals, Spindler asserted, do not fully accept the values contained in the Protestant ethic, but place more emphasis on values of sociability, group conformity, and moral relativism.

There are several reasons why such values might be related to persistence in college. The most obvious, of course, is that students who are more serious or dedicated in purpose, and more inclined to be self-directive and resist group pressures may be able to achieve at a higher level in college due to commitment to such a value system.

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[7]George Spindler, "Education in a Transforming American Culture," Harvard Educational Review, 25:150-156, 1953.

It is also possible that the collegiate community tends to be committed to the "Protestant ethic." There is some evidence to indicate that age is related to commitment to the values contained in the Protestant ethic.[8] If this generalization applies to the college community, professors and officials of the university would have values which are nearer to the Protestant ethic values than many entering freshmen. Such a discrepancy may result in subsequent conflict and withdrawal.

Summary of the Purpose of the Study and the Underlying Rationale

In the foregoing pages it was stated that the purpose of this study is directed toward a study of various factors which differentiate between students who remain in college through the end of the freshman year and students who withdraw from college during the same period.

An equally important aim of the study is to differentiate among different classifications of students who withdraw from college. Failure to make distinctions among students who withdraw from college in reference to previous achievement or basic differences such as sex produces results which are less precise than desired.[9]

After consideration of several possible factors which may be related to collegiate withdrawal, it was concluded that a comprehensive study of the problem should consider such variables as intellective ability, social background, attitudes, and values.

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[8]Richard Prince, A Study of the Relationship Between Individual Values and Administrative Effectiveness in the School Situation, (Unpublished Dissertation), Chicago: University of Chicago, 1957.

[9]See the review of literature in Chapter II.

The approach to the problem of collegiate withdrawal reported herein is different from previous investigations in two respects: comprehensiveness and methodology. In the first respect, several investigators have examined collegiate withdrawal in relation to academic aptitude, or attitudes, or values, or social background. None, to date, has considered all such factors in approaching the problem. The problem presented herein takes into account all of these aspects.

Methodologically, the study is unique in that this is the first known attempt to use a multivariate analysis technique in the study of the problem of collegiate withdrawal. This technique, to be discussed in Chapter Three, is especially valuable in defining the relative contribution or importance of variables in the differentiation among students who withdraw and students who remain enrolled in college.

The Hypothesis to be Tested

Following directly from the previously stated purposes and rationale of the study, the subsequent hypothesis was formulated:

> It is possible to differentiate among groups of students classified by collegiate persistence, first term freshman grade point average, and sex, on the basis of intellective ability, social background, attitudes, and values.

For the purposes of the statistical test, the above hypothesis was stated in null form, as follows:

> There are no differences in intellective ability, social background, attitudes and values, among groups of students classified by collegiate persistence, first term freshman grade point average, and sex.

The null hypothesis tests the assumption that all of the groups of students may be considered members of the same parent population and

no differences exist among groups in intellective ability, social background, attitudes, and values.

If, subsequent to the analysis of data, the null hypothesis is rejected, the differences among groups will be examined. Special attention will be directed toward apparent differences between students who withdraw from college and those who remain in college through the end of the freshman year. Attention will also be directed at different classifications of withdrawals, such as males and females who withdraw, and students who withdraw from college with above and below average achievement records.

Thus, the importance of the study, the goals and objectives, and specific directions of inquiry have been set forth. In the following chapter, a critical review of the literature is presented and the findings of previous investigators will be reported and summarized.

In the third chapter an account of the methodology of the study is presented, including a description of the sample and sampling procedure, the instrumentation, the processing of data, and the analysis procedures.

In the fourth chapter the results of the analysis are reported. A summary of the purpose of the study, the relevant research, the methodology of the study, the findings of the study, and the conclusions to be drawn from the study are presented in the final chapter.

CHAPTER II

THE REVIEW OF THE LITERATURE

The review of the literature contains a critical examination of research on the problem of student retention and withdrawal from college. The findings of several studies are presented and the design, methodology, techniques of analysis, and generalizations are examined with reference to a set of evaluative criteria.

A systematic review of journal publications and unpublished doctoral dissertations over the past ten year period was made. An evaluation of the research was approached by applying a set of criteria to the studies included in the review. These criteria represent some of the basic considerations which should be taken into account in the design and methodology of research.[1] The criteria used in the tentative evaluation of the literature were as follows:

I. Definition of the Problem

   A. Was the problem clearly defined?

   B. Was the problem stated in the form of testable hypotheses?

II. Statement of Methodology

   A. Were all pertinent and distinguishing characteristics of the sample adequately described, such as methods of selection, size, and other pertinent characteristics related to the statement of the problem?

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[1] William W. Farquhar and John D. Krumboltz, "A Check List for Evaluating Experimental Research in Psychology and Education," Journal of Educational Research, 52:353-354, 1959.

B. Was a control group randomly selected and adequately defined? Was the population from which the control group was drawn made explicit?

C. Were the methods and sources of data collection clearly stated and adequate to the problem?

III. Analysis of the Data

A. Was some statistical design employed in the investigation and was it appropriate to the problem under study and the data collected?

B. Did the analysis of data result in some statement of probability?

IV. The Findings

A. Were the findings consistent with the problem presented?

B. Did the investigator generalize within the limits of the study?

1. Did he generalize within the universe sampled?
2. Did he generalize within the evidence available in his findings?
3. Did he generalize within the structure of his hypotheses or within the stated purposes of the study?

Several limitations are apparent in any attempt to evaluate published research. Professional journals frequently impose restrictions on the length of manuscripts in order to increase the volume of research studies published. This restriction in turn frequently requires that certain details of the experiment be omitted from the published report. It is therefore possible to criticize research unjustly. As this reviewer

had no alternative but to accept the published report as reasonably representative of the research, an advance apology is due those investigators who are recipients of unjust criticism.

It is common for research studies in the area of college student withdrawal to direct attention to several facets of the problem. Some of the studies include student given reasons for withdrawal, various background characteristics of those who withdraw, the academic ability of withdrawals, and other related phenomena. Categorization of studies is therefore difficult.

It is, however, advantageous to present the research findings in some orderly fashion. The review has therefore been divided into the following categories: (1) student given reasons for withdrawal from college; (2) the academic ability of students who withdraw from college; (3) social background of those who withdraw from college; and (4) attitudes and values of college student withdrawals.

Academic Aptitude and Student Withdrawal From College

The relationship between the intellectual ability of students and subsequent withdrawal from college has received careful study by several investigators. Margaret Ruth Smith of Wayne State University conducted a study of all freshman students, both part-time and full-time, who entered Wayne State University in the fall of 1953.[2] The total group of 949 entering freshman students was subsequently divided into three

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[2]Margaret Ruth Smith, A Study of First Year Drop-Outs at Wayne State University, Detroit, Michigan: Wayne State University, 1957 (Mimeographed).

sub-groups on the basis of the length of their persistence in college. Group I consisted of those students who dropped out during or at the end of the first semester. Group II consisted of those students who dropped out during or at the end of the second semester. Group III was a random sample from the total population of 1075 students who remained in college for both semesters and returned to Wayne State for the beginning of the sophomore year.

Data regarding students were collected from University records, individuals on campus, and from a questionnaire mailed to students. Sixty per cent of the first semester drop-outs and 88 per cent of the second semester drop-outs returned the questionnaire.

Of the 949 students who entered Wayne State University from high school in September, 1953, thirty-three per cent dropped out at some time during their first year or at the end of the year. Sixteen per cent dropped out during or at the end of the first semester and seventeen per cent dropped out during or at the end of the second semester. A larger proportion of part-time students dropped out during the first year than regular or full-time students. Seventy-five per cent of group one were in good academic standing at the time of departure, in contrast to sixty-two per cent of group two and eighty per cent of group three who were in good academic standing at the time of withdrawal. When the groups were compared in terms of number of academically superior students, (those above a "B" average), group three (students enrolled) had eighteen per cent, group two had thirteen per cent, and group one had ten per cent.

Students who remained in college showed a slight superiority on the total score of the American Council of Education Psychological

Examination. There was, however, no relationship between time of withdrawal and the total score on the A.C.E. Psychological Examination.

The problem under study by Smith was clearly defined. Broad questions were presented to guide the investigation, but no hypotheses were stated. The sample was adequately described. One of the strongest points of the study was the fact that the investigator studied the nature of the "non-respondents" to the questionnaire. Non-respondents were compared to respondents on a variety of data. Thus, the investigator was able to speak with some confidence concerning the representativeness of the portion of the sample who returned the questionnaire.

Adequate control groups were selected and defined. Methods of data collection were made explicit.

The study did have some limitations. First, Smith included both full-time and part-time students in the sample. Thirty-eight per cent of the students who withdrew from Wayne during or at the end of the first year were part-time students. The inclusion of part-time students in the sample limited the ability to generalize the findings of the study to the general student population of most colleges and universities.

There was an indication that a statistical model and statistical techniques were used in the analysis of the data. The nature of this model, the instances of its use, and the probability of difference statements between groups were not stated.

Emma W. Bragg tested the null hypothesis that there are no statistically significant differences in the performance of those students who withdraw from college and those students who remain in relation to

certain selected criteria considered to be related to withdrawal.[3]

The population under study consisted of the "day class" of an anonymous university. From the original freshman enrollment of 724 students, 419 students (58 per cent) withdrew during the first two years of college. Three hundred five students, or 42 per cent, remained enrolled through the beginning of the third year. Random samples of 100 cases were drawn from both the group who remained and the group who withdrew. Comparison of unmatched groups served as the statistical design and tests of the critical ratio and chi square were used as the statistical techniques.

The findings of the study indicated that there was a statistically significant difference in the academic performance of students who continued and students who withdrew from college on the criterion of high school grade point average. There was also a significant difference between the two groups in relation to academic performance during the first semester in college as measured by the first semester grade point average. In both instances, those students who remained in college tended to have a higher high school grade point average and a higher grade point average the first semester in college.

The quantitative section of the American Council on Education Psychological Examination did not discriminate between those who withdrew and those who remained enrolled. The linguistic section of the A.C.E. discriminated between the two groups at the twentieth percentile,

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[3]Emma W. Bragg, "Study of Student Withdrawal at 'W.U.'," The Journal of Educational Psychology, 47:199-230, April, 1956.

but not at the fiftieth or seventy-fifth percentiles. The Cooperative English Test, total score, discriminated between those who continued and those who withdrew at the twentieth and fiftieth percentiles, but not at the seventy-fifth percentile. There was no relationship between sex and continuation in college, nor between age and collegiate persistence.

The problem was clearly defined by Bragg, and a testable hypothesis was formulated. The characteristics of the sample, including the method of selection, and the nature of the control group were made explicit. Methods of collection and sources of data were clearly explained. The instruments were described, although no reliability statement was given for any of the instruments.

The critical ratio was used to test differences in means, except in the cases of the A.C.E. Psychological Examination and the Cooperative English Test in which the investigator used the chi square statistic to test for differences in the per cent scoring above the selected percentiles of 20, 50, and 75. The *t* test of significance of difference between two means is a more exact test of difference than is the critical ratio. The investigator reported no limitations of the data which would have necessitated use of the critical ratio in preference to the *t* test.

Moreover, the transformation of the scores received on the A.C.E. Psychological Examination and the Cooperative English Test into frequencies scoring within a given percentile was of questionable value. An over-all, three by two chi square test would not have yielded the differences the investigator reports; thus, a separate chi square test must have been made on each percentile grouping. These separate tests would reduce the confidence one could place in the resulting statements

of probability of difference. The use of the t test in this instance would have given a more accurate statement of differences. The t test, however, would necessitate leaving the data in score form, and would prohibit tests of significance within various percentile groups.

Halladay and Andrew report a study of student withdrawal from various selected colleges in Arkansas.[4] The sample consisted of the 1955-56 freshman classes of nine participating Arkansas colleges. Any student who failed to re-enroll for the fall term, 1956, was considered a "drop-out." A total of 1,067 drop-outs were included in the sample.

The findings, as reported by the investigators, indicated that the largest number of drop-outs took place after the end of the first academic year. The percentage of male and female drop-outs was essentially the same. Thirty-six per cent of all drop-outs earned a passing grade prior to withdrawal, while 64 per cent of the drop-outs did not achieve at an acceptable level or left college before any grades were assigned. The investigators reported that the analysis of scores of freshman drop-outs on "an ability test" indicated that 64 per cent of the drop-outs scored below the national media on the test. They also indicated that 74 per cent scored below the national median on "an English achievement test."

By way of evaluation, the Halladay and Andrew study possesses many serious limitations. The problem could have been more clearly stated and the specific goals or hypotheses of the study explicitly

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[4]D. Whitney Halladay and Dean C. Andrew, "Drop-outs from Arkansas Colleges," Personnel and Guidance Journal, 37:212-13, November, 1958.

defined. While the sample size was given, the exact nature of the sample including information as to the sex distribution, distribution among the colleges, and collegiate class level was not stated.

No control group was selected. National norms were used for comparative purposes. National norms do not provide data or criteria necessary to test differences between students who withdrew from Arkansas colleges and students who remained enrolled. No description was given of the instruments used in the study. No statistical design was discussed and no statements of probability of difference were given. Recognizing the limitations of the study, the generalization of the findings should be restricted.

Paul Munger conducted a study on withdrawal from college of students who were admitted to the University of Toledo from the upper, middle, and lower thirds of their high school graduating classes.[5] Scores on the Ohio State Psychological Examination, administered as an entrance examination, and grade point averages for the first semester in college were used as criterion variables. Each student was classified as to the length of persistence in college. After assigning students to college persistence groups, the test scores and the first semester grade point averages of the various groups were compared.

The analysis of data indicated that there was no significant relationship between the scores on the Ohio State Psychological Examination and persistence in college for students who had graduated in the upper,

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[5]Paul F. Munger, "Student Persistence in College," Personnel and Guidance Journal, 35:241-43, December, 1956.

middle, and lower third of their high school classes. That is, with high school rank held constant, there was no significant difference in measured academic aptitude between those students who withdrew from college and those who remained. There were, of course, differences among the scores of upper, middle and lower groups themselves.

There was a significant relationship between persistence in college and the first semester grade point averages of the three groups. Munger generalized that a more accurate prediction of attrition could be made through utilization of both the rank in the high school graduating class and the first semester grade point average than could be made by either of the variables alone. The investigator stated that it was likely that middle third students would remain in college to graduation if they had just slightly better than a "C" average in the first semester; upper third students if they almost had a "B" average; and lower third students if they had barely a "C" average in the first semester.

Although no hypotheses were given, the problem was clearly stated. Sample selection and size were made explicit. The control groups were obtained in accord with the design of the study. The methods of data collection were given. The group means, standard deviations, and descriptive information were presented in regard to the instruments used. The analysis of variance and t test were used as statistical techniques and were appropriate to the data. The investigator was careful to generalize within the population sampled and within the evidence available. A high degree of confidence could be placed in the findings.

Another approach was made to the problem of collegiate withdrawal by Lins and Pitt who studied a group of 1,994 freshmen of the University

of Wisconsin.[6] All of the students were high school graduates and residents of the state of Wisconsin.

From September, 1948, to June, 1952, students would have had opportunity to register for a total of eight semesters of study. The mean number of semesters for which students were registered was 5.2. Twenty-eight per cent of the students were registered for two semesters or less. Only thirty-eight per cent were registered for all eight semesters. The greatest loss of students was during the freshman year, during the first two registration periods. The second greatest loss was during the first registration period of the second year. Student withdrawal subsequent to the first semester of the second year was relatively small.

The findings of the study indicated that the higher the percentile rank of a student in his high school graduating class, the more semesters he was likely to be registered during the eight semester period. The product moment coefficient of correlation between these two variables was .37 which is significant at the .01 level of confidence. Percentile ranks on the American Council on Education Psychological Examination for students correlated .288 with the number of semesters registered. The mean percentile rank on the A.C.E. for all students in the sample was 49.3 and ranged from 34.4 for students registered only one semester to 57.5 for students who were registered all eight semesters. The correlation of the first semester grade point average of students with the length of residence in college was .541 which is significant at the .01 level of

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[6] L. J. Lins and Hy Pitt, "The Staying Power and Rate of Progress of University of Wisconsin Freshmen," College and University, 29:86-99.

confidence. The higher the first semester grade point average of students, the more likely they were to remain in college.

The problem was clearly defined, although no hypotheses were presented. The size and selection of the sample were described and contrasting groups, serving a control function, were formulated. Methods and sources of data collection were given. The mean and standard deviation for all the instruments were listed but no estimate of instrument reliability was given. The analysis of data did result in a statement of probability of relationships. Generalizations were made within the limits of the population sampled and in accord with the evidence of the study.

The statistical model used in this study was of unusual interest. The correlation of ability and achievement indices with length of collegiate persistence was a novel approach and produced interesting results. No statement was made concerning the nature of the distribution of collegiate "persistence scores." It is quite likely, though, that the distribution would have been far from normal and would have approached a U shape. The possible effects of such a U shape distribution in inflating the coefficients of correlation should have been discussed.

Finally, as supportive research, dissertations by Goble of Indiana University and Hanks of the University of Arkansas are presented. Goble of Indiana University compared the graduates of the 1950 freshman class at Miami University to those who did not graduate.[7] Students coming from

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[7]Robert Irvin Goble, A Study of the Student Drop-Out Problem at Miami University, (Unpublished Ph.D. dissertation, Indiana University, 1956).

the higher quartiles of the high school graduating class were found to be more likely to graduate. The most frequently given reasons for withdrawal included military service for men and marriage for women.

Hanks, at the University of Arkansas, studied freshman student withdrawal and found withdrawals to have significantly lower scholastic aptitude scores, less mastery of the English language and lower high school grade point averages than students who remained in college beyond the end of the freshman year.[8]

Attitudes and Values of Students Who Withdraw from College

Partially because a limited amount of research has been conducted on the relationship between student attitudes and values and withdrawal from college, studies concerned with student given reasons for withdrawal have been included in this section. Student opinions may, however, be indicative of attitudes and values.

Roger Yoshino reported a study of freshman student withdrawal.[9] The population consisted of 98 students who were assigned to the investigator when they were first enrolled in college. Data were collected from counseling sessions and interviews, together with a tabulation of selected data from the file of each of the student advisees. Of the

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[8]Charles Hanks, A Comparative Study of Factors Related to Retention and Withdrawal of Freshman Students at the University of Arkansas, (Unpublished Ph.D. dissertation, University of Arkansas, 1954).

[9]Roger Yoshino, "College Drop-outs at the End of the Freshman Year," Journal of Educational Sociology, 32:42-48, September, 1958.

total of 98 students, 45 had withdrawn during or at the end of the freshman year. The fifty-three students who remained in college served as the control group.

The results of the unstructured interview showed that students offered the following reasons as influential in the decision to drop out of school: lack of preparation in high school, 51 per cent; inadequate finances, 39 per cent; no clear cut field of interest, 33 per cent; poor study habits, 29 per cent; had to take courses they were not interested in, 27 per cent; marriage, 22 per cent; discouragement with low grades, 18 per cent; planned to attend college for only one year, 18 per cent; unhappy personal adjustment, 16 per cent; lack of academic ability, 13 per cent; misconception of what to expect in college, 11 per cent; not enough courses in which they had an interest, 11 per cent; could not make "house" grades, 11 per cent; transfer to another college, 11 per cent; homesick, 4 per cent; and family problems at home, 4 per cent.

There was a significant difference in high school grade point average and in American Council on Education Psychological Examination scores between students who withdrew and students who remained in college. Students who remained in college tended to be higher on both measures. There was also a significant difference on the above two measures between those students who dropped out for academic reasons and those who withdrew because of other reasons.

The most interesting finding of the study was that there was no significant difference between those students who withdrew from college and those students who remained in college on the ratings given by high

school officials to the following questions: (1) How well does he get along with others? (2) Does he need constant prodding or does he go ahead with work without being told? (3) How emotionally stable is he? (4) What kind of a citizen is he? (5) Has he a program of definite purposes in terms of which he distributes his time and energy? (6) What are his chances of success in college?

Although the problem was adequately defined, no testable hypotheses were presented. Methods of data collection were made explicit and were adequate to the problem presented. A t test and chi square analysis were reported as the statistical tools utilized and were appropriate to the nature of the data. There is some question as to the nature of the sample. The rate of withdrawal for the end of the freshman year of 46 per cent was an unusually high figure. Other investigators have consistently reported less than twenty per cent attrition during the freshman year.

The author did overgeneralize beyond the data presented in the discussion of the findings. The generalizations were made that students who matriculate into college have better than average personalities; and that freshmen are immature in a number of ways, and need guidance and support from their families, instructors and upperclassmen. The design of the study, the instruments used, and the actual data collected would not appear to be supportive of such a statement.

Harry A. Grace reported one of the few attempts to examine the relationship between personality characteristics and withdrawal from college.[10] He tested the hypothesis that independent-responsible students

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[10]Harry A. Grace, "Personality Factors and College Attrition," Peabody Journal of Education, 35:36-40, July, 1957.

would be least likely to drop out of college and dependent-irresponsible students most likely to leave.

Freshman students who entered the college during 1954 and 1955 were studied. Every student who withdrew from college for whatever reason was considered in the attrition group. A total of 107 students from both classes withdrew before April, 1957. A control group of 107 students who continued was matched with the attrition group with regard to measures of academic aptitude.

The Taylor Manifest Anxiety Scale and Gough's scales measuring dominance and responsibility were used as test instruments. A measure of men's participation in college life was formed through the use of a list of men who received athletic numerals or sophomore varsity letters. Participation in the voluntary military training program was also used as a measure of participation in college life.

The analysis of data, according to the investigator, indicated that those who remained in college earned more college credits. The men who remained enrolled were more active in campus varsity athletics and AFROTC than those who withdrew. The investigator claimed that the data supported the hypothesis that independent-responsible students would be least likely to drop out of college and dependent-irresponsible ones most likely to leave. The investigator then confused the issue by stating that when attrition and control groups were compared, only women who remained in college were more responsible.

The problem was clearly defined and testable hypotheses were formulated. A control group was selected and matched according to level of ability with the attrition group. Methods of data collection,

however, were not made explicit. Statistical techniques were apparently used, but no mention was made of the particular techniques used. The analysis did result in a statement of probability of group differences.

Because the entering classes of two separate years were used, some members of the population were enrolled in college for longer periods of time than others, and thus would have had more opportunity to withdraw from college. If, as the author claims, there were original differences between the two entering freshman classes in dominance and responsibility, this would have possibly caused the subsequent withdrawal group to be atypical on the same measures.

Notwithstanding all of the possible reasons for attaining invalid but statistically significant results, the investigator did not present any data to support the main hypothesis of the study. The mere fact that within the withdrawal group a slightly larger number of students appear to be dependent-irresponsible rather than independent-responsible is no support for the hypothesis that independent-responsible students are least likely to drop out of college. A comparison with a control group of those who remain in college would be necessary to make any such assertion. Due to the above limitations, it is impossible to accept the conclusions of the investigator.

C. A. Berry and A. L. Jones conducted a study to reveal reasons students gave for withdrawal from Grambling College during the 1953-54 academic year. A total of 151 freshman students severed connections with Grambling College during or at the end of the year.[11] A questionnaire

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[11]C. A. Berry and A. L. Jones, "Factors Involved in the Withdrawal of Students from Grambling College At or Before the End of Their Freshman Year," Journal of Negro Education, 25:No. 4:445-47, 1956.

was mailed to each of the 151 former students. Follow-up letters were sent to the 128 students who did not reply to the first questionnaire. In toto, 71 students, or 47 per cent of the total withdrawal group, returned the questionnaire.

Of those who returned the questionnaire, 49 per cent had completed two semesters, 27 per cent had completed one semester, and 24 per cent had withdrawn before the first semester had ended. Of the 76 per cent who had completed at least one semester at Grambling College, 15 per cent had attained honor status and 76 per cent earned between a "C" and "B" grade point average.

The majority of the students expressed positive feelings and attitudes toward Grambling College. Results of the questionnaire indicated that lack of finances was the outstanding reason precipitating the withdrawal of students. Other reasons included were dislike of the college, marriage, "to join the Armed Service," family difficulties, pregnancy, and health.

The purpose of the Berry and Jones study was stated in general terms, and the sample and methods of data collection were described.

Recognizing the difficulty involved in attempting to receive a near 100 per cent return from mailed questionnaires, the ability to generalize is limited when less than half of the original sample is retained in the final analysis. Moreover, the investigators did not make any statement as to the nature of the remaining 53 per cent of the original sample who did not return the questionnaire. The assumption of similarity of respondents and non-respondents without some comparative data would seem unjustified when studying collegiate withdrawal.

No control group was selected and apparently no statistical model was applied to the data. Thus, no statement of probability of difference between those who remained in college and those who withdrew from college during or at the end of the freshman year could be made.

Holmes studied voluntary freshman withdrawal from the College of Liberal Arts of Syracuse University in order to obtain student given reasons for withdrawal and other characteristics of the withdrawals.[12] Out of the entering freshman class of 1050 students in the College of Liberal Arts, it was found that 169 students withdrew by the end of the freshman year, including 55 males and 114 females.

Questionnaires were mailed to all students who withdrew from college and completed questionnaires were received from 44 per cent of the sample. Fifty-six of the female withdrawals (49 per cent) and 19 of the males (34 per cent) returned the questionnaire. Freshman student population norms of the College of Liberal Arts at Syracuse University were used in the comparison of biographical characteristics of students who withdrew with the characteristics of the total population.

The findings of the study indicated that the students who withdrew were more likely to come from the local area (i.e., the local city, county, and state) than the total freshman population. Various aspects of the services of the college came under criticism in the responses of the questionnaire, including the food services of the college and academic

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[12]Charles H. Holmes, "Why They Left College: A Study of Voluntary Withdrawal from the College of Liberal Arts at Syracuse University," College and University, 34:295-300, September, 1959.

counseling. The investigator stated that the main student given reason for withdrawal was simply that students wanted to attend another college or university. Some 63 of the 75 (respondents) listed the fact that they did transfer to another college.

The Holmes study has definite limitations. A clearer statement of the problem, including a statement of hypotheses or a discussion of specific aims of the study would have been desirable. The main limitation of the study was the sex bias of the sample, in addition to the inability to obtain a larger percentage of returns on the questionnaires. The large percentage of respondents who indicated they transferred to another institution points up the likelihood of some bias in questionnaire returns and a resultant bias in the sample used in the analysis. The number of males in the final analysis was 19, and thus limited the ability to generalize to collegiate withdrawals in general. While the freshman student population was used for comparative purposes, the selection of a control group consisting of students who remained in college would have been desirable. No statistical design was reported and no statements of probability of differences were given.

Wooster and Stover studied the entering freshman class of a college of education to determine the reasons for withdrawal of those students who dropped out of the college.[13] A letter was sent to each student who withdrew, asking the reasons for withdrawal from the college of education. A reply card was enclosed. Of the 55 per cent who returned

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[13]G. F. Wooster and W. W. Stover, "Lost: Students," Educational Research Bulletin, 37:85-90, April, 1958.

the card, marriage was the reason given by more than half of the respondents. Transfer to another institution, dissatisfaction with college, "personal" reasons, military service, and work were also given as reasons for withdrawal.

The sample of the Wooster and Stover study should have been more clearly defined. Also, the prominence of marriage as a reason for withdrawal would indicate a strong sex bias in the sample. No mention is made, however, of the number of males and females in the sample.

No control group was selected. No mention was made of the use of any statistical model in the analysis of the data and, of course, no statements of probability of differences were given.

The investigators generalized beyond the findings of the study if the data reported may be considered complete. A recommendation was made for individual counseling of students and it was asserted that individual counseling would reduce the number of withdrawals. While this is a logical hypothesis, and worthy of study, the design of the study and the data collected do not merit such generalization.

Social Backgrounds of Students Who Withdraw From College

The relationship between collegiate persistence and various social background factors such as level of parental income and education, social status of the father's occupation, and other sociological variables which may influence the social importance and motivation of college persistence is of particular relevance to the general problem of college student withdrawal.

W. L. Slocum conducted a study concerning the withdrawal from college of students who entered the State College of Washington as freshmen in the fall of 1951, 1952, and 1953.[14] Transfer students were excluded. Drop-outs were defined as those students who were not enrolled on April 25, 1955. A sample of the total population under study was randomly drawn. This yielded a sample of 1,019 students which included 465 enrolled students and 554 drop-outs. Completed questionnaires were obtained for 99 per cent of the enrolled students and 81 per cent of the drop-outs. Data were gathered from the counseling center records and from the office of the registrar.

The findings of the study indicated that there was seldom a single cause for withdrawal as perceived by students. Most of the drop-outs identified two or more problems as important or very important in connection with the decision to drop out of school. Furthermore, the data of the study indicated that the enrolled students met many of the same problems as the drop-outs. Eighty-two per cent of the drop-outs identified two or more important reasons for withdrawal, and more than two reasons were identified by 61 per cent.

Fifty-one per cent of the drop-outs were in academic difficulty at the time of withdrawal. Only 31 per cent, however, acknowledged that low grades had been either important or very important to them in connection with their decisions to withdraw. This finding was interpreted as an indication that low grades frequently may be regarded by

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[14] W. L. Slocum, "Social Factors Involved in Academic Mortality," College and University, 32:53-64, 1956.

students as the reflection of other problems which operate to depress grades rather than as an indication of lack of intellectual capacity. There was, however, a significant difference between students who withdrew from college and students who remained in relationship to rank in high school graduating class and scores on the American Council on Education Psychological Examination.

Both women who were enrolled and women who withdrew from college were dependent upon parents for the bulk of their financial support while in college. The men drop-outs, however, could be described as being more dependent upon parental support and personal savings than males who remained in college. The males who remained in college were more dependent on part-time summer employment.

It was found that the family background factor which had considerable bearing on chances of academic survival was the educational level of the parents. Generally, the higher the educational level of parents, the higher the probability of survival of the student.

There was some evidence in the pattern of the responses of the enrolled students and of the drop-outs that parental interest as perceived by the student was of great importance in connection with the decision to remain in college or to leave. This was indicated by the fact that while 81 per cent of the enrolled students answered, "Yes, very much so," to the question,"Do your parents want you to finish college," only 35 per cent of the drop-outs answered "Yes, they were very much concerned," to a similar question, "Did your parents encourage you to remain at WSC?"

The problem was broadly defined, although there were no stated hypotheses. The instruments used and the methods of data collection were made explicit. Slocum implied the use of statistical tests, but did not make explicit which techniques were used, nor the instances of use. Statements of probability of difference were given.

The most serious limitation of the study was the fact that the investigator failed to make clear the precise nature of the sample. Some of the students included in the sample would have had the opportunity to be seniors at the time when the sample was drawn. Other students would have been in school for less than two years. The results of the study would have been more precise if a more thorough explanation of the nature of the sample had been given, including the length of residence and the class level of all members of the drop-out sample.

Three doctoral dissertations were reviewed which presented data relative to the relationship between social background and collegiate persistence. Smoke compared graduates and non-graduates of the 1951 graduating class of Indiana University on selected variables.[15] Smoke found that the parents of graduates had more education, that the greatest mortality occurred among students whose fathers were farmers or farm managers, and whose mothers were managers, operatives, or service workers, and that the greater the participation in high school activities, the more likely students were to graduate. Graduates also had higher academic scores and higher reading scores than non-graduates.

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[15]Eileen Smoke, A Comparison of the Graduates and Non-Graduates of the Class of 1951 at Indiana University (Unpublished Ph.D. dissertation, Indiana University, 1955).

Lehr, in a study of student withdrawal at Northwestern State College, found that the first semester grade point average of those who remain in college was significantly higher than those who withdrew from college.[16] Lehr, however, found no relationship between withdrawal from college and age, distance of the student's home from the college, English and reading ability, parental occupation, and level of intellectual ability.

Certain non-intellectual factors and their relationship to college student withdrawal were studied by Hood.[17] Groups of freshmen who attended a summer counseling camp sponsored by the university were given an extensive questionnaire. The responses of students who completed the first two years of college were compared with the responses of students who withdrew from college prior to the end of the first two years. Those students who expected to have many friends in college and those who had had some previous leadership experience had a lower attrition rate than those who expected to have only a few friends and who had had no previous leadership experience.

Among the males, age, occupational level of the father, educational level of the father, rank in high school class and varsity athletics were found to be related to withdrawal from college. Those

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[16]Milton W. Lehr, A Statistical Description of the Factors Related to Drop-Outs and Non-Drop-Outs at Northwestern State College, (Unpublished Ph.D. dissertation, University of Oklahoma, 1956).

[17]Albert Bullard Hood, Certain Non-Intellectual Factors Related to Student Attrition at Cornell University, (Unpublished Ph.D. dissertation, Cornell University, 1957).

students who did not know whether it was proper for college students to disagree with their parents, and those who answered "don't know" to questions dealing with parental attitudes and opinions had a significantly higher attrition rate.

A Comprehensive Study of Student Withdrawal From College

One of the most comprehensive and well-known attempts to study student retention and withdrawal in colleges and universities was directed by Robert E. Iffert of the United States Office of Education.[18] The study was designed to answer three questions: (1) What is the rate of student drop-out in relation to type of institution, economic status of the family, motivation of the student, academic performance, amount of self-help, participation in extracurricular activities, and residence of the student? (2) What reasons do students give for transferring to other institutions and for discontinuing college attendance? (3) What implications do the characteristics of students and their mobility have for higher educational institutions with reference to recruitment, selection, admission, counseling, instruction, scholarship aid, and other functions?

All of the approximately 1,600 eligible institutions in the United States were classified by type of institution and by source of control. A stratified random sample of 177 institutions was selected. Due to

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[18] Robert E. Iffert, Retention and Withdrawal of College Students, U. S. Department of Health, Education and Welfare, Office of Education, Bulletin 1958, No. 1, Washington: United States Government Printing Office, 1957, p. 1.

various factors, the number of institutions participating in the study and supplying complete data was eventually reduced to 147.

The students selected for study from the participating institutions included full-time freshmen for the fall of 1950. Part-time students, foreign students, students who were married at the time of first registration, and students who were in attendance under the provisions of the legislation for veterans' education were excluded.

In addition to the collection of data from the respective institutions, all students in the study sample were asked to fill out and return a questionnaire. In total, more than 75 per cent of the graduates responded to the questionnaire and more than 60 per cent of the non-graduates responded.

The rate of graduation, in regular progression from the institution of first registration, was 39.5 per cent, with 38.8 per cent of the men and 40.5 per cent of the women graduating. This difference between sexes in relation to rate of graduation was not statistically significant. The investigator estimated that if all students who eventually graduated from some institution of higher learning were included, the percentage would rise to approximately 60 per cent. Thus, it was estimated that approximately 40 per cent of all entering freshmen never finish the four year degree at any institution at any time.

Iffert attempted to explore the hypothesis that the stronger a student's motivation, the better his chances of remaining in college. It was reported, however, that every effort to find such an association of sufficient magnitude to support the hypothesis by comparing the ratings of reasons for going to college and the records of persistence met with failure.

Moreover, students who withdrew from college did not identify unsatisfactory college facilities and services by their ratings in a way that would set them apart as a distinct group from those who remained in college. The mean rating of many facilities and services decreased in level of satisfaction as length of attendance increased. It was concluded that withdrawal from college is associated not so much with dissatisfactions as with inability, or unwillingness, to endure dissatisfactions.

The most important reasons given by males for leaving college were military service, lack of interest in studies, financial difficulties, discouragement by low grades, difficulties with college level work, employment opportunity, and probation for academic reasons. Women rated the planning of marriage, finances, full-time work, lack of interest in studies, and discouragement by low grades as the more important reasons for leaving college.

The findings of the study indicated that there was a relationship between family income and persistence in college. Students from higher income families tended to remain in college longer. There was, however, no relationship between student part-time work in college and withdrawal from college. Differences between the several attendance groups did not provide convincing evidence of the probability that earning part or all of college expenses seriously affected persistence in college.

When rank in the high school graduating class of college students was examined in relation to withdrawal or persistence in college, it was found that a significant relationship existed. The higher the rank in the high school graduating class, the greater the probability of graduation

from college. There was also a relationship between withdrawal from college and the standing on the college placement tests. The higher the standing on the placement tests, the greater the chance for graduation from college. It was stated, however, that the rank in the high school graduating class was a much better predictor of graduation than the standing in the placement tests.

It was interesting to note that if admission officers had allowed entrance to only the top fifth of the high school classes, 44 per cent of this select group would have failed to graduate from the institution of first registration in the normal four year period.

Considering the scope of the research, the problem was excellently defined. Although no testable hypotheses were formulated, general questions were asked and these questions served as a guide to the collection and analysis of the data. The size and the methods of selection of the sample were adequately described. This was a particularly important factor in a study attempting to make generalizations relative to all types of institutions in all parts of the country.

Control groups were selected, in a sense, as withdrawal students were classified as to the term of withdrawal, up to and including graduation. The analysis and reporting of the data followed closely the purposes set out for the study. Generalizations were made within the limits of the study. The limitations of the sample, the questionnaire, and the findings of the study were made explicit.

A more detailed explanation of the statistical techniques used in the study would have been desirable. In some instances, the analysis of the data did result in some statement as to the probability of

difference. In other cases, no statement of probability of difference was given.

Summary

The foregoing review of the literature consisted of a critical examination of the research literature concerned with the problem of student retention and withdrawal from college. Several studies were presented and the hypotheses, methodology, techniques of analysis, findings and generalizations were examined relative to a set of evaluative criteria.

The main conclusions to be derived from the review of the literature are as follows:

1. The evidence strongly supports the conclusion that student status on various estimates of academic aptitude is related to persistence in college. A high level of attainment on the various cognitive measures increases the probability of the student remaining in college and low attainment on the cognitive measures decreases the probability of remaining in college.

2. There is some tentative evidence to suggest that measures of academic aptitude distinguish between students who withdraw from college during the freshman year, and students who withdraw from college subsequent to the freshman year.

3. The relationship of student attitudes and values to withdrawal from college remains unclear. Although the limited amount of research conducted in this area is suggestive of the possibility of such a relationship, additional evidence is necessary before any relationship may be claimed or disclaimed.

4. Students offer a great variety of reasons explaining withdrawal from college. Each student typically has several reasons for withdrawal. Interestingly, the majority of student reasons for withdrawal from college are not centered in the institution, but directed toward various phenomena outside of the institution. One investigator, in fact, reported that there was a tendency for satisfaction with various aspects of the collegiate environment to decrease as length of college attendance increased.

5. There is sufficient evidence to suggest a relationship between collegiate persistence and the social backgrounds of students prior to admission to college. Parental socio-cultural status as reflected in such factors as parental income, occupation, and educational level appears to be related to collegiate persistence.

6. There has been little effort to examine the interrelationship between academic aptitude and other significant variables in distinguishing between those students who remain in college and those students who withdraw. It is possible, for example, that the relationship of attitudes, values, and social background factors to collegiate withdrawal may be due primarily to instrument contamination with cognitive factors and only secondarily, if at all, to the trait purportedly measured.

7. Little attention has been directed toward possible differences between students with high academic achievement records who withdraw from college and students with low achievement records who withdraw from college.

8. The research concerned with the study of student retention and withdrawal has various limitations which should be considered in future examination of the problem. Some of the more common limitations of the studies reviewed in this chapter were:

a. A clear definition of the nature of the student under study is necessary if the results of the investigation are to be generalized to other groups of students and other institutions. At a minimum, it would appear necessary to define the collegiate class level status, the sex distribution of the sample, and qualifications which may have been placed on the sample such as number of credits carried or academic achievement prior to withdrawal.

b. In most instances, it is necessary to select a control group which is comparable to the withdrawal group of students. The method of selection of the control group and the nature of the students in the control group should be defined with clarity.

c. If subjects are dropped from the sample because of a lack of complete data, attention should be given to the possibility that the sample used in the analysis may have been biased thereby. Studies utilizing a questionnaire commonly face this problem.

d. The use of appropriate statistical techniques allows the investigator to generalize the specific findings of the study to the general population.

e. Generalizations should be confined to the data and findings of the study. Generalization beyond the data may be misleading to other investigators who may wish to conduct further research, or to those who in some manner wish to apply the findings of the study.

The findings resultant from the review of the literature were used in planning the design and methodology of this study. The account of the methodology of the study is presented in Chapter III.

CHAPTER III

THE METHODOLOGY

Definition of the Population

The population under study consisted of Fall 1958 entering Michigan State University freshmen. Three thousand two hundred sixteen students at Michigan State University were classified as freshmen during the fall registration period.

Certain restrictions, however, were placed on the population in order to best achieve the goals of the study. The following types of students were excluded from the population under study: (1) all students who had previously attended any college or university; (2) all foreign students; (3) all part-time students enrolled for less than 12 credits of study; and, (4) students whose test data were incomplete or unusable.

With these qualifications observed, the restricted population of the study numbered 2,746 students, including 1,436 males and 1,310 females. The sample of students used in the analysis was selected from the restricted population as defined above, and any future references to the population of the study, or generalizations and conclusions to be drawn from the results of the analysis should be interpreted in terms of the restricted population.

Selection and Classification of the Sample

Every student from the restricted population who withdrew from college subsequent to the September 1958 registration period but prior to June 17, 1959, was identified and classified as a "withdrawal" for the purposes of this study. Three hundred three students from the restricted population withdrew during the 1958-59 academic year, and all 303 students were included in the sample of the study.

A sample of 250 students was randomly drawn from the total group of 2,443 students from the restricted population who remained enrolled through the end of the freshman year.[1] This group of 250 students was included in the sample of the study and will hereafter be referred to as "enrollees."

After the initial selection and classification of the sample on the basis of collegiate persistence, all members of the sample were classified by level of first term achievement. Students who achieved first term grade point averages of 2.00 (C) or above, were separated from students who achieved first term grade point averages of 1.99 (C minus) or below.[2]

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[1]Students at Michigan State University are assigned student numbers. Each number consists of six digits. The student number of each student was recorded on the International Business Machine card, and cards were electronicly sorted on the last two digits of the student number. Such a procedure completely randomized the cards. The top twenty five student cards in each of the ten machine "pockets" were selected to comprise the sample.

[2]A letter grade of A, B, C, D, or F is usually reported for each course taken by the student. A term grade point average is computed by the assignment of point values to each of the letter grades, letting A=4, B=3, C=2, D=1, and F=0. The point value of the letter grade is multiplied by the number of credit hours of the course, and the sum for all courses is divided by the total number of credits for courses taken. Such computation yields grade point averages ranging from 4.00 (A) to 0.00 (F).

Forty-eight students of the withdrawal group withdrew from the university during the first term, prior to the assignment of any course grades. These students, of course, had no grade point average. Because the 0.00 grade point average of these students could not be assumed to be a reasonable estimate of past or potential achievement, students with such a grade point average were classified into a third achievement level category for purposes of analysis.

A further classification was made on the basis of sex. The final separation yielded a total of ten groups. The nature of these groups is defined in Table 1.

TABLE 1

NUMBER OF STUDENTS IN EACH GROUP, CLASSIFIED BY COLLEGIATE PERSISTENCE, FIRST TERM GRADE POINT AVERAGE, AND SEX

First Term Grade Point Average Range	Withdrew from College		Enrolled in College	
	Males	Females	Males	Females
0.00	Group 1 N=28	Group 2 N=20	--	--
0.01-1.99	Group 3 N=116	Group 4 N=68	Group 7 N=55	Group 8 N=34
2.00-4.00	Group 5 N=32	Group 6 N=39	Group 9 N=82	Group 10 N=79

It is apparent from Table 1 that groups one through six consist of students who withdrew from college sometime during the freshman year and that groups seven through ten contain students who remained in

college through the end of the freshman year. Students in groups three, four, seven and eight are similar to the extent that all received a first term grade point average of less than 2.0 (C), while students in groups five, six, nine and ten received first term grade point averages of 2.0 (C), or more. Groups ranged in size from 20 to 116 students.

Instrumentation

In order to achieve the purposes of the study, it was necessary to obtain measurements of the academic ability, attitudes, values, and social backgrounds of all students in the sample.

The following instruments were selected to measure the above characteristics:

I. Academic Ability
   - A. The College Qualification Test, (Psychological Corporation).
   - B. Test of Critical Thinking, Form G, (American Council on Education).
   - C. Michigan State University Reading Test, (Michigan State University).

II. Attitudes
   - A. The Inventory of Beliefs, Form I, (American Council on Education).
   - B. Rokeach's Dogmatism Scale, Form E, (Professor Milton Rokeach, Michigan State University).

III. Values
   - A. The Differential Values Inventory, (Richard Prince, University of Chicago).

IV. Social Background
   - A. Biographical Data Sheet, (Michigan State University).

Each of these instruments will be discussed with special attention given to the origin and purpose of the instrument, evidences of validity and reliability, and other distinguishing characteristics of the instrument.

College Qualification Test

The College Qualification Test consists of a series of three ability tests which may be combined into a comprehensive total score.[3] The instrument was designed to be predictive of college success as measured by grades. The three ability tests included are in the areas of verbal facility, numerical ability, and general information.

The verbal test consists of 75 vocabulary items, 50 of which require identification of synonyms and 25 which require identification of antonyms. There is a time limit of 15 minutes. The numerical ability test contains 50 items drawing on arithmetic, algebra and geometry. It was designed to measure conceptual skill and not computational or clerical speed. The time limit for this test is 35 minutes. The third test of the College Qualification Test series measures general information. The information test is composed of 75 items from a broad range of subject matter areas, half of the items dealing with physical, biological and chemical sciences and half with social studies such as history, economics, geography, and government. The time limit for this test is 30 minutes.

The total score of the College Qualification Test consists of the sum of the scores on the verbal, numerical and information tests. Because of the greater general predictive power of the total score, the single total score of the College Qualification Test was used in preference to the three separate sub-tests.

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[3]George K. Bennett, Marjorie G. Bennett, Wimburn L. Wallace and Alexander G. Wesman, College Qualification Tests, Manual, 1957, New York: The Psychological Corporation, 1957.

The "Study of Critical Thinking, Attitudes, and Values in Higher Education" reported data regarding the relationship of College Qualification Test to freshman student grades in the Basic College freshman courses of Communication Skills, Natural Science and also to term grade point averages.[4] The findings of this study can serve as an indication of test validity. The data are presented in Table 2.

TABLE 2

PEARSON PRODUCT MOMENT CORRELATION COEFFICIENTS OF COLLEGE QUALIFICATION TEST, TOTAL SCORE, WITH GRADES IN COMMUNICATION SKILLS, NATURAL SCIENCE, AND GRADE POINT AVERAGES FOR MALES AND FEMALES

	Males	Females
Communication Skills		
First Term	.66	.60
Second Term	.57	.61
Third Term	.43	.51
Natural Science		
First Term	.61	.64
Second Term	.55	.51
Third Term	.38	.49
Term Grade Average		
First Term	.60	.57
Second Term	.51	.41
Third Term	.34	.37

Correlation coefficients between the College Qualification Test scores and these achievement criteria ranged from .34 to .66. While it is evident that the magnitude of the correlation coefficients tended to

[4]Irvin J. Lehman and Stanley O. Ikenberry, Critical Thinking, Attitudes and Values In Higher Education: A Preliminary Report. (Paul L. Dressel, Principal Investigator), East Lansing: Office of Evaluation Services, Michigan State University, 1959 (Mimeographed).

decrease from term to term, it is also evident that the test, as the publisher claims, is broadly predictive of collegiate success when success is defined in terms of grades. The fact that correlation coefficients tend to decrease from term to term may be due to several factors including a narrower range of ability in the latter terms due to acceleration and withdrawal of some students, and possible fluctuation and change in student ability from the time of measurement in the fall. The evidences of validity reported by the test publisher in the manual are in general agreement with the data presented in Table 2.[5]

Estimates of the reliability of the College Qualification Test, total score, are given in the test manual and include coefficients of .97 for males and .96 for females.[6] These reliability coefficients were determined through the split half method, a comparison of differences between scores on the odd and the even items of the test.

A test of the reliability of the College Qualification Test using the restricted population of the study was conducted. Application of Kuder-Richardson formula 20 yielded a reliability coefficient of .93.

The Test of Critical Thinking, Form G

The Test of Critical Thinking, Form G, was developed as a part of the Cooperative Study of Evaluation in General Education.[7] In order

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[5]George K. Bennett, Marjorie G. Bennett, Wimburn L. Wallace, and Alexander G. Wesman, College Qualification Tests, Manual, 1957, New York: The Psychological Corporation, 1957.

[6]Ibid.

[7]Paul L. Dressel and Lewis B. Mayhew, General Education: Explorations In Evaluation, Washington, D.C.: American Council on Education, 1954.

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.[8]

While it is debatable that grades serve as the best ultimate 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. In this study it was necessary to obtain a variety of measures which would serve as indicators of academic ability. In such a context, the criterion of grades is appropriate.

The Pearson product-moment correlation coefficients of the Test of Critical Thinking scores with term-end grade point averages and with grades in Communication Skills and Natural Science are presented in Table 3.[9] The correlation coefficients ranged from .21 to .57. It is evident that those qualities and abilities measured by the Test of Critical Thinking are related to achievement in the two Basic College Courses and to term-end grade point averages of freshmen.

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[8]Cooperative Study of Evaluation in General Education, Paul L. Dressel, Director. Instructor's Manual for the Test of Critical Thinking, Form G, The American Council on Education, Committee on Measurement and Evaluation, 1953 (Mimeographed).

[9]Irvin J. Lehmann and Stanley O. Ikenberry, Op. cit., p. 62.

TABLE 3

PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENTS OF TEST OF CRITICAL THINKING SCORES WITH GRADES IN COMMUNICATION SKILLS, NATURAL SCIENCE, AND TERM GRADE POINT AVERAGES FOR MALES AND FEMALES

	Males	Females
Communication Skills		
First Term	.49	.39
Second Term	.42	.45
Third Term	.35	.39
Natural Science		
First Term	.54	.57
Second Term	.39	.44
Third Term	.31	.44
Term Grade Averages		
First Term	.48	.45
Second Term	.37	.37
Third Term	.21	.34

The manual for the Test of Critical Thinking reported estimates of reliability of the instrument ranging from .71 to .89.[10] A reliability coefficient of .79 was found when the Kuder-Richardson formula 20 was applied to the Test of Critical Thinking scores of the restricted population here under study.

Michigan State University Reading Test

The Michigan State University Reading Test was developed by the Office of Evaluation Services of Michigan State University. The

[10]Cooperative Study in Evaluation in General Education, Paul L. Dressel, Director, Instructor's Manual For the Test of Critical Thinking, Form G, The American Council on Education, Committee on Measurement and Evaluation, 1953 (Mimeographed).

items and passages included in the revised form of the test were selected on the basis of the empirical relationship of the items to academic success. Furthermore, the forty-five item test was designed to measure the ability of students to comprehend thoughts expressed in reading passages which were representative of textual materials found in several academic areas.

The ability to read should be closely related to the ability to do college level work. Thus, it would be expected that there would be a significant correlation between grades in college and reading ability. Data regarding Pearson product-moment correlation coefficients between scores on the Michigan State University Reading Test and first, second, and third term grades in Communication Skills and Natural Science courses and term-end grade point averages for the three terms are presented in Table 4.[11]

The correlation coefficients exhibited in Table 4 range from .34 to .65. It is thus apparent that reading ability, as measured by the instrument under consideration, is significantly related to academic achievement of freshmen during the first year in college.

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. Using the test scores of the restricted population a reliability coefficient of .79 was obtained for the Michigan State University Reading Test by application of Kuder-Richardson formula 20.

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[11]Lehmann and Ikenberry, op. cit., p. 64.

TABLE 4

PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENTS OF MICHIGAN STATE UNIVERSITY READING TEST WITH GRADES IN COMMUNICATION SKILLS AND NATURAL SCIENCE, AND WITH TERM-END GRADE POINT AVERAGES FOR MALES AND FEMALES

	Males	Females
Communication Skills		
First Term	.65	.60
Second Term	.58	.49
Third Term	.56	.55
Natural Science		
First Term	.60	.52
Second Term	.50	.44
Third Term	.35	.48
Term Trade Averages		
First Term	.57	.52
Second Term	.48	.34
Third Term	.36	.46

The Inventory of Beliefs, Form I

The Inventory of Beliefs was developed by the Inter-College Committee on Attitudes, Values, and Personal Adjustment of the Cooperative Study of Evaluation in General Education.[12] 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.

Individuals who reject the majority of the statements contained in the Inventory of Beliefs (or high scorers) are thought to be more

[12]Paul L. Dressel and Lewis B. Mayhew, General Education: Explorations In Evaluation, Washington, D.C.: American Council on Education, 1954.

independent, adaptive, and non-stereotypic in belief systems. A low score is characterized as being indicative of individuals who are defensive, conforming, resistant, or who are stereotyped in beliefs at an immature level.[13]

It is more difficult to provide validity data for measures of attitudes and values than for measures of academic aptitude. The inventory manual reported evidence of face validity and construct validity. Indications of concurrent validity are presented in Table 5.[14]

It is apparent from Table 5 that The Inventory of Beliefs is related to the two measures of academic aptitude, but that the relationship is of a much smaller magnitude than the relationship between The Inventory of Beliefs and Rokeach's Dogmatism Scale, a measure of an attitude or personality characteristic similar to that of stereotypy. The magnitude of the relationship between stereotypy and dogmatism is similar to the relationship between the College Qualification Test and the Michigan State University Reading Test. Thus, we can conclude that although characteristics measured by the Inventory of Beliefs are not independent of the phenomenon measured by the cognitive instruments, the Inventory appears to be measuring characteristics more closely related to factors measured by the dogmatism scale.

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[13]Cooperative Study of Evaluation in General Education, Paul L. Dressel, Director. Instructor's Manual for the Inventory of Beliefs, The American Council on Education, Committee on Measurement and Evaluation, 1953 (Mimeographed).

[14]Lehmann and Ikenberry, op. cit., p. 56.

TABLE 5

AN INTERCORRELATION MATRIX OF THE INVENTORY OF BELIEFS, ROKEACH'S DOGMATISM SCALE, COLLEGE QUALIFICATION TEST, AND MICHIGAN STATE UNIVERSITY READING TEST FOR MALE AND FEMALE FRESHMAN STUDENTS

	Rokeach's Dogmatism Scale		College Qualification Test		Michigan State University Reading Test	
	Male	Female	Male	Female	Male	Female
Inventory of Beliefs	-.63	-.61[a]	.33	.28	.33	.29
Rokeach's Dogmatism Scale			-.19	-.16	-.22	-.20
College Qualification Test					.70	.71

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

Reliability estimates on the Inventory of Beliefs, as reported in the manual, range from coefficients of .69 to .95 with a median coefficient of .86. The Kuder-Richardson formula 20 was applied to the test score data of the restricted population of the study. A reliability coefficient of .84 was obtained.

Rokeach's Dogmatism Scale, Form E

Milton J. Rokeach developed the Dogmatism Scale 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 has defined dogmatism in the following manner:

> (Dogmatism) represents 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. In other words, dogmatic thinking and believing makes it possible to ward off threatening aspects of reality and at the same time gives one the satisfaction of feeling that one understands it.[15]

The data presented previously in Table 5 attest to the relationship between the Dogmatism Scale and The Inventory of Beliefs. The fact that these two scales were constructed independently to measure theoretically related phenomena and are rather highly correlated tends to support the claim for validity of both measures.

Plant, Minium, and Myers reported odd-even reliability coefficients for the Dogmatism Scale of .84 for males and .85 for females.[16] An internal consistency reliability of .76 was obtained, using the scores of the restricted population of this study.

Differential Values Inventory

The Differential Values Inventory was developed by Richard Prince at the University of Chicago.[17] Several social theorists have studied

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[15]Milton J. Rokeach, "Political and Religious Dogmatism: An Alternative to Authoritarian Personality," Psychological Monographs, 70: No. 425, 1956, p. 5.

[16]Walter T. Plant, Edward W. Minium, and Celestine Myers, "An Analysis of the Rokeach Dogmatism Scale Used With A Sample of American College Students," (An unpublished paper read at the Annual Meeting of the Western Psychological Association, San Diego, California, April 16-18, 1959).

[17]Richard Prince, A Study of the Relationship Between Individual

the value patterns and character structure of the American society. Prince chose to develop his instrument to measure the "traditional" and "emergent" value categories outlined by Spindler.[18] The items contained in the Differential Values Inventory were written for four "traditional" value categories which included puritan morality, individualism, work-success ethic, and future-time orientation and for the four "emergent" value categories of 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.

A person with high traditional values was 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.[19]

The emergent value system on the other hand places a great deal of importance on getting along with others and achieving group harmony.

Values and Administrative Effectiveness in the School Situation, (Unpublished Dissertation, University of Chicago, 1957).

[18]George Spindler, "Education in a Transforming American Culture," Harvard Educational Review, 25:156-163, Summer, 1953.

[19]Prince, op. cit., p. 42.

Absolutes are questionable and morality is group-determined rather than predetermined by any particular source. Everything one does should be done in consideration of others and in regard for feelings and reactions of others. Emphasis is on the present.[20]

Prince administered the inventory to several groups which were assumed to be different in relationship to the value patterns in question. An extensive item analysis was conducted to identify the items which were most appropriate to the purpose of the instrument. In the final form of the Differential Values Inventory there are 64 items. In each item an emergent value alternative and a traditional value alternative are pitted against each other. The subject is forced to make a choice between one of the two alternatives.

Prince found that high school students attending parochial schools were more traditional in values than students attending public high schools; teachers in parochial high schools more traditional in values than teachers in public high schools; teachers more traditional in values than students in both public and parochial high schools; administrators more traditional than teachers; and older teachers more traditional than younger teachers.[21]

Lehmann and Ikenberry found that students aspiring toward more than four years of college education were more traditional in values than students aspiring to four years or less of college. Rural college

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[20] Ibid., p. 42.

[21] Ibid., pp. 87-91.

students were found to be more traditional in values than urban students. Students with parents of low educational level and occupational status tended to be more traditional in values.[22]

These value differences identified by the Differential Values Inventory are in general agreement with current knowledge and theory concerning differences in values among various social and cultural groups. Hence, it would appear that the Differential Values Inventory is measuring characteristics similar to those described by Prince in the purpose of the Inventory.

An estimate of reliability, using the restricted population of this study and the Kuder-Richardson formula 20, was computed with a resulting coefficient of .75.

Michigan State University freshmen were re-tested on the Differential Values Inventory at the end of one year. Although some change in values could logically be expected over a period of nine months of college, correlation coefficients of the fall and spring scores of .61 for males and .60 for females were found.[23] Coefficients of this magnitude indicate a reasonable stability in the value scores over the year.

Although the evidence for validity and reliability of the Differential Values Inventory is not as extensive as some other measures used in this study, the inventory appears to have a sound theoretical base with more evidences of validity and reliability than most value instruments.

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[22]Lehmann and Ikenberry, op. cit., pp. 32-36.

[23]Ibid., p. 74.

The Social Status Index

Previous research in the area of college student withdrawals has provided evidence of a relationship between the social backgrounds of adolescents and college attendance. For this reason it was necessary to obtain some indication of the social backgrounds of the members of the sample. The social prestige of the father's occupation, and the level of education attained by the father and mother were considered to be indicative of the general social status of the family.

Accordingly, data indicating the level of schooling completed by the father and mother and a description of the father's occupation were obtained from each of the students in the restricted population.

The educational level of the father and mother were each classified according to the following form:

1. Attended grade school (grades 1 through 8) but did not finish.
2. Completed grade school through grade 8.
3. Attended high school (grades 9 through 12) but did not graduate.
4. Graduated from high school.
5. Attended college but did not graduate.
6. Graduated from college.
7. Attended graduate school or professional school but did not attain a graduate or professional degree.
8. Attained graduate or professional degree.

The educational levels of the father and mother were quantified simply by assigning point values of one through eight corresponding to each of the numbered alternatives listed above.

Data were collected regarding the father's occupation by asking students to "describe in a line or two...." what their father did for a living. The occupational descriptions were then classified according

to the North-Hatt classification system as set forth by Bendix and Lipset.[24]

Ratings of occupations ranged from a point value of 96 given to U.S. Supreme Court Justice to 33 points given to a shoe shiner.[25] The usefulness of the North-Hatt occupational ratings was considerably increased by additional research at Ohio State and by the work of A. O. Haller of Michigan State University.[26] Both the staff at Ohio State University and Dr. Haller have provided interpolations to the original scale which have resulted in ratings for over 500 different occupations.

The first step in the quantification of the social prestige of the father's occupation was to examine the North-Hatt listings to determine if the occupation had been rated in the original work. If the occupation was not contained in the North-Hatt work, the ratings provided

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[24]Reinhard Bendix and Seymour Martin Lipset, Class, Status and Power, Glencoe, Illinois: The Free Press, 1953, pp. 110-115.

[25]The National Opinion Research Center conducted a survey which was based on the plans developed by Paul K. Hatt and C. C. North. Randomly selected subjects rated 90 occupations as (1) excellent standing; (2) good standing; (3) average standing; (4) somewhat below average standing; (5) poor standing; (6) I don't know where to place that one. When "don't know" answers were excluded and other responses were weighted, the scoring theoretically allowed a maximum of 100 points for any job receiving only "excellent" ratings, and a minimum of 20 points for work that was unanimously rated as "poor."

[26]Both the interpolations derived at Ohio State University and the interpolations derived by Dr. Haller were supplied by Dr. A. O. Haller, Department of Sociology and Anthropology, Michigan State University. The North-Hatt interpolations are recorded in an unpublished, mimeographed paper by Russel Dynes entitled "The North Hatt Scale."

by The Ohio State University were used. In the event that the occupation was not rated in the original North-Hatt work, nor in the Ohio State University interpolations, Dr. A. G. Haller's interpolations were used as a third source.

If the father's occupation was not given by the student, the following preference order was utilized: (1) the step-father's occupation, if any; (2) the mother's occupation, if any; (3) the mean rating of all occupations as established in the North-Hatt study. In over 95 per cent of the cases, the father's occupation was listed.

After the data regarding the educational level of parents and father's occupation had been quantified, the three variables were then combined into a single social status index score. Factor analysis was used to determine the weights for combining the variables into the index score which would be most representative of social status or social background. The method for the construction of the index was based on the property of the first factor. "This factor represents the dimension along which the items can best discriminate."[27] It was assumed that the one phenomenon these items could best measure, in combination, was the social status position of the family.

The intercorrelations among the three biographical variables used in the index are presented in Table 6. The Pearson product-moment correlation coefficients were computed using the scores of every member in the study sample. The correlation matrix was factor analyzed and

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[27]Margaret J. Hagood and Daniel O. Price, Statistics for Sociologists, New York: Henry Holt and Company, 1952, p. 56.

TABLE 6

INTERCORRELATIONS OF BIOGRAPHICAL VARIABLES RELATED TO THE SOCIO-ECONOMIC POSITION OF THE FAMILY

Biographical Variables	Father's Educational Level	Mother's Educational Level
Mother's Educational Level	.228	
Father's Occupational Prestige Rating	.350	.150

the first factor was identified by a set of factor loadings. Correlation coefficients were obtained between the first factor and each of the biographical variables.

The correlation coefficients of each of biographical variables with the first factor are presented in Table 7. To form an index it was necessary to weight the variables in proportion to their correlations with the first factor.[28]

The raw scores were transformed into standard scores. Each standard score was then multiplied by the correlation coefficient of the respective variable with the first factor. The following formula was used:[29]

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[28]S. S. Wilks, "Weighting Systems for Linear Functions of Correlated Variables When There Is No Independent Variable," Psychometrika, 3:24-43, March, 1938.

[29]Hagood and Price, op. cit., p. 528.

TABLE 7

CORRELATION COEFFICIENTS OF THE BIOGRAPHICAL VARIABLES WITH THE FIRST FACTOR

Biographical Variables	Correlation Coefficients
Father's educational level	.786
Mother's educational level	.584
Father's occupational prestige rating	.731

$$\text{Index Score} = .786\left(\frac{X_1-\bar{X}_1}{S_1}\right) + .584\left(\frac{X_2-\bar{X}_2}{S_2}\right) + .731\left(\frac{X_3-\bar{X}_3}{S_3}\right)$$

where: X_1, $\bar{X}_1$, S_1; are the raw score, mean, and standard deviation, respectively, of father's educational level.

X_2, $\bar{X}_2$, S_2; are the raw score, mean, and standard deviation, respectively, of mother's educational level.

X_3, $\bar{X}_3$, S_3; are the raw score, mean, and standard deviation, respectively, of father's occupational prestige rating.

The means and standard deviations for the three biographical variables are presented in Table 8.

Using the known values presented in Table 8, it was possible to simplify the formula to the following:

$$\text{Index Score} = (.435X_1 + .315X_2 + .080X_3) - 8.474$$

where: X_1; raw score of father's educational level.

X_2; raw score of mother's educational level.

X_3; raw score of father's occupational prestige rating.

TABLE 8

MEANS AND STANDARD DEVIATIONS OF FATHER'S EDUCATION, MOTHER'S EDUCATION, AND FATHER'S OCCUPATION FOR THE SAMPLE OF THE STUDY

Biographical Variable	Mean	Standard Deviation
Educational level of fathers	4.277	1.808
Educational level of mothers	3.381	1.854
Occupational prestige rating of fathers	69.363	9.116

Using the International Business Machine's Electronic Punch machine the first factor index was calculated for all members of the sample. The above formula yields a mean of zero with both plus and minus values in the score range. A constant of six was added to each index score which caused all scores to be positive. Decimals were removed by multiplying each score by 10, thus providing index scores which ranged from 22 to 106.

Collection of Data

During the registration periods, September 21-26, 1958, the following instruments were administered to entering freshmen at Michigan State University: The Inventory of Beliefs, Form I, The Test of Critical Thinking, Form G, The Differential Values Inventory, Rokeach's Dogmatism Scale, The Michigan State University Reading Test, The College Qualification Test, and a Biographical Questionnaire. Two subsequent testing sessions were arranged for students who did not attend the first session. Out of 2,973 entering freshmen who met the requirements of the restricted

population, complete and usable test data were obtained for 2,746 students, or 92.4 per cent of the total restricted population.

The names and student numbers of students who withdrew from college during any of the three terms of the freshman year were obtained from the Office of the Registrar. An additional check was made during the winter and spring registration periods to identify students who did not register for study.

First term grade point averages were obtained for all students in the restricted population at the end of Fall term. The scores of students on the various test instruments, the status of students with respect to college persistence, and the Fall term grade point average of students were recorded on International Business Machine Cards, using a separate card for each student. The student number, and a code denoting sex were also included on the card.

The Statistical Model and Computation Procedures

After a review of several possible statistical models, multiple discriminant analysis was selected as the most appropriate technique. Multiple discriminant analysis is a statistical method of combining test scores or other available data so as to maximize the difference among groups and minimize the differences within each group. Through the separation of individuals who are known to belong to mutually exclusive groups, it is possible to determine the combinations of variables which will maximally discriminate among the different groups. It is also possible to observe the magnitude of the group differences and to classify future individuals into one of these groups on the basis of similar data.

In this study, individuals had been classified according to collegiate persistence, first term grade point average, and sex.

A series of observations or measurements for each member of ten defined and mutually exclusive groups was collected.[29] The problem required a statistical methodology which would maximally discriminate among the ten groups of the basis of the information available. It was desirable to use a statistical tool which would indicate the intensity and direction of the difference. Because many of the variables used in the study were interrelated, it was also advisable to use a technique designed to identify basic, independent factors which accounted for possible group differences.

Description of Multiple Discriminant Analysis

The computational procedures followed were based on a method provided by Bryan in his doctoral dissertation.[30]

An illustration of computation procedures, including worksheets, is available in an Air Force research report by Bryan, Rulon, and Tiedeman.[31] A discussion of the development and perfection of the

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[29] See Table 1.

[30] Joseph G. Bryan, A Method for the Exact Determination of the Characteristic Equation and Latent Vectors of a Matrix with Applications to the Discriminant Function for More Than Two Groups, Cambridge: Harvard University Graduate School of Education (Unpublished Doctoral Dissertation), 1950.

[31] David V. Tiedeman, Joseph G. Bryan, and Phillip J. Rulon, The Utility of the Airman Classification Battery For Assignment of Airmen to Eight Air Force Specialties, Cambridge, Mass.: Educational Research Corporation, June, 1951.

multiple discriminant analysis technique has been published by Tatsuoka and Tiedeman.[32]

The linear combinations of variables which maximize the differences between groups and minimize the differences within groups are derived from the solution of the determinantal equation,

$$|A - \lambda W| V = 0$$

where:

A = The Among Matrix

W = The Within Matrix

λ = The Latent Roots of the System

V = The Latent Vectors, or Discriminant Coefficients

The first step in the computational procedure was to compute the intercorrelation matrix, means, standard deviations, variances and covariances for the seven variables in each of the ten groups and for the total group. The Michigan State Integral Computer, MISTIC, was used to compute these values.[33]

The means computed for each group and for the total group were used to compute the among groups, or A matrix. The element in the ith row and the jth column of the A matrix was computed according to the following formula.

$$a_{ij} = \sum_{g=1}^{10} \left[\frac{(\sum_{p} X_i)(\sum_{p} X_j)}{N_g} \right] - \frac{(\sum_{p}\sum_{g} X_i)(\sum_{p}\sum_{g} X_j)}{\sum_{g} N_g}$$

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[32]Maurice Tatsuoka and David V. Tiedeman, "Discriminant Analysis," Review of Educational Research, 24:402-420, December, 1954.

[33]Computer Laboratory, Michigan State University, "K5 - M, Correlation, Means, Standard Deviation, Variance, Card Input," MISTIC Library Index, East Lansing, April, 1959 (Mimeographed).

where: a_{ij} is the element in the ith row and the jth column of matrix A.

p is the subscript denoting individuals.

g is the subscript denoting groups.

X_i is an individual's score on the ith variable.

X_j is an individual's score on the jth variable.

N_g is the number of individuals in each group.

The variance and covariance matrices were used to compute the within groups, or W matrix. The formula for the computation of the W matrix is as follows:

$$w_{ij} = \sum_{g=1}^{10} \left[\sum_{p} X_i X_j - \frac{\sum X_i \sum X_j}{N_g} \right]$$

where: w_{ij} is the element in the ith row and the jth column of matrix W.

g is the subscript denoting groups.

p is the subscript denoting individuals.

X_i is an individual's score on the ith variable.

X_j is an individual's score on the jth variable.

N_g is the number of individuals in each group.

The element in the ith row and the jth column of the variance-covariance matrix was multiplied by the number of students in the group and the corresponding products from the ith row and the jth column for each of the ten groups were added. The resultant sum was equal to the element in the ith row and jth column of the W or within matrix.

After the computation of the among and within matrices, the determinantal equation, $|A - \lambda W|V = 0$ was solved through the use of the Michigan State Integral Computer.[34] Several linear combinations of variables are possible in the solution of the determinantal equation.. The first linear combination of the determinantal equation maximizes the discriminant criterion; the second linear combination maximizes the ratio of the residual dispersion among groups to the residual dispersion within groups after the effect of the first linear combination has been removed; the third linear combination maximizes the ratio of the among groups dispersion to the within groups dispersion after the effects of the first two have been removed. Subsequent linear combinations continue to maximize the ratio of the among groups dispersion to the within groups dispersion after the effects of the preceding linear combinations have been removed.

Assumptions of the Statistical Model

The assumption which is made in the use of multiple discriminant analysis is that the test scores of the populations under study are multivariate normal with equal variance and covariance matrices. A review of the literature was made to determine the availability of methods to test the assumption of multivariate normality and equality of variance and covariance matrices. The review of the literature

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[34] "M5 - 139, Solution of Determinantal Equation $A - \lambda B = 0$," MISTIC Library Index, East Lansing, Michigan: Computer Laboratory, Michigan State University, April, 1959.

revealed no complete test of this assumption. In the review of previous research which had used the discriminant analysis statistical technique, no studies were found which reported a test of the assumption.

David V. Tiedeman, an authority on the use of discriminant analysis in the fields of education and psychology, was presented with the problem of (1) the availability of a method to test the assumption; and (2) the advisability of testing the assumption if a method were available. Tiedeman stated that,

> I don't know of a simple, direct test of the multivariate normal assumption. There are no tables of which I am aware which specify the expected frequencies under the assumed multivariate normality. You might be able to compute these under existing electronic equipment by Monte Carlo methods but it would take time.... We usually test the normality of the discriminant scores rather than that of the original scores. In addition, we do it for the discriminants separately rather than simultaneously. It's not just that it's easier; it's also because I <u>feel</u> that the expected distributions are not affected too markedly by considerable departures from the assumption of multivariate normality necessary for the derivation of those distributions.[35]

The decision was therefore made not to make a formal test of the assumption of multivariate normality and equality of variance-covariance matrices of the populations. If the data of this study were to be used to classify future freshmen students into the existing groups defined in this study, a test of the normality of the discriminant scores should be made.

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[35]A letter received from Dr. David Tiedeman, Professor of Education, Harvard University.

Summary

The population of the present study consisted of the Fall, 1958, entering freshman class of Michigan State University with the exclusion of foreign students, part time students, transfer students, and students who had incomplete test records.

The academic status of all members of the freshman class, including number of credits carried and course grades during the first term of study were collected.

All students who withdrew from college between September and June of the first academic year were classified into six separate groups on the basis of sex and first term grade point average. A random sample of 250 freshmen students who remained enrolled through the end of the freshman year was drawn and subsequently classified on the basis of sex and first term grade point average. Thus, with the samples of enrollees and withdrawals, classified on the basis of collegiate persistence, first term grade point average, and sex, a total of ten groups was available for study.

The instruments used in the study included The College Qualification Test, the Test of Critical Thinking, Form G, The Michigan State University Reading Test, The Differential Values Inventory, The Inventory of Beliefs, Rokeach's Dogmatism Scale, and a Biographical Data Sheet. A social status index score was computed through the combination of the biographical variables of father's educational level, mother's educational level, and father's occupational prestige rating into a single index score. All instruments were assumed, on the basis of prior

research, to have sufficient validity and reliability to be included as criterion measures in this study.

Multiple discriminant analysis was used to analyze the data. The solution of a determinantal equation yields the linear combinations of variables which maximize the differences among groups and minimize the differences within groups. The first linear combination maximizes the ratio of the dispersion among groups to the dispersion within groups. Subsequent linear combinations continue to maximize the ratio of the among groups to within groups dispersion after the effects of preceding linear combinations have been removed.

The results of the analysis are presented in Chapter Four.

CHAPTER IV

THE ANALYSIS OF DATA

The data were initially analyzed to determine group status on each of the variables and interrelationships among the variables. As a matter of record, group means on each of the variables used in the study are presented in Appendix A. The within group intercorrelation matrix of the seven variables used in the study is presented in Table 9. A clear understanding of the basic interrelationships among the instruments used in the study is helpful in the interpretation of the multivariate linear combinations of variables in the discriminant functions.

TABLE 9

PEARSON PRODUCT-MOMENT WITHIN GROUP CORRELATION COEFFICIENTS AMONG THE VARIABLES USED IN THE STUDY

VARIABLES	1	2	3	4	5	6	7
1. Inventory of Beliefs							
2. Critical Thinking	.24						
3. Differential Values	-.03	.03					
4. Rokeach's Dogmatism	-.58	-.17	.12				
5. Reading	.22	.53	.03	-.18			
6. Coll. Qual. Test	.22	.51	.03	-.13	.61		
7. Social Status	.08	.02	-.16	-.05	.05	.11	

It is evident from Table 9 that the cognitive measures are highly interrelated. The highest correlation coefficient was .61 between the

College Qualification Test and the Michigan State University Reading Test. The lowest coefficient of correlation was .51 between the Test of Critical Thinking and the College Qualification Test.

A low order but statistically significant relationship was found between the two attitudinal measures and the three cognitive instruments.[1] The Inventory of Beliefs, for example, correlated .22, .24, and .22 with the Michigan State University Reading Test, the Test of Critical Thinking, and the College Qualification Test, respectively. Similarly, Rokeach's Dogmatism Scale correlated -.18, -.17, and -.13, respectively, with the same three cognitive instruments. In contrast, however, a high correlation coefficient of -.58 was found between the Inventory of Beliefs and Rokeach's Dogmatism Scale.

The Differential Values Inventory was not found to be significantly related to the three cognitive measures. The correlation coefficient between the Differential Values Inventory and the Inventory of Beliefs did not reach the magnitude required for statistical significance. A low but significant correlation was found, however, between the value instrument and the social status index. The correlation coefficient of -.16 would indicate a slight tendency for individuals with high traditional value scores to have a lower score on the social status index.

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[1]Based on the appropriate F test, a within groups correlation coefficient of .12 is significantly different from zero at the .01 level of confidence. A coefficient of .09 is significant at the .05 level of confidence.

Results of the Multiple Discriminant Analysis

The Test of the Hypothesis

Following the procedures outlined in Chapter Three, the within groups and among groups matrices were computed. These matrices are presented in Appendix B of the study.

The solution of the determinantal equation $|A - \lambda W|v = 0$, where A is the among matrix, W is the within matrix, v represents the discriminant coefficients, and λ represents the latent root of the system, was necessary for the test of the hypothesis of the study. This hypothesis, stated in null form, was as follows:

> There is no difference in intellectual ability, social background, attitudes, and values among groups of students classified by collegiate persistence, first term grade point average, and sex.

A test of the statistical significance of the latent roots, or discriminant functions, has been presented by Rao to test multivariate discrimination among several groups.[2] The formula used to test the statistical significance of the discriminant functions was as follows.

$$\chi^2 = \left[N - \tfrac{1}{2}(p + k)\right] \log_e (1 + \lambda)$$

where:
- N = the total sample of 553 individuals.
- p = the total number of variates, or 7.
- k = the total number of groups, or 10.
- λ = the discriminant function, or latent root of the system.

Values of chi square computed by the above formula can be referred to the tabled distribution of chi square values with the appropriate

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[2] C. Radhakrishna Rao, Advanced Statistical Methods in Biometric Research, New York: John Wiley and Sons, Inc., 1952, pp. 372-73.

degrees of freedom. The latent root, the chi square value, the degrees of freedom, and the significance level obtained for each of the discriminant functions are presented in Table 10.

TABLE 10

LATENT ROOTS, CHI SQUARE VALUES, DEGREES OF FREEDOM AND STATISTICAL SIGNIFICANCE LEVELS FOR EACH OF THE SIX DISCRIMINANT FUNCTIONS

Discriminant Function	λ	χ^2	D.F.	Significance Level
V_1	.5120	225.113	15	$<.001$
V_2	.2022	100.270	13	$<.001$
V_3	.0420	22.395	11	$<.05$
V_4	.0196	10.569	9	.40
V_5	.0148	8.113	7	.50
V_6	.0054	2.924	5	.95

Two discriminant functions were significant beyond the .001 level of confidence. The third function was significant at the .05 level of confidence. The magnitude of the three remaining latent roots, or discriminant functions, was not sufficient to achieve statistical significance. The latter three functions were therefore concluded to represent chance variation.

If the sum of the latent roots were to be considered an estimate of the total variance or dispersion among groups as defined by the instruments used in the study, the first discriminant function would account for approximately 64.3 per cent of the total dispersion among groups; the second discriminant function would account for 25.4 per cent

of the total dispersion among groups; the third discriminant function would account for 5.3 per cent of the total dispersion. The remaining three functions, combined, would account for less than 5 per cent of the total dispersion among groups.

Interpretation of the Significant Discriminant Functions

It is possible to interpret the discriminant functions by an examination of the conventionalized coefficients or by an examination of the conventionalized coefficients weighted by the standard deviation of the corresponding variate. Tiedeman and Bryan make the following comment on the interpretation of discriminant functions:

> It can be shown that the individual values of the discriminant function are independent of the units of measurement, and origin of coordinates of the initial variates, since the coefficients automatically adjust themselves (linearly) to the scales employed. On the other hand, the interpretation of separate coefficients does depend on the units of the initial variates.[3]

Tiedeman and Bryan concluded that in cases in which the units of measurement are sufficiently comparable (i.e., instruments have similar or identical range, means, and variance) that interpretation of functions may be made directly from the conventionalized coefficients.[4]

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[3]David V. Tiedeman and Joseph G. Bryan, "Predictions of College Field of Concentration," Harvard Educational Review, 24:122-39, Spring, 1954, p. 132.

[4]The term "conventionalized coefficient" indicates that discriminant coefficients were divided by the value of the largest coefficient which yielded a value of 1.00 for the largest coefficient, and lesser values for the remaining coefficients.

If the variates, however, do not have similar units of measurement, and if the standard deviation of some variates is two or three times that of other variates, for purposes of interpretation, the discriminant coefficients should be weighted by the standard deviation of the instrument. Such a procedure would adjust the coefficients in terms of the initial units of measurement.

The variables used in this study did not have similar or comparable units of measurement. For this reason the weighting procedure was followed for purposes of interpretation. The standard deviation of each of the instruments is presented in Appendix C.

Because only the first three discriminant functions were statistically significant, the remaining three discriminant functions are not included in subsequent discussions of the findings. The conventionalized discriminant coefficients for all six functions are included in Appendix D of the study.

Interpretation of the First Discriminant Function

The weighted conventionalized discriminant coefficients of the first and most powerful discriminant function are presented in Table 11. Examination of the data in Table 11 revealed that the first function may be considered intellective or cognitive in nature. The College Qualification Test, the Michigan State University Reading Test, and the Test of Critical Thinking were all weighted heavily and positively. The dominance of the three cognitive measures supports the generalization that the first function was primarily an intellective one.

TABLE 11

WEIGHTED CONVENTIONALIZED DISCRIMINANT COEFFICIENTS OF THE FIRST DISCRIMINANT FUNCTION

Variable	Weighted Coefficient
Inventory of Beliefs	- .319
Test of Critical Thinking	6.290
Differential Values Inventory	1.590
Rokeach's Dogmatism Scale	- .959
Michigan State University Reading Test	6.858
College Qualification Test	11.096
Social Status Index	5.011

The social status index was weighted positively in the first discriminant function, along with the cognitive variates. Apparently some element measured by the social status index is positively related to the dimension differentiated by the cognitive instruments. This finding would agree with the previous research findings concerning the relationship between social background and measures of academic ability.

The contribution of the Differential Values Inventory in the first function was minor when compared to the weightings of the cognitive instruments and the social status index. The values instrument was, however, weighted positively in the first function, in the expected direction of traditional values of achievement, morality, individualism, and orientation toward the future.

The attitudes of stereotypy as measured by the Inventory of Beliefs and dogmatism as measured by Rokeach's Dogmatism Scale did not

appreciably influence the nature of the first function. This conclusion is based first upon the slight weightings received by the two attitudinal measures in the first function. Secondly, because the two tests are negatively correlated it was enigmatic that both instruments were weighted in the same direction in the first function. It is likely that the minimal influence of one instrument would be at least partially removed by the other. Of course, the discriminant coefficients are so small that chance alone could account for the seemingly contradictory weightings.

Thus, to summarize the discussion of the first discriminant function, the complex of discriminant coefficients indicated that the function was primarily an intellective function.

Interpretation of the Second Discriminant Function

The weighted conventionalized discriminant coefficients of the second discriminant function are presented in Table 12. The College Qualification Test received the heaviest weighting in the second function and was weighted negatively. The Test of Critical Thinking received a small and negligible weighting. The Michigan State University Reading Test was heavily weighted in a positive direction.

Examination of the sub-tests of the College Qualification Test revealed that the total score was strongly influenced by numerical and science items. The numerical sub-test, of course, contributed to the numerical factor of the total score. The information sub-test also contributed to the numerical-science influence because half of the items were taken from the natural science subject matter areas.

TABLE 12

WEIGHTED CONVENTIONALIZED DISCRIMINANT COEFFICIENTS OF THE SECOND DISCRIMINANT FUNCTION

Variable	Weighted Coefficient
Inventory of Beliefs	1.236
Test of Critical Thinking	..605
Differential Values Inventory	-1.408
Rokeach's Dogmatism Scale	- .119
Michigan State University Reading Test	6.858
College Qualification Test	-9.539
Social Status Index	5.495

The positive weighting received by the highly verbal Michigan State University Reading Test in the second function can be assumed to have neutralized the negative weight received by verbal elements in the College Qualification Test. It is probable, however, that a negative weighting on some of the numerical-scientific elements of the College Qualification Test remained. It may thus be concluded that the interaction of the cognitive instruments resulted in a slight negative weight on a numerical-scientific ability factor.

The meaning of the second function, however, does not become clear until the non-cognitive measures are examined. Examination of the weighted discriminant coefficients of the non-cognitive measures suggests the influence of various social-cultural elements related to socio-economic background and to sex. The social status index, for

example, received a heavy positive weighting. The traditional values of the Differential Values Inventory were weighted negatively in the second function, favoring the emergent values of sociability, group conformity, and moral relativism, previously associated with students from high social strata and with females.

The slight contributions of the two attitudinal measures are also in the direction of attitudes previously associated with individuals from the middle class culture and with females.

The negative weighting of the College Qualification Test, and the positive weighting of the Michigan State University Reading Test, when considered in relation to the non-cognitive variables, appear to result in the same social-cultural influence. The negative influence of numerical ability is in agreement with previous investigations concerning sex and social-cultural differences on cognitive or ability measures. College females, for example, have been shown to receive higher scores than college males on tests of verbal ability. Similarly, males are known to typically score higher than females on tests of numerical ability.[5] Previous research also indicates that there are social-cultural differences on measures of verbal ability.[6]

The complex of discriminant coefficients in the second discriminant function would indicate that the function may be interpreted

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[5]Dorothy H. Eichorn and Harold E. Jones, "Development of Mental Functions," Review of Educational Research, 22:421-438, December, 1952.

[6]Samuel R. Pinneau and Harold E. Jones, "Development of Mental Abilities," Review of Educational Research, 28:392-400, December, 1958, p. 394.

primarily as a social-cultural function, maximizing differences previously associated with different socio-economic and sex groups. Such a generalization is supported by the positive weight of the social status index, the negative weight of the Differential Values Inventory, and the negative weight on numerical-scientific abilities resulting from the interaction of the cognitive instruments.

The Interpretation of the Third Discriminant Function

The weighted conventionalized discriminant coefficients of the third discriminant function are presented in Table 13. The most prominant variable in the third discriminant function was the positively

TABLE 13

WEIGHTED CONVENTIONALIZED DISCRIMINANT COEFFICIENTS OF THE THIRD DISCRIMINANT FUNCTION

Variable	Weighted Coefficient
Inventory of Beliefs	1.87
Test of Critical Thinking	-2.54
Differential Values Inventory	.04
Rokeach's Dogmatism Scale	2.17
Michigan State University Reading Test	6.86
College Qualification Test	-2.69
Social Status Index	-3.91

weighted Michigan State University Reading Test. The two remaining cognitive measures, however, received negative weights. The social

status index was negatively weighted in the third function and was second in magnitude only to the reading test. The weightings received by the Inventory of Beliefs, Rokeach's Dogmatism Scale, and the Differential Values Inventory were small and were considered negligible. In addition, the fact that both attitudinal measures were positively weighted, and highly negatively correlated suggests that each instrument may serve to counter balance or negate the other in the final discriminant score.

Examination of group differences when the raw score group means have been weighted by the corresponding discriminant coefficients of the third function is helpful in the interpretation of the function. In Table 14, the raw score means of certain variables, weighted by the corresponding discriminant coefficients, are presented for each group and for the total group. In the second column of Table 14 the values for groups resultant from the combination of cognitive instruments are listed. In the third column the contributions of the social status index are presented. Contributions of the attitude and value measures are listed in column four and the mean discriminant scores for groups and for the total group on the third discriminant function are presented in the final column of Table 14.

A careful examination of the data contained in Table 14 revealed that when an above average discriminant value on the cognitive measures was combined with a below average discriminant value on the social status index, a high score on the third function resulted. This pattern is illustrated in groups one, two, five and six. The converse condition, a below average discriminant value for the cognitive instruments and an above average discriminant value on the social status index, resulted

TABLE 14

DISCRIMINANT FUNCTION VALUES FOR SELECTED COMBINATIONS OF VARIABLES AND FOR THE FINAL SCORE ON THE THIRD DISCRIMINANT FUNCTION FOR EACH GROUP AND FOR THE TOTAL GROUP

Group Description	Cognitive Instruments	Social Index	Attitudes and Values	Mean Score on Third Function
1. Withdrew, No GPA, Males	4.13	-12.85	22.57	13.85
2. Withdrew, No GPA, Females	6.03	-15.44	22.41	13.00
3. Withdrew, Below 2.0, Males	2.44	-13.89	22.74	11.29
4. Withdrew, Below 2.0, Females	3.97	-15.39	22.80	11.38
5. Withdrew, Above 2.0, Males	4.54	-15.21	22.87	12.20
6. Withdrew, Above 2.0, Females	7.17	-15.40	23.41	15.18
7. Enrolled, Below 2.0, Males	3.63	-15.87	22.69	10.45
8. Enrolled, Below 2.0, Females	4.64	-17.03	22.99	10.60
9. Enrolled, Above 2.0, Males	4.52	-16.20	23.06	11.38
10. Enrolled, Above 2.0, Females	6.35	-17.76	22.49	11.08
Total Group	4.43	-15.55	22.80	11.68

in a low score on the third function. This pattern is illustrated best by groups seven and eight. When the cognitive and social status discriminant values are approximately proportionate in magnitude, an average score on the third function resulted.

The minimal contribution of the attitudinal and value measures in the third function is also illustrated in Table 14. The range between the highest and lowest group scores is only one point. It may be concluded that the differences which are apparent on the third function are resultant from an interaction between the cognitive measures and the social status index.

Focusing attention on the cognitive measures and the social status index, the data in Table 14 reveal that the discriminant contributions resultant from the combination of the cognitive instruments and also the discriminant contribution of the social status index are higher for female groups than for male groups. Because group differences on the cognitive combination are resultant from interaction between a highly verbal instrument, (reading) with instruments more heavily loaded with numerical and scientific factors, group differences on the cognitive combinations likely represent sex differences rather than differences in general intellectual ability.

It is therefore concluded that the interaction between the cognitive instruments and the social status index results in a removal of the sex factor from the social status index. If the first function were considered an intellective function with sex and cultural differences included, and the second function a social-cultural function including sex differences, the third function may logically be considered a social background function, with sex and intellective differences removed.

Group Differences on the Significant Discriminant Functions

For purposes of discussion and analysis, group differences on the first two discriminant functions will be presented first and group differences on the third discriminant function will be discussed separately. The mean discriminant scores for the first and second discriminant functions are presented in Table 15.

TABLE 15

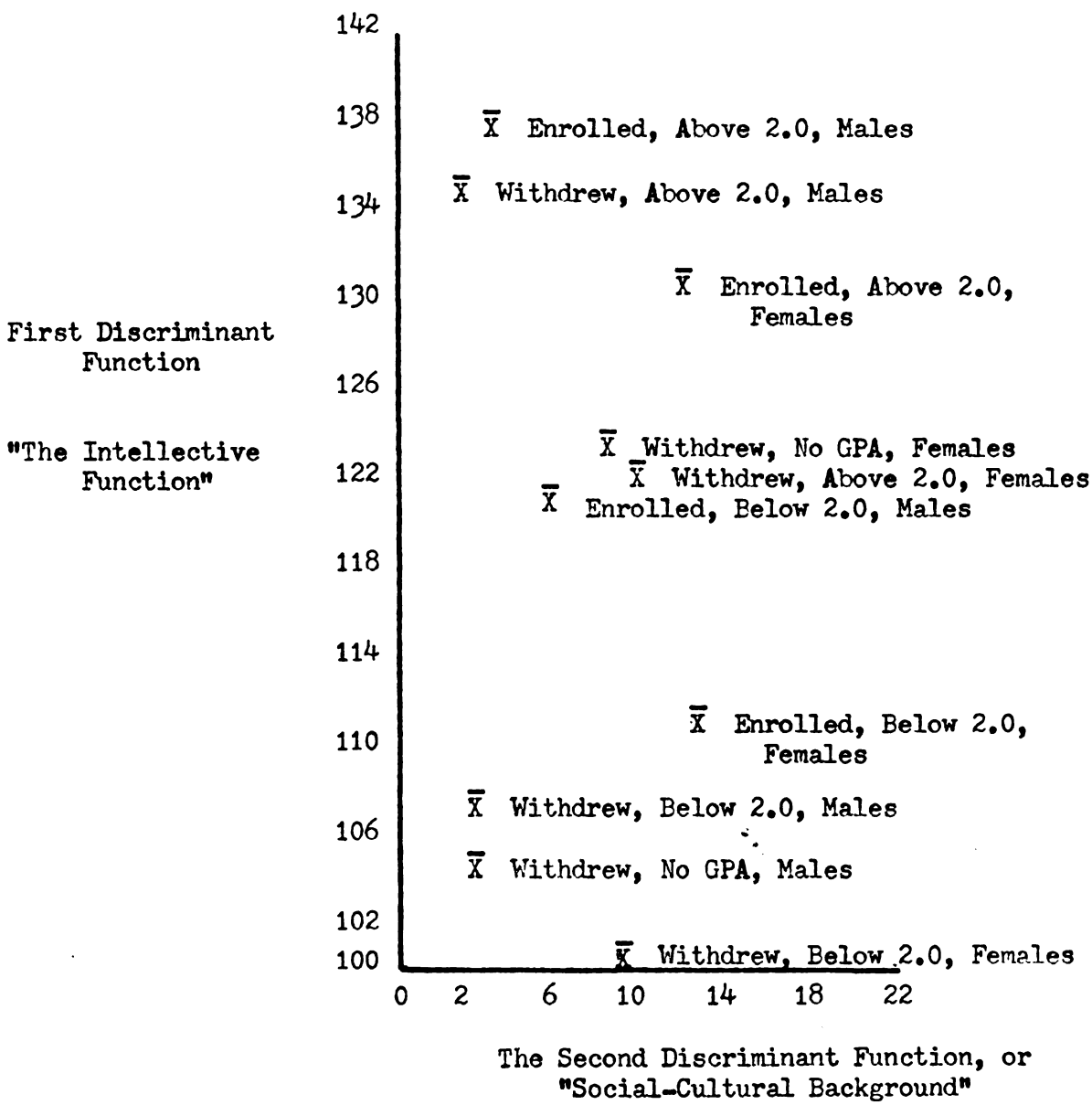
MEAN DISCRIMINANT SCORES ON THE FIRST AND SECOND DISCRIMINANT FUNCTIONS

Group Description	First Function	Second Function
Withdrew, No GPA, Males	104.40	3.42
Withdrew, No GPA, Females	123.22	8.86
Withdrew, Below 2.0, Males	107.04	3.38
Withdrew, Below 2.0, Females	100.02	9.94
Withdrew, Above 2.0, Males	135.03	3.14
Withdrew, Above 2.0, Females	122.03	10.54
Enrolled, Below 2.0, Males	120.53	6.54
Enrolled, Below 2.0, Females	110.94	12.89
Enrolled, Above 2.0, Males	137.83	4.08
Enrolled, Above 2.0, Females	130.77	12.22

The position of each of the ten groups in the two dimensional space defined by the first two discriminant functions has been plotted in Figure 1. It is apparent that the intellective discriminant function,

Figure 1

Differences Among Group Means Plotted in the Two Dimensional Space of the First Two Significant Discriminant Functions



plotted vertically, differentiates most effectively between above and below average achievement groups. Of the top five groups on the first or intellective function, four groups received above a 2.0 grade point average, while the remaining group received no grade point average. These group differences support the previous interpretation of the first function as an intellective function.

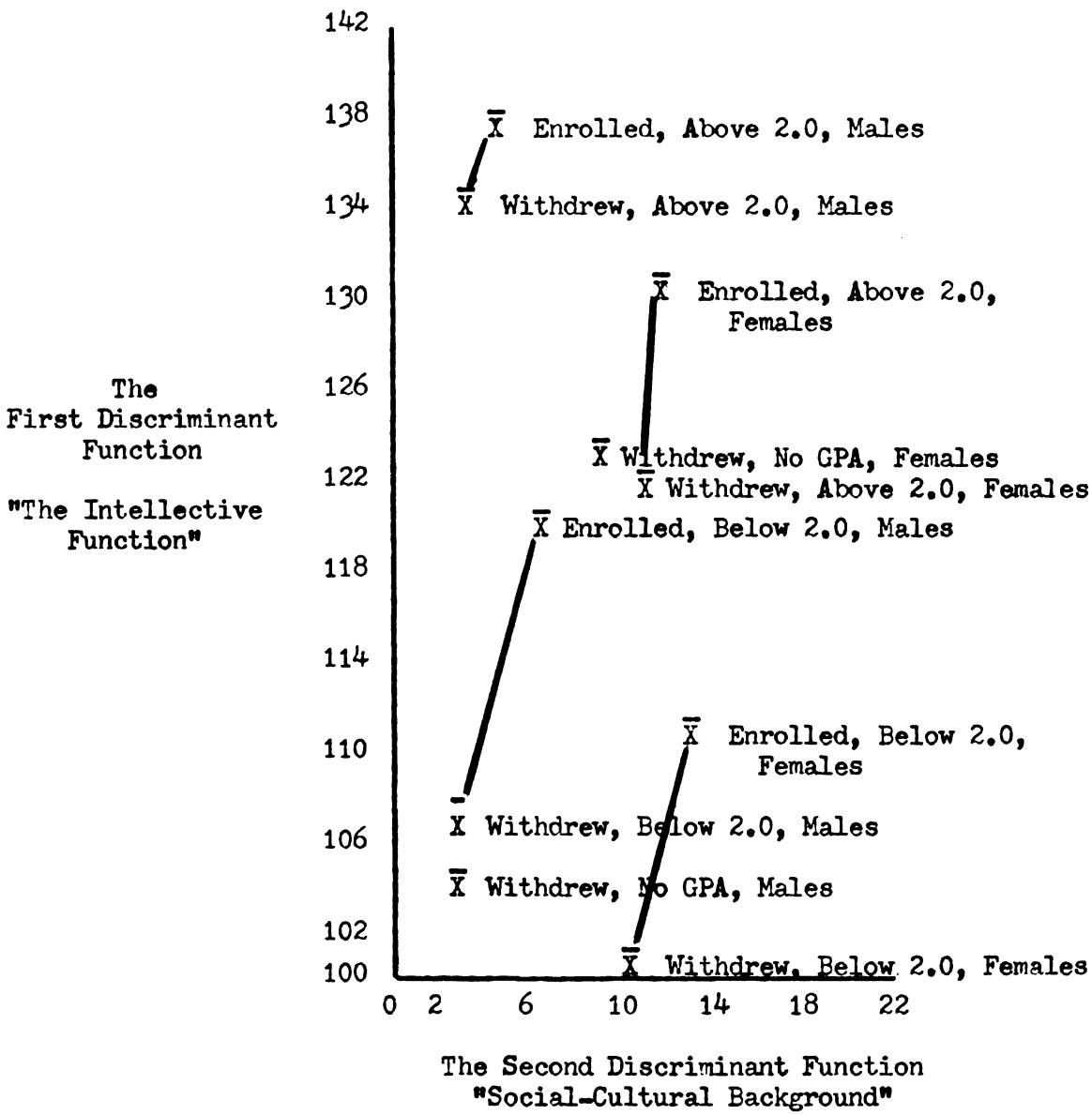
The second discriminant function, the social-cultural background function, effectively discriminated between males and females. Plotted horizontally, in Figure 1, the social-cultural function placed the five female groups toward the right of the graph, and the five male groups toward the left, illustrating that females received higher scores than males on the second function. Group differences on the second function also support the previous interpretation of the second function as a social-cultural function maximizing sex differences.

Discrimination Between Withdrawal Groups and Enrolled Groups

Groups of students who withdrew are contrasted to groups of students who remained in college through the end of the freshman year in Figure 2. All ten groups are plotted in the two dimensional space, the intellective discriminant function scaled vertically and the social-cultural discriminant function scaled horizontally. Lines have been drawn to connect similar sex and achievement groups which withdrew or remained in college. Of course, no lines are drawn from the withdrawal groups having no grade point average as they have no counter-part in the enrollee category.

Figure 2

Differences Between the Withdrawal and Enrollee Groups, Within Similar Sex and Academic Achievement Categories, Plotted In the Two Dimensional Space of the First and Second Discriminant Functions



In all instances it is apparent that when similar sex and grade point average groups are compared, freshmen who remained enrolled in college were higher on the intellective function than freshmen who withdrew. This generalization holds true for both males and females and for above and below average achievement groups. The dominance of the intellective function in the discrimination among groups is illustrated by the fact that lines connecting groups tend to run vertically rather than horizontally.

Further examination of Figure 2 indicates that within the achievement and sex categories, the social-cultural function discriminated between enrolled and withdrawn groups. Within sex and achievement groups, students who withdrew tended to be lower on social-cultural function than students who remained in college. This tendency is illustrated by the consistent slant of the lines connecting groups. This difference would suggest that students who remained in college came from higher social strata homes and had more feminine characteristics than students who withdrew.

Examination of group differences on the first two functions clearly revealed that students who withdrew from college were not a homogeneous group, and when classified by first term grade point average and sex, were found to be diverse in social-cultural background and intellective ability. For example, the second highest group on the intellective function was a group of students who withdrew from college. Moreover, two out of the bottom five groups in intellectual ability were groups of students who remained in college.

Discrimination Between Above and Below Average Achievement Groups

Differences between above and below average achievement groups are illustrated in Figure 3. As previously indicated, above average achievement groups were consistently higher on the intellective discriminant function than the below average achievement groups. All four above average achievement groups were higher on the intellective function than the four below average achievement groups, regardless of collegiate persistence or sex.

The discrimination among the high and low achievement groups was accomplished almost entirely by the intellective function. There was little or no difference between above and below average achievement groups on the social-cultural background function. This, of course, is as expected, recognizing that the group dispersion defined by the first function is removed from subsequent functions.

Discrimination Between Males and Females

Differences between males and females in similar achievement and collegiate persistence groups are illustrated in Figure 4. As previously noted, all five of the female groups had higher discriminant scores on the social-cultural function than any of the male groups. Within a given achievement level and collegiate persistence group, males tended to be higher than females on the intellective function. An exception to this generalization was the group of females who withdrew from college prior to receiving grades. These females were considerably higher on the intellective function than would be expected from the pattern of the remaining nine groups on the function.

Figure 3

Differences Between Above and Below Average Achievement Groups, Within Similar Collegiate Persistence and Sex Categories, Plotted in The Two Dimensional Space of the First and Second Discriminant Functions

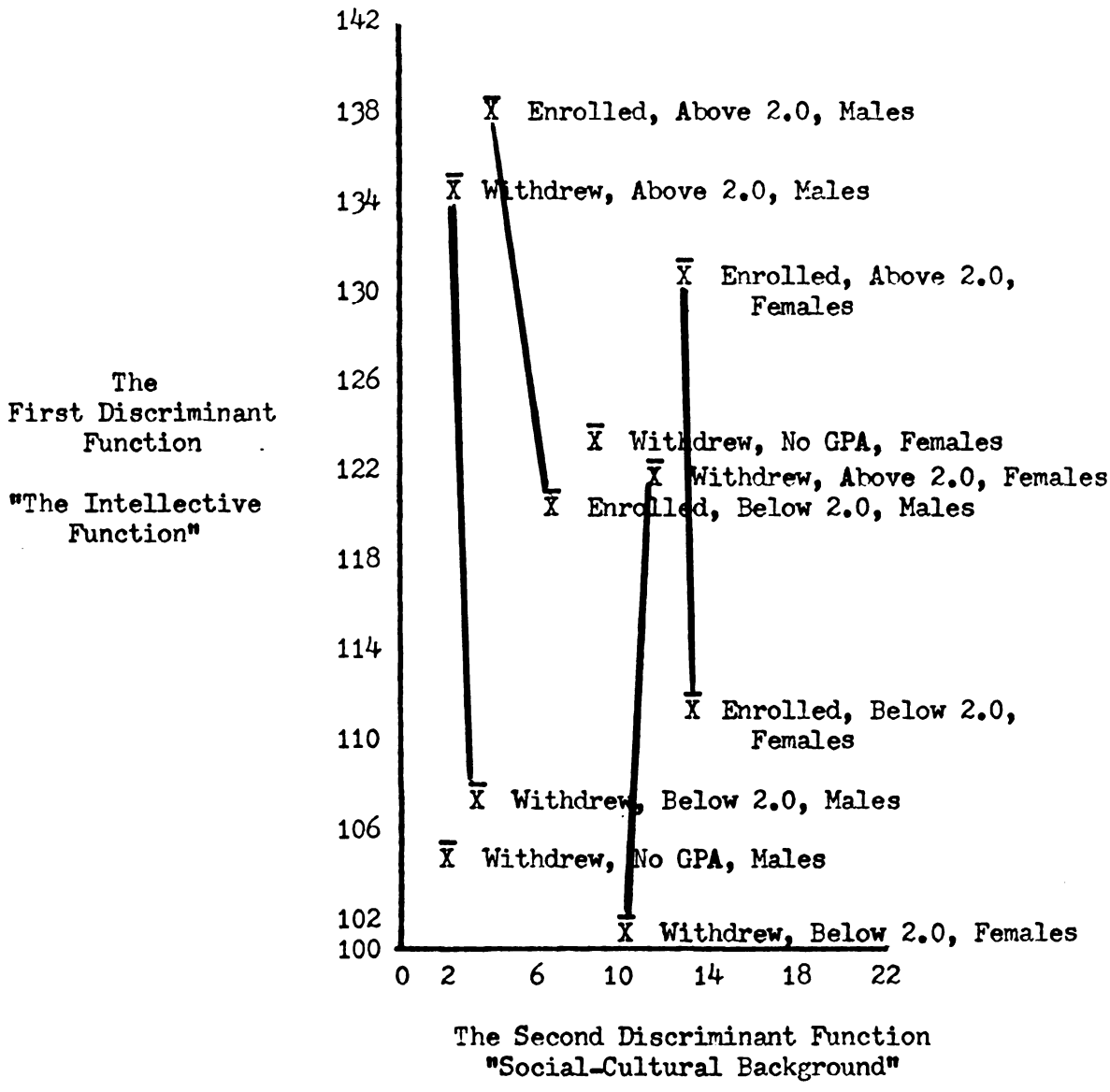
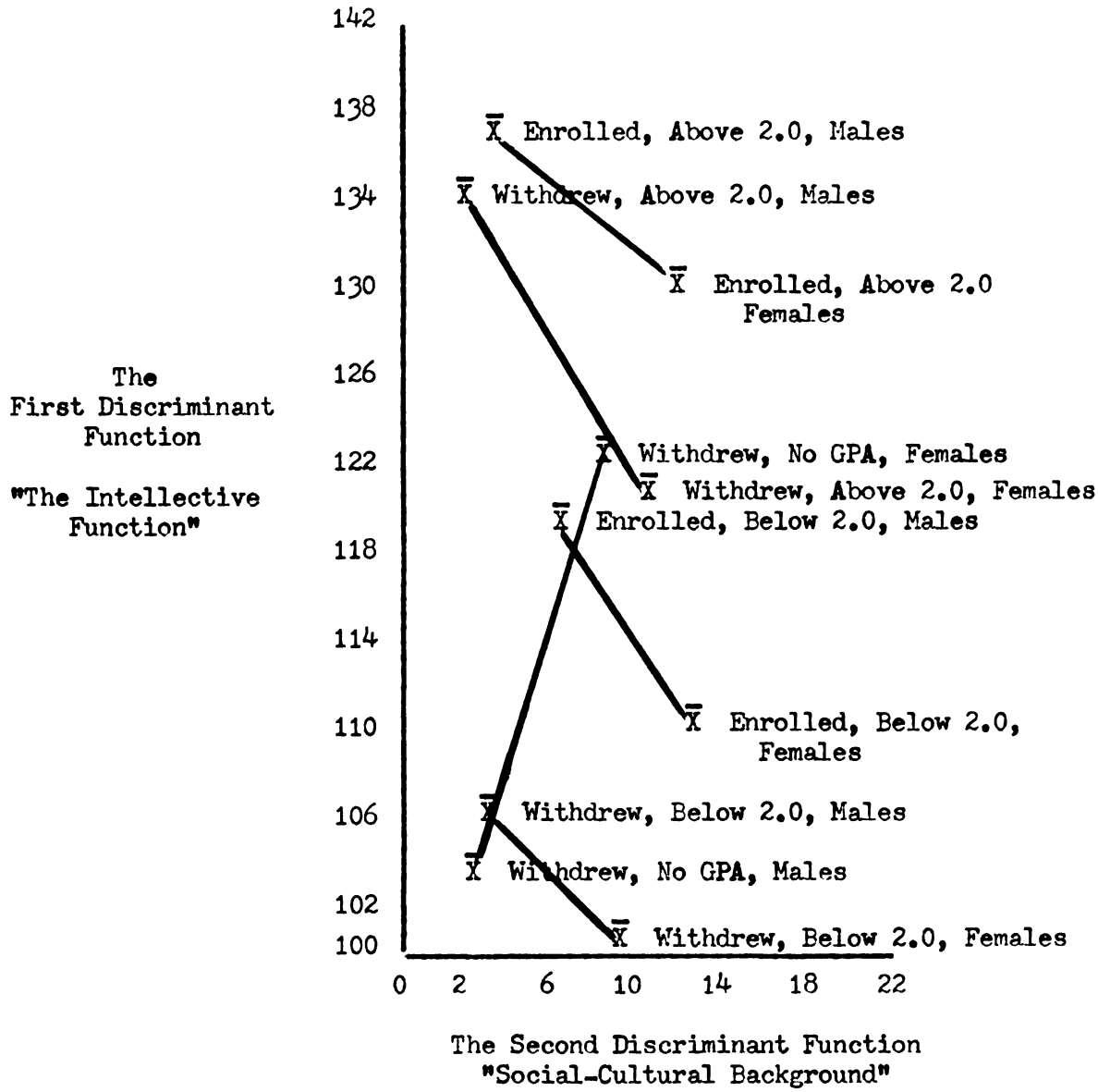


Figure 4

Differences Between Males and Females, Within Similar Collegiate Persistence and Achievement Categories, Plotted In The Two Dimensional Space of the First and Second Discriminant Functions



Group Differences on the Third Discriminant Function

While the magnitude of group differences on the third discriminant function was less than on the first and second functions, the differences among groups on the third function were statistically significant and theoretically interesting. In previous discussion it was suggested that the third function was a social background function, with the usual correlates of intelligence and sex removed. The differences among groups on the third function would lend theoretical support to such a generalization. The means of each of the ten groups on the third discriminant function are presented in Table 16 in order of magnitude of the group mean.

TABLE 16

GROUP MEANS ON THE THIRD DISCRIMINANT FUNCTION

Group Description	Score on the Third Function
Withdrew, Above 2.0, Females	15.18
Withdrew, No G.P.A., Males	13.85
Withdrew, No G.P.A., Females	13.00
Withdrew, Above 2.0, Males	12.20
Withdrew, Below 2.0, Females	11.38
Enrolled, Above 2.0, Males	11.38
Withdrew, Below 2.0, Males	11.29
Enrolled, Above 2.0, Females	11.08
Enrolled, Below 2.0, Females	10.60
Enrolled, Below 2.0, Males	10.45

The highest five groups on the third discriminant function all withdrew from college during the freshman year. Four out of the bottom five groups remained enrolled in college through the end of the freshman year. It is also of interest to note that among the withdrawal groups, the four top groups on the third function were males and females who withdrew from college with above average achievement records, or students with no reported grades. Similarly, the two lowest groups on the third function were those who remained enrolled in college, despite a below average achievement record during the first term.

The groups of students nearest the median on the third function were those whose collegiate persistence was more nearly in accord with achievement records. For example, withdrawal groups nearest the median on the third function had below average first term achievement records. The enrollee groups nearest the median were above average in first term achievement.

These differences between students who withdrew from college and students who remained theoretically support the interpretation of the third function as a social background function, with sex and intellectual differences removed.

There were no apparent sex differences on the third function. Within collegiate persistence and sex categories, however, the below average achievement groups tended to be lower on the third function than the above average achievement groups. It is thus apparent that the differences defined by the third function are independent of intelligence, inasmuch as the above average achievement groups have a tendency to fall in the same direction as the withdrawal groups.

It may be concluded that the third discriminant function represents the linear combination of the instruments which best discriminated between students who remained enrolled in college and students who withdrew, regardless of achievement level or sex. These differences would lend theoretical support to the conclusion that the third function was a social background function with the influences of intelligence and sex removed.

Summary

The findings of the study failed to support the null hypothesis that there was no difference in intellectual ability, social background, attitudes and values among groups of students classified by collegiate persistence, first term grade point average, and sex. It may therefore be concluded that such differences did exist among groups of students so classified.

Three statistically significant discriminant functions were found. The strongest discriminant function, accounting for more than half of the total variance among groups, was heavily loaded with cognitive variates. In addition, the social status index contributed positively to the first function. Although the contribution of the values inventory was slight in the first function, it was in the direction of the more traditional "Protestant ethic" values of achievement, morality, individualism, and orientation toward the future. Both the nature of the discrimination among groups and the weights accorded the variables indicated that the first discriminant function was primarily an intellective function.

The complex of variates forming the second significant discriminant function indicated that the function primarily discriminated along a social-cultural continuum. It was suggested that the interaction between the Michigan State University Reading Test and the College Qualification Test resulted in a slight negative weight on numerical science ability factors, known to be related to cultural background and sex differences. The social-cultural content of the second function was further influenced by the strong positive weight given the social status index. In addition, the Differential Values Inventory received a negative weight, in favor of the more emergent values associated with persons from higher social strata and with females.

All of these conditions pointed toward the probability that the second discriminant function differentiated along social-cultural lines, maximizing sex differences measured by the variables. Group differences on the second discriminant function support this conclusion.

The third significant discriminant function was described as an interaction between a sex related difference on cognitive instruments and the social status index. The formation of the discriminant score suggested that an average score on the third function resulted when the discriminant value of the cognitive instruments was proportionate to the magnitude of the discriminant value of the social status index. A high discriminant value for the cognitive combination and a low social status value resulted in a high score on the third function. The interaction among the cognitive measures and between the cognitive measures and the social status index was interpreted as resulting in the removal of the sex factor from the social background element. Thus, the function

might be thought of as a social background function with sex and intellectual differences removed.

Group status on each of the functions was discussed. The first, or intellective discriminant function, differentiated most effectively between high and low achievement groups. When similar achievement and sex groups were compared on the intellective function, students who remained enrolled in college were higher on the function than students who withdrew. In addition, within similar collegiate persistence and achievement groups, males tended to be higher on the intellective function than females.

Examination of group status on the second discriminant function revealed that it differentiated most effectively between males and females. All five of the female groups were above the five male groups on the second function. Within sex and achievement groups, students who remained enrolled in college through the end of the freshman year were higher on the socio-cultural function than students who withdrew during the same period. There was no apparent difference in the status of high and low achievement groups on the social-cultural background function.

The third significant discriminant function discriminated between those students who withdrew from college and those who remained through the end of the freshman year. Highest on the third function were the groups of students who withdrew from college with no first term grade point average. Lowest on the third discriminant function were the males and females who remained enrolled in college despite a below average achievement record for the first term. No discrimination between males and females on the third function was evident. Within collegiate

persistence and sex groups, the above average achievement groups tended to be higher on the third function than the below average achievement groups. As withdrawal groups were also highest on the third function, differences among achievement groups were considered to be independent of the intellective factor.

In the chapter to follow the implications and conclusions of the study will be discussed. In addition, attention will be directed toward those questions either left unanswered by this study, or suggested by the findings of the study.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

The purpose of this investigation was to study the nature of the student who withdraws from college prior to the completion of his first academic year. The study was designed to differentiate between students who withdraw from college and students who remain in college, and also to differentiate among different types of students who withdraw from college such as withdrawals of above and below average achievement and male and female withdrawals.

The variables of intellectual ability, social background, attitudes, and values were shown to be theoretically related to collegiate persistence and attendance. Accordingly, the following hypothesis was formulated and subsequently tested.

> It is possible to differentiate among groups of students classified by collegiate persistence, first term grade point average, and sex, on the basis of intellectual ability, social background, attitudes, and values.

The Methodology

The population under study consisted of the 1958 entering freshman class of Michigan State University. Only those students who had never before attended a college or university, enrolled for full-time study of 12 credits or more, and American citizens, were included in the study. All test data were collected during Orientation Week.

Students for whom full test records were not available were excluded from the study. These qualifications observed, the total population numbered 2,746 Michigan State University freshmen students.

The first term grade point average of all students was obtained from the Office of the Registrar, Michigan State University. The records of the Registrar's Office were also used to identify those freshman students who withdrew from college, or failed to re-enroll.

At the conclusion of the 1958-1959 academic year, 303 students from the total group of 2,746 students had withdrawn from the University. All of these 303 students were included in the withdrawal sample of the study.

A random sample of 250 students was drawn from the remaining number of 2,443 students who were enrolled at the University through the end of the academic year.

Both the "withdrawal" and "enrollee" groups were further classified into sub-groups on the basis of sex and first term achievement. A grade point average of 2.0 was selected as an appropriate criterion for the classification of students into above and below average academic achievement groups. Classification of withdrawals and enrollees by achievement and sex yielded ten groups, six of which withdrew from college and four of which remained enrolled.

To test the hypothesis of the study, it was necessary to collect data relevant to the intellectual ability, social backgrounds, attitudes, and values of the members of the sample. Intellective characteristics were measured by three cognitive instruments: (1) The College Qualification Test, a general academic ability measure; (2) The Test of Critical

Thinking, Form G, a measure of logical reasoning and problem solving aspects of critical thinking ability; and, (3) The Michigan State University Reading Test, a measure of the ability to comprehend thoughts expressed in reading passages representative of textual materials found in the several academic areas in college.

The measurement or quantification of social background was approached by combining the biographical variables of father's occupational prestige rating, level of father's education, and level of mother's education into a single index. First factor loadings from a factor analysis of the correlation coefficients among the three variables were used to combine the three variables into a single index score. The index score was assumed to measure the general social status of the family, and hence, was called the social status index.

Attitudes were measured by two instruments, the Inventory of Beliefs, Form I, and Rokeach's Dogmatism Scale, Form E. Both instruments were designed to measure related phenomena, the former measuring stereotypy, or rationality of belief systems, and the latter measuring dogmatism, or general authoritarianism.

A measure of values was obtained through the use of the Differential Values Inventory, an instrument designed to measure the degree of commitment to the "Protestant ethic" values of achievement, individualism, puritan morality, and orientation toward the future.

Multiple discriminant analysis was selected as an appropriate statistical technique. Through the use of multiple discriminant analysis, it was possible to define the linear combinations of variates which maximized the differences between groups and minimized the differences

within groups. Through the examination of the discriminant coefficients which determine the linear combinations, it was possible to gain insight into the nature of the basic phenomena which characterized the student who withdrew from college.

The first linear combination of the multiple discriminant analysis maximized the discriminant criterion; the second combination maximized the discriminant criterion after the effects of the first combination had been removed; the third linear combination maximized the discriminant criterion after the effects of the first two had been removed.

The Test of the Hypothesis

The analysis of data yielded three significant discriminant functions. The null hypothesis was therefore rejected. A test of significance of the latent roots of the determinental equation indicated that the first two functions were statistically significant at the .001 level of confidence, and the third significant at the .05 level of confidence. Three additional discriminant functions were obtained, but were not found to be significantly different from chance.

The Nature of the Three Significant Discriminant Functions

The first discriminant function accounted for over 60 per cent of the total dispersion among groups as defined by the variables, and was considered to be an intellective function. The College Qualification Test, the Test of Critical Thinking, and the Michigan State

University Reading Test were all weighted positively in the first function, and were the three most heavily weighted variates. The social status index was weighted positively in the first function and was the fourth heaviest weighted variable. The Differential Values Inventory was weighted positively in the first discriminant function, favoring the traditional values of achievement, individualism, puritan morality, and orientation toward the future. The weights given the two attitudinal measures were so small as to suggest that the instruments did not materially affect the nature of the first function. Examination of the discriminant coefficients in the first discriminant function revealed that the function was a linear combination of intellective elements buttressed by social background and value elements which complemented the cognitive complex.

Careful examination of the discriminant coefficients of the second discriminant function revealed that the function could be considered to be social-cultural in nature. Such a conclusion was supported by the positive contribution of the social status index, and the negative weight given the Differential Values Inventory. The Michigan State University Reading Test had a strong positive weight in the second discriminant function. The College Qualification Test, however, had an even stronger negative weighting. It was concluded that the interaction among the cognitive measures in the second discriminant function resulted in a slight negative weight on numerical-scientific abilities, associated with cultural and social differences.

The third discriminant function was formed through an interaction between the cognitive instruments and the social status index.

This interaction resulted in a removal of sex differences from the social status index, especially all those sex characteristics defined by second discriminant functions. It was concluded that the third function represented a measure of social background factors with the usual correlates of intelligence and sex removed.

Group Differences on the Three Significant Discriminant Functions

The intellective discriminant function, differentiated most effectively between the above average achievement groups and the below average achievement groups. All of the above average achievement groups were higher than any of the below average achievement groups on the intellective function, regardless of collegiate persistence or sex. When similar sex and achievement groups were compared on the intellective function, it was apparent that, on the whole, students who remained enrolled in college were higher on the intellective function than students who withdrew. This finding is, of course, in accord with the findings of previous investigations. It was also evident, however, that heterogeneity existed among the different withdrawal groups, equally as great, if not greater, than the heterogeneity among students who remained enrolled. Finally, when similar collegiate persistence and achievement level groups were compared, males tended to be higher on the intellective function than females.

Examination of group differences on the second, or social-cultural background function, indicated that the most marked discrimination of the second function was between males and females. All five female groups were higher than the five male groups on the social-cultural

background function, regardless of collegiate persistence and achievement. A slight difference was apparent between the withdrawal and enrollee groups when similar sex and achievement level groups were compared. There was no apparent difference, however, between the above and below average achievement groups on the second discriminant function.

The third significant discriminant function was not as powerful in differentiating among groups as were the first two. The patterns of groups differences, however, were especially interesting. The third discriminant function differentiated primarily between groups of students who withdrew from college and groups of students who remained in college through the end of the freshman year. Especially interesting was the fact that various, apparently atypical groups, appeared on the extremes of the distribution of mean scores on the third function. For example, the highest groups on the third function were composed of students who withdrew from college with no first term grade point average or an above average achievement record. Conversely, the lowest groups on the third discriminant function were males and females who remained enrolled in college despite a below average achievement record for the first term.

Although the third discriminant function discriminated most clearly between withdrawals and enrollees, a slight difference was apparent between above and below average achievement groups. The difference, however, was other than one would expect if the discrimination between withdrawals and enrollees were primarily due to a cognitive element. While those who withdrew from college were higher on the third function than those who remained enrolled, there was a slight tendency

for the above average achievement groups to be higher on the function than the below average achievement groups.

Conclusions and Generalizations

Differences Between Withdrawals and Enrollees, Within Sex and Achievement Categories

The findings of this investigation tend to support the findings of previous research on the problem of collegiate withdrawal. Within sex and achievement categories, students who remained enrolled in college had more general academic ability than those students who withdrew. Moreover, within sex and achievement groups, those students who withdrew from college tended to be lower on the social-cultural function than students who remained in college. It is concluded, therefore, that intellectual ability must continue to be considered as related to withdrawal from college. Students who find it difficult or impossible to achieve at the required levels of performance in college will naturally have a higher attrition rate than the more capable students.

Differences Between Withdrawals and Enrollees, Regardless of Sex and Achievement

When students who withdrew from college were separated into groups on the basis of first term achievement and sex, and compared to similarly separated groups of students who remained enrolled in college, the first two significant discriminant functions did not differentiate all withdrawal groups from all groups of students enrolled in college. Such a finding clearly illustrates the fact that students who withdraw

from college are not a homogeneous group, but conversely, must be considered a diverse, heterogeneous group in terms of academic ability. The data also suggest the possibility that the proportion of males and females in a withdrawal sample, or the proportion of above average and below average achievement students in a given sample of withdrawals, may be more instrumental in the determination of differences in intellectual ability or differences in social background than the collegiate persistence status of the group.

The third discriminant function most effectively separated withdrawal groups from groups of enrollees. The nature of the third function is certainly less clear than the nature of the first two functions. It was suggested, however, that the third discriminant function was a rather pure social background function, with the usual correlates of intelligence and sex related social-cultural elements removed. With the removal of the intellectual factors most closely related to achievement, and the removal of the social-cultural factors related to sex, the element most closely related to the collegiate persistence then remained. It may be that the third function is an indirect measure of the social-psychological motivation to remain in college. That is, the linear combination of elements which removed the sex and intellective bias from the social status index, thus leaving a "pure" measure of social background, could theoretically reflect the environmental influences on the student prior to admission to college.

If the above speculations were correct, the nature of the third discriminant function would agree closely with current social-psychological theory. Such theory would suggest that the pressures from the

family, peers, and self directed toward attending and continuing college are greater in a high social status home than in a low social status home regardless of ability or sex. In fact, the pressures in a lower social status home may be directed toward non-attendance or non-persistence.

A student with less than average ability, but from a high social status home, may be unable to achieve at a satisfactory level in college, but may continue to remain enrolled in college due to the pressures and social needs created by his previous and current social environment. Accordingly, a student of high ability may leave college because the pressures of his prior and current social environment motivate him to do so.

No claim is made that all of the pressures are in the form of aspirations and expectations of self and significant others. Admittedly, pressures may be largely financial, or may be a combination of financial pressures and social-psychological factors.

The Research Division of the National Education Association, after reviewing the research on high school drop-outs, reached the following conclusions:

> The typical drop-out's parents are unimpressed with the value of education; often they openly scorn "book learning." In addition, the family is likely to regard school as a financial burden; not only does it cost something to keep a child in school, but the family is deprived of the money which the boy or girl could be contributing to the budget.... Probably the most important home connected factor is the attitudes of the parents toward the child's education and toward school in general. A child's attitudes are shaped largely by the feelings of his parents...and are reinforced by the attitude of the community. The value systems of those around him inevitably color the child's outlook.[1]

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[1]Research Division of the National Education Association, "High School Drop-Outs," Research Bulletin, 38:11-14, February, 1960, pp. 12-13.

Although no definite conclusions can be made as to the nature of the third discriminant function, the evidence suggests the possibility that the function is a measure of the social-psychological motivation to remain in college, independent of achievement or sex differences.

Differences Among the Various Withdrawal Groups

The findings of this study suggest that there is apparently an ability difference between male and female Michigan State University freshman students. Such a difference, in favor of males, was apparent both within the withdrawal groups and within the enrolled groups of students.

It is difficult to conclude why males, within collegiate persistence and achievement categories, were consistently higher on the intellective discriminant function than females. There are four possible conclusions as to why the apparent discrepancy in ability between males and females was found: (1) there are differences between the Michigan State University males and females in general academic ability; (2) the instruments which purportedly measured the cognitive elements had a sex bias; (3) the multiple discriminant analysis technique maximized any existing sex differences in differentiating between the different groups; and (4) the possibility of sample bias. Any one, or combination of the four, could provide an answer to why sex differences were found on the first discriminant function. Further research is necessary before any definite conclusions may be formulated.

The females who withdrew before receiving a grade point average deviated sharply from the pattern established by the remaining nine

groups examined on the first or intellective function. This group of females scored unusually high on the first discriminant function, indicating above average academic ability.

It is interesting to note, however, that while this group of females was placed in an unusual status on the intellective function, the position of the group on the third discriminant function would indicate that the group was similar to other withdrawal groups. It is possible that special circumstances such as marriage, pregnancy, or homesickness may have combined with low social status to precipitate withdrawal regardless of above average ability. Of course, it may also be that the social status of females is more potent in the determination of collegiate persistence than in males.

Discussion of the Contribution of the Various Instruments In Differentiating Among Groups

Although no probability test was made to test the statistical significance of the contributions of each of the variates in the discrimination among groups, it was possible to observe the relative size of the discriminant coefficients of each function, and to suggest the dominance of particular instruments in the functions. Recognizing the lack of probability statements, the following remarks must be made with reservation and caution.

The three cognitive measures, including the Michigan State University Reading Test, the College Qualification Test, and the Test of Critical Thinking, were most prominent in the differentiation between different achievement level groups. The cognitive instruments were heavily weighted in each of the three significant discriminant functions,

indicating that both intellective and social factors were measured by the instruments.

The social status index consistently contributed to the formation of all three functions, suggesting that the index, constructed from the variables of father's occupational prestige, mother's educational level and father's educational level contained both cognitive and non-cognitive factors.

The Differential Values Inventory contributed modestly, but in the theoretically expected directions, suggesting that while the values inventory was not a primary factor in any of the three functions, the "Protestant ethic" values are related to achievement and socio-cultural sex differences. The lack of influence of the Differential Values Inventory in the third discriminant function suggested that the measured values were not related to collegiate persistence.

The contributions of the attitude measures of Rokeach's Dogmatism Scale and the Inventory of Beliefs suggested that the attitudes measured by these two instruments were not important in differentiating among groups of withdrawals and enrollees, classified by achievement level and sex. Although the instruments had the heaviest weighting in the third discriminant function, each tended to negate the influence of the other.

Implications For Further Research

The study of students who withdrew from college during the freshman year has revealed several unanswered questions and possibilities for further research. The more important of these suggestions are listed below.

1. Of first priority is the need for further study of the nature of the third discriminant function. The third function differentiated between groups of students who were enrolled in college and students who withdrew from college, regardless of the sex or prior collegiate achievement. Equally interesting was the observation that the enrollee groups which would normally have been predicted, on the basis of first term achievement, to withdraw from college, were lowest on the third function. Moreover, at the other extreme on the third function were groups of students who withdrew from college prior to receiving any notice of achievement, or subsequent to achieving at an above average level.

Further exploration of the nature of the third function would have the possibilities of achieving a more definite understanding of the nature of the function, and also of eventually constructing a more precise and stronger measure of the phenomenon.

2. Further research should be directed toward a more exact definition of differences in collegiate persistence between males and females. Attention should especially be directed toward the possibility that the social-psychological motivation to remain in college, or to withdraw, may be more influential in the case of females than with males.

3. It would be desirable to use the basic design of this study to investigate collegiate withdrawal during the sophomore, junior, and senior years in college. Each year, a separate study could be conducted, and a comprehensive study including all withdrawal groups at all points in time could be conducted at the end of the four year period. These investigations would serve to validate the findings of this study, and would also add a time dimension.

4. Further research is needed concerning the relationship between collegiate persistence and student attitudes and values. The findings of this study would suggest that attention should be directed to attitudes and values related to college attendance and schooling in general. Also, attention should be given to the relationship of values or standards of personal achievement, the self concept, and collegiate persistence.

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APPENDIX A

GROUP MEANS FOR ALL TEN GROUPS AND FOR THE TOTAL GROUP ON THE MEASURES EMPLOYED IN THE STUDY

Appendix A

GROUP MEANS FOR ALL TEN GROUPS AND FOR THE TOTAL GROUP ON THE MEASURES EMPLOYED IN THE STUDY

Group Descriptions	Size of Group	Inventory of Beliefs	Critical Thinking	D-V Inventory	Rokeach's Dogmatism	M.S.U. Reading	College Qualification Test	Social Status Index
1. Withdrawal, No G.P.A., Males	28	57.04	25.57	35.93	171.93	23.21	103.79	49.21
2. Withdrawal, No G.P.A., Females	20	61.95	31.50	33.90	162.35	28.45	117.10	59.10
3. Withdrawal, Below 2.0, Males	116	58.28	27.01	34.13	172.03	22.35	107.17	53.18
4. Withdrawal, Below 2.0, Females	68	59.78	24.43	32.57	170.41	21.62	93.40	58.93
5. Withdrawal, Above 2.0, Males	32	66.47	33.91	33.25	160.50	29.91	138.25	58.22
6. Withdrawal, Above 2.0, Females	39	64.28	30.95	34.15	170.15	29.15	114.46	58.95
7. Enrolled, Below 2.0, Males	55	60.51	30.89	35.25	167.85	25.80	116.58	60.75
8. Enrolled, Below 2.0, Females	34	61.38	28.32	32.26	170.11	24.32	100.53	65.18
9. Enrolled, Above 2.0, Males	82	64.48	34.74	35.85	165.72	30.20	138.54	62.02

Appendix A (Continued)

Group Descriptions	Size of Group	Inventory of Beliefs	Critical Thinking	D-V Inventory	Rokeach's Dogmatism	M.S.U. Reading	College Qualification Test	Social Status Index
10. Enrolled, Above 2.0, Females	79	65.53	32.90	32.71	157.58	29.78	122.47	67.99
(For Total Group)	553	61.80	29.91	34.02	167.14	26.13	115.34	59.51

APPENDIX B

MATRIX A AND MATRIX W OF THE DETERMINANTAL EQUATION

$$|A - \lambda W| V = 0$$

WHERE

A = The Among Groups Matrix

W = The Within Groups Matrix

V = The Latent Vectors of the System

λ = The Latent Roots of the System

APPENDIX B

THE AMONG GROUPS MATRIX

+005070	+005112	-000250	-007018	+005431	+018543	+006669
+005112	+006912	+000752	-007267	+006541	+027028	+006157
-000250	+000752	+000866	+000834	+000475	+004582	-001297
-007018	-007267	+000834	+014075	-007633	+025735	-010921
+005431	+006541	+000475	-007633	+006725	+027678	+006466
+018543	+027028	+004582	-025735	+024678	+116785	+016044
+006669	+006157	-001297	-010921	+006466	+016044	+015078

THE WITHIN GROUPS MATRIX

+099547						
+011858	+024850					
-001661	+000848	+027982				
-107755	-015852	+012204	+348583			
+009816	+011672	+000702	-014658	+019284		
+035539	+041898	+002398	-039110	+044227	+273923	
+008059	+001129	-008326	-009436	+002081	+018575	+108602

APPENDIX C

STANDARD DEVIATIONS OF THE MEASURES EMPLOYED IN THE STUDY FOR THE TOTAL GROUP

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STANDARD DEVIATIONS OF THE MEASURES EMPLOYED IN THE STUDY FOR THE TOTAL GROUP

Variable	Standard Deviation
Inventory of Beliefs	13.75
Test of Critical Thinking	7.58
Differential Values Inventory	7.22
Rokeach's Dogmatism Scale	25.61
Michigan State University Reading Test	6.86
College Qualification Test	26.58
Social Status Index	14.95

APPENDIX D

CONVENTIONALIZED DISCRIMINANT COEFFICIENTS CORRESPONDING TO THE SIX DISCRIMINANT FUNCTIONS

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CONVENTIONALIZED DISCRIMINANT COEFFICIENTS CORRESPONDING TO THE SIX DISCRIMINANT FUNCTIONS

Variable	V_1	V_2	V_3	V_4	V_5	V_6
Inventory of Beliefs	-.02321	.08989	.13630	-.02024	-1.00000	.10836
Test of Critical Thinking	.82990	.07978	-.33498	.71883	.080343	-1.00000
Differential Values Inventory	.22007	-.19489	.005457	1.00000	.84039	.45691
Rokeach's Dogmatism Scale	-.03745	-.00463	.08491	.24395	-.56739	-.01337
Michigan State University Reading Test	1.00000	1.00000	1.00000	-.04111	.64092	.21201
College Qualification Test	.41746	-.35889	-.10136	-.16906	-.14693	.12541
Social Status Index	.33509	.36744	-.26122	.18456	-.06550	.17198