THE PREDICTIVE VALIDITIES, AS MEASURED BY MULTIPLE CORRELATION, OF TWO BATTERIES USING ACADEMIC ACHIEVEMENT AS CRITERION

DISSERTATION

Presented to the Graduate Council of the North Texas State University in Partial Fulfillment of the Requirements

For the Degree of

DOCTOR OF EDUCATION

By

Thomas M. Barnett, B.S., M.S.

Denton, Texas

June, 1967
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CHAPTER I

INTRODUCTION AND STATEMENT OF THE PROBLEM

Introduction

The use of test scores as predictive devices is a well-established procedure. An examination of educational history reveals a number of quite worthwhile early studies in this area. One of these was the very first dissertation produced at Teachers College of Columbia, which attempted to predict teacher success on the basis of tests which were designed to measure certain teacher attitudes.\(^1\) During the years following the publication of this interesting paper, the work with such predictors continued to gain momentum. The many persons who were involved in the various phases of testing conducted increasing numbers of studies and attempted to apply their findings to specific problems. Interest in this area increased until today it is possible to find a test which will attempt to predict success in almost any area.

Educators followed this work with measures and their predictive validity very closely because they were anxious to apply helpful new methods to the problems of their students.

\(^1\) Junius L. Merian, Normal School Education and Efficiency in Teaching (New York, 1906).
One of the most significant undertakings was the attempt to predict academic success on the basis of selected test scores. The early studies often used the intelligence quotient as a predictor and grade point average or class rank as the criterion. In most of these very limited studies the coefficient of prediction, Pearson's product-moment coefficient of correlation, was positive but often its value was not of sufficient magnitude to be considered significant by most authorities.

Multiple correlation was developed in an attempt to determine the intercorrelations among several predictors and with a criterion. In addition to the coefficient of correlation between these several predictors and the criterion, the method was capable of indicating the best combination of predictors. The coefficient of multiple correlation was always larger than the coefficient of simple correlation between any single predictor and the same criterion, often significantly larger. This value was not a simple sum of the correlations of the dependent variables and the separate independent variables, but considered the correlation between the dependent and the independent variables as well as their intercorrelations.²

It is the practice of many present-day colleges and universities to subject their beginning students to a series of tests. These are administered to the student either prior to

his acceptance or shortly following his matriculation. The many uses of the scores from these tests vary with the school and with the particular situation involved. Many schools apply this information when making decisions concerning admission, class section, homogeneous grouping, and remedial work. The scores of these tests are also studied by those who are conducting research in the field of testing in an effort to learn more about the predictive validity of these tests. Such information is basic to the development of improved predictive instruments. These researchers are also continuing their investigations of the application of this kind of information to the areas of admission, counseling, and the prediction of academic success in various subject matter areas.

Statement of the Problem

The problem of this study was to determine the predictive validity, as measured by multiple R, of two batteries given to beginning college students using various achievement criteria.

Predictive battery I contained the following instruments:

A. **Cooperative English Test**: English Expression
B. **Iowa Silent Reading Test**
C. **Iowa Aptitude Test in Chemistry**
D. **Cooperative Mathematics Pre-Test**
E. **California Short-Form Test of Mental Maturity**.
Predictive battery II contained the following instruments:

A. The **American College Testing Program**: *English Test*
B. The **American College Testing Program**: *Mathematics Test*
C. The **American College Testing Program**: *Social Studies Test*
D. The **American College Testing Program**: *Natural Science Test*.

In addition to the listed tests, each battery included predictors which were intended to provide some information regarding the type of high school from which the student was graduated and an indication of his socio-economic status. Since the school with which this study was concerned was a military one, it was felt that the success of any student might have been affected by his previous experience in a military situation. For this reason, it was noted whether the student was graduated from a military or a non-military high school. Also, the occupation of the student's father was classified on the **North-Hatt Occupational Prestige Scale**, which ranked the occupations according to prestige.\(^3\) This was done with the realization that the occupational level of the head of a household provided an indication of the family's standard of living as well as of its position within the community.

The achievement criteria were

A. Grade point average at the end of the first year of college

B. Grade point average in the following selected subject matter areas:
   1. Freshman Business Administration
   2. Freshman Biology
   3. Freshman Chemistry
   4. Freshman English
   5. Freshman Foreign Language
   6. Freshman Mathematics
   7. Freshman Military Schools Training
   8. Freshman Physics
   9. Freshman World History
  10. Sophomore English
  11. Sophomore Government
  12. Sophomore Military Schools Training
  13. Sophomore United States History

C. Grade point average at the end of the second year of college.

Purpose

This particular military school, much like schools everywhere, is beset with a number of varying problems having to do with the guidance of its students. The purpose of this study was to attempt to provide those who are responsible for this
guidance some additional tools with which to attack their problems and to provide helpful information which may facilitate their arrival at satisfactory solutions. Achievement of these purposes was attempted by endeavoring to successfully complete several tasks.

The multiple regression equations between the two predictive batteries and the several criteria were determined. These may prove to be of value to the faculty member who must help student advisees plan suitable college programs. These equations should give added meaning to the scores on the individual members of the batteries by providing the advisor with information concerning their relative predictive value.

Neither the giving of tests nor the taking of them is desirable strictly for its own sake. Students find test taking to be an exhausting experience and teachers are often annoyed when asked to spend extra time administering and scoring large numbers of tests. Only when it is possible to learn something from the results does testing become a valuable activity. Likewise, little is to be gained from the administration of a number of unnecessary tests within a battery or of additional batteries which only retest previously examined areas. Therefore, this study has attempted to determine the minimum number of instruments that will combine to give a significant coefficient of multiple correlation.

Admissions present a variety of problems at most colleges and this school is no exception. In addition to the usual
admission problems, this two-year school must deal with the fact that enrollment is limited and a number of applications have to be turned down each year. It is difficult for the admissions personnel at any school to decide who is to be accepted and who will be refused admission, but at this school some attempt must be made to select students who will remain for the full two-year program. In the typical year of 1964, 44 per cent of the freshman class withdrew at the end of the year, leaving the 1965 sophomore class smaller than was desired. It was felt that many of these withdrawals may have been at least partially due to difficulties arising from the military environment. The battery having the highest predictive validity, as determined by this study, should facilitate the admission of students whose academic success may be predicted with some degree of accuracy.

Hypotheses

The following hypotheses were developed and tested using the appropriate statistical procedures.

1. The value of the multiple $R$ found between the predictors in battery I and the criterion of grade point average at the end of the first year of college is significantly larger than the value obtained when a simple $r$ is determined between the best single predictor and the same criterion.

2. The value of the multiple $R$ found between the predictors in battery II and the criterion of grade point average
at the end of the first year of college is significantly larger than the value obtained when a simple \( r \) is determined between the best single predictor and the same criterion.

3. The value of the multiple \( R \) found between the predictors in battery I and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple \( r \) is determined between the best single predictor and the same criterion. The subject matter areas considered were

a. Freshman Business Administration
b. Freshman Biology
c. Freshman Chemistry
d. Freshman English
e. Freshman Foreign Language
f. Freshman Mathematics
g. Freshman Military Schools Training
h. Freshman Physics
i. Freshman World History
j. Sophomore English
k. Sophomore Government
l. Sophomore Military Schools Training
m. Sophomore United States History

4. The value of the multiple \( R \) found between the predictors in battery II and the criterion of grade point average in selected individual subject matter areas is significantly
larger than the value obtained when a simple $r$ is determined between the best single predictor and the same criterion. The subject matter areas considered were the same as those in hypothesis number three.

5. The value of the multiple $R$ found between the predictors in battery I and the criterion of grade point average at the end of the second year of college is significantly larger than the value obtained when a simple $r$ is determined between the best single predictor and the same criterion.

6. The value of the multiple $R$ found between the predictors in battery II and the criterion of grade point average at the end of the second year of college is significantly larger than the value obtained when a simple $r$ is determined between the best single predictor and the same criterion.

7. In each instance, the value of the multiple $R$ from battery I is significantly larger than the value of the multiple $R$ from battery II when using the same criterion.

The 5 per cent level of significance was used throughout.

Background and Significance of the Study

Test batteries are administered to beginning college students for a variety of reasons. However, the particular batteries which were listed earlier are administered primarily for the purpose of suggesting that the student select appropriate specific courses within a particular subject matter area. The individual members of the batteries were designed
to predict success in their specific areas and in the past their use has been confined to this primary function.

Evidence supporting the application of scores from tests which were administered before matriculation was found in a study undertaken at the United States Air Force Academy. O'Connor reported that cadet selection was partially based on a prediction of academic success which had been derived by correlating scores on the Scholastic Aptitude Test and the English Composition and Mathematics sections of the College Entrance Examination Board, with first year grade point average. Achievement in secondary school was also included in the predictor battery and a multiple correlation of .69 was obtained. When these instruments were included in the admissions program, the results were classes in which freshman losses for academic failure had totaled less than 4 per cent of each entering class.

Each faculty member at this Southwestern military school is responsible for the academic progress of some twenty advisees. It is necessary for him to help his students make wise decisions in such matters as course selection, course scheduling, and the number of courses to be attempted during any one semester. Often the faculty member needs additional

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information about the educational background of a student before he is able to make scheduling suggestions. In the past, individual scores on the above tests were often all that was available to the teacher, and there was very little information as to which test or combination of tests would best indicate the probable success of the new college student. This study has attempted to provide such information by discovering whether the multiple R's computed between the batteries and academic success, as indicated by grade point average, are significant.

Definitions of Terms

**Best Single Predictor** is that instrument which has the largest Pearson's product-moment coefficient of correlation when correlated with the chosen criterion.

**Grade Point Average** is an indication of academic achievement determined by multiplying the grade value (4.0 for A, 3.0 for B, 2.0 for C, 1.0 for D, and 0 for F) by the number of semester hours in each course attempted to get grade points; then, the grade points are summed and divided by the total hours attempted.\(^5\)

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\(^5\)New Mexico Military Institute, *Catalog* (Roswell, New Mexico, 1965), p. 73.
Multiple Correlation is a technique by which two or more predictors can be simultaneously correlated with a criterion.\(^6\)

Multiple R is the coefficient of multiple correlation.\(^7\)

Multiple Regression Equation is "the statistical device by which a number of predictors are combined to yield a single score having the highest possible correlation with a criterion."\(^8\)

Subject Matter Area includes all courses in a particular discipline which are taught at a given level.

Limitations of the Study

The study was limited to those male students who entered a Southwestern military school as college freshmen in the fall of 1964. Only those students whose permanent records contained information for each of the predictors were included. Nine students were excluded due to omissions in this section of their permanent records. The study was further limited by excluding eight students who remained at the school for less than one semester. Criteria from the first year of college considered all students who remained one semester or longer, while the criteria for the second year were limited to those students returning for the second year. Subject matter area grades


\(^8\)Ibid.
and their correlation with the batteries were studied only in those areas in which fifty or more students were enrolled. Grades in all courses were included in determining the correlation of the cumulative grade point average and scores on the predictive batteries.

**Basic Assumptions**

For the purpose of this study it was assumed that all tests administered by the guidance and counseling department of the school being considered were properly administered by qualified personnel. It was further assumed that grade point averages were an index of academic achievement.

**Summary**

The early portions of this chapter described the problem of this study as the examination of the relative predictive validities of two batteries with a number of selected criteria. The members of both predictive batteries were listed as were the criteria selected for study. The desirability of arriving at a single battery which would perform the dual purpose of predicting grade point averages and facilitating admission procedures was discussed as a purpose of the study.

The hypotheses indicated that each battery would produce a coefficient of multiple correlation which would be significantly larger than the coefficient of simple correlation between the best single predictor and the same criterion.
It was also hypothesized that battery I would produce a significantly larger coefficient of multiple correlation with the selected criteria than would battery II.

A portion of this chapter was devoted to the definition of several terms pertinent to a multiple correlational study. Also included were certain limitations and basic assumptions.
CHAPTER II

DESCRIPTION OF THE INSTRUMENTS
AND RELATED RESEARCH

The predictors used in this study may be divided into two groups, test predictors and non-test predictors. The test predictors were grouped into two separate batteries, battery I containing those tests administered under the direction of the school's guidance and counseling department during new cadet week and battery II which was composed of the four tests of the American College Testing Program. The two non-test predictors, the North-Hatt Occupational Prestige Scale and a dichotomized indication of the type high school from which the student had been graduated, were included in both predictive batteries. Descriptions of all predictive instruments used in this study are given in the following paragraphs.

The Cooperative English Tests

The Cooperative English Tests were written by a select committee and published by the Educational Testing Service. They were first published in 1937 and were revised in 1942, 1951, and 1960.¹ They were given in order to "measure

achievements of high school and college students in two fundamental English areas; reading and written expression.\textsuperscript{2}

The Cooperative English Tests are divided into Reading Comprehension and English Expression sections. At the school where this study was conducted only the English Expression section was administered. This section is divided into two parts, effectiveness and mechanics. The part dealing with effectiveness has thirty questions and is to be taken in fifteen minutes. The mechanics part has sixty questions and requires twenty-five minutes. All questions on both parts are multiple choice. There are provisions for testing English expression on six different levels but this study was only concerned with form 1C which is given to beginning college students.

Norms are available in the Technical Manual\textsuperscript{3} and the Manual for Interpreting Scores.\textsuperscript{4} The tables provide individual percentiles, medians, and first and third quartiles. The mean for the standardization group was 41.54, and the standard deviation was 11.53; both were reported in raw score units.

The reliability coefficient of .81 was obtained by determining Pearson's product-moment coefficient of correlation


between equivalent forms administered at the same level. The standard error of measurement of 4.69 was reported in raw score units.

A claim for predictive validity for the English Expression section was made at the University of Florida using 2,449 beginning college students. The coefficient of correlation, using a composite grade from all regular first semester freshman English tests as a criterion, was .67.\(^5\)

Jensen and Clark obtained a coefficient of correlation of .574 using 500 randomly selected freshman students. Their criterion was grade point average at the end of the freshman year.\(^6\) Webb and Goodling reported a coefficient of correlation of .30 with the criterion of first year grade point average. Their subjects were freshman students at Emory University.\(^7\)

The *Iowa Silent Reading Test*

The *Iowa Silent Reading Test* was written by H. A. Green, A. N. Jorgensen, and V. H. Kelley. It was first published in 1927 and was revised in 1931, 1939, and 1943. The test was


"designed to measure economically, accurately, and reliably the proficiency of pupils in high school and junior college in doing silent reading of the work-study type."*8

This test is composed entirely of multiple choice questions. A total of forty-five minutes of actual testing time is required, but it is suggested that at least an hour be allowed for its administration. It is divided into these seven subtests: Rate and Comprehension, Directed Reading, Poetry Comprehension, Word Meaning, Sentence Meaning, Paragraph Comprehension, and Location of Information.

Norms are available in the Manual of Directions.*9 These were based on the results of 3,600 entering freshmen at the State University of Iowa who took the 1939 edition of the test. The median was 181.1, and the standard deviation was 15.4; both were expressed as transformed scores.

The coefficient of reliability of .949 was determined by the split-half method. The standard error of measurement was two. Johnson included the Iowa Silent Reading Test in his predictive battery and reported its validity as having a coefficient of correlation of .46 with the criterion of freshman grade point average.*10 Garrett reported a coefficient of correlation of

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9Ibid., pp. 14-16.

.345 between the Iowa Silent Reading Test and the criterion of grade point average at the end of the freshman year. The subjects of his study were first-year nursing students.11

The Iowa Aptitude Test in Chemistry

The Chemistry Aptitude section of the Iowa Placement Examinations was written by G. D. Stoddard, L. W. Miller, and Jacob Cornog. The test first appeared in 1924 and was revised in 1930 and 1941. The revision of form A, which was included in this predictive battery, was done by Jacob Cornog and D. B. Stuit. The purpose of this section was "to measure the ability of the student to think in the field of chemistry."12

The Chemistry Aptitude section of this test is composed of 110 objective items which are to be answered in forty-seven minutes. The test is divided into four parts and while the parts are not named, each is designed to test a specific area. Part one is designed to measure skills in arithmetic and algebra; part two is concerned with the student's ability to change a verbal statement into an algebraic expression; part three is designed to measure his ability to read and comprehend facts in the field of chemistry; and part four is designed to measure

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the range of the information about chemistry already possessed by the student.

The norms for this test are contained in the Examiner's Manual. For the standardization group, the mean score was 57.0, and the standard deviation was 23.5. The coefficient of reliability, which was determined by the equivalent forms procedure was .963. The coefficient of correlation for predictive validity was reported as .50, with college chemistry grades at the end of the first semester being the criterion. The standard error of measurement was 3.04. Uhrbrock reported a coefficient of correlation of predictive validity of .601 when cumulative grade point average was used as the criterion.

The Cooperative Mathematics Pre-Test

The Cooperative Mathematics Pre-Test was written by the Committee on Tests of the Mathematical Association of America and was published by the Cooperative Test Division of the Educational Testing Service. Form X, which was administered to the subjects of this study, was first published in 1947. The test was given in order to "furnish a supplemental means of checking on classification in appropriate mathematics courses."^15


This test has only one section and is composed of forty multiple choice questions to be answered in forty minutes. The questions are designed to measure the student's knowledge of algebra and geometry at the elementary and intermediate levels.

The test has no accompanying manual of instructions but norms for beginning college students are available from the publisher. The coefficient of reliability was determined by the split-half method and was reported as being .90. The coefficient of correlation for predictive validity was .50, using first semester mathematics grades as the criterion. Boyce used college algebra students as subjects and reported that the Cooperative Mathematics Pre-Test produced a coefficient of correlation of .41 with grade point average in college algebra.

The California Short-Form Test
of Mental Maturity

The California Short-Form Test of Mental Maturity was written by Elizabeth T. Sullivan, Willis W. Clark, and Ernest W. Tiegs. The original edition of the test was constructed in 1938. It was completely revised in 1957 and again in 1963. In the 1963 edition the number of items was reduced to 120 and the testing time was reduced from fifty-two minutes to

16Ibid., p. 5.

thirty-nine minutes. The purpose of this test was to provide "information about the functional capacities that are basic to learning, problem-solving, and responding to new situations."18

The test is composed of seven areas, Opposites, Similarities, Analogies, Numerical Values, Number Problems, Verbal Comprehension, and Delayed Recall. The first four areas are combined to give a non-language score; the last three areas produce the language score. Each of the first three sections has a four-minute time limit; the Number Value and the Verbal Comprehension sections each require five minutes; the Delayed Recall section is to be completed in six minutes; and the Number Problems section has a seven-minute time limit. All 120 questions are multiple choice. Administration of the test can provide a language score, a non-language score, and a total score; however, only the total score was used in this study.

Norms were developed for this instrument by using 38,793 students from various sections of the United States. Tables reporting these norms are in part four of the Examiner's Manual. The mean was 60.8, and the standard deviation was 17.7; both were reported in raw score units.19


The coefficient of reliability of the California Short-Form Test of Mental Maturity was .91 and was determined by the split-half method. The standard error of measurement was 5.3 raw score units. The Technical Report for the 1963 edition did not provide a coefficient of correlation of predictive validity. However, a coefficient of correlation of .94 between the 1963 and the 1957 forms was reported. Warren obtained a coefficient of correlation of .61 between the 1957 form of the California Short-Form Test of Mental Maturity and English grades. With the criterion of mathematics grades this coefficient of correlation was .58 and was .45 when correlated with cumulative grade point average. Barry and Jones reported that when the 1957 form of the California Short-Form Test of Mental Maturity was used as a predictor of college achievement, the coefficient of correlation was not significant at the 5 per cent level. When they compared those students who were in the upper 20 per cent of their class with those who were placed on academic probation, the coefficients of correlation between the test and the academic records of the talented students were positive. These values for the probationary students were negative.

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20 Ibid., p. 25.


The *American College Testing Program*

Predictive battery II contained all four tests of the *American College Testing Program*. Four committees, one for each of the sections, developed this instrument. The tests were first used in 1959 and have undergone frequent revision. This program was given in order to provide information about the student, his high school achievement, and his college potential.\(^{23}\)

The English usage section is an eighty item, fifty minute test which is designed to measure the student's understanding and use of those elements basic to effective writing. In this, as well as in the three other tests, all questions were multiple choice. The equivalent form, split-half, and test-retest methods were used to determine the reliability coefficients for all four of the tests in the *American College Testing Program*. For the English test these values ranged from .84 to .90, with a mean of .89. The median standard error of measurement was 1.54, with a range of 1.45 to 1.89. The predictive validity of this test, using first semester college English grades as a criterion, had a coefficient of correlation of .498.\(^{24}\)

The mathematics usage section is a forty item, fifty minute test and is designed to measure the student's mathematical reasoning ability. This test had a mean reliability coefficient of .88; the range of values was from .85 to .89. The standard error of measurement had a median value of 2.20, with a range

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\(^{24}\)Ibid., p. 17.
of 2.00 to 2.57. The predictive validity, using first semester college grades as the criterion, had a coefficient of correlation of .374.\footnote{Ibid.}

The social studies reading section is a fifty-two item test with a time limit of forty minutes. This section is designed to measure the evaluative reasoning and problem solving skills necessary for social studies. The reliability coefficient ranged from .82 to .86, with a median value of .84. The standard error of measurement had a range of 2.01 to 2.55 and a median value of 2.15. The predictive validity, using first semester college social studies grades as a criterion, had a coefficient of correlation of .466.\footnote{Ibid.}

The last section in the American College Testing Program is the natural science reading test. This test, which has fifty-two items and is to be completed in forty minutes, was designed to measure the critical reasoning and problem-solving skills required in the natural sciences. The mean reliability coefficient of this test was .84 with a range of .82 to .87. The standard error of measurement ranged from 2.12 to 2.45 and had a median value of 2.34. The predictive validity, using first semester college grades as a criterion, had a coefficient of correlation of .374.\footnote{Ibid.}

Boyce reported a coefficient of correlation of .25 when the American College Testing Program: Mathematics Test was 

\footnotesize{\textsuperscript{25}Ibid. } \textsupersize{\textsuperscript{26}Ibid. } \textsupersize{\textsuperscript{27}Ibid.}
used as a predictor of grade point average in freshman college algebra. Foster and Danskin conducted a very extensive evaluation of the American College Testing Program as a predictor of college grade point averages. They found that the various tests within the program produced coefficients of correlation ranging from .40 to .60 with grade point average in their respective subject matter areas. Their study also reported that for male freshman students the coefficient of multiple correlation between the tests within the American College Testing Program and the criterion of first semester grade point average was .607. This multiple R increased to .775 when high school rank was added to the predictive battery.

The norms for this series of tests are available in the Technical Report. The test raw scores were converted to a standing and score scale which had a range of 1 to 36. For college preparatory high school seniors, the median score was 2.0, and the standard deviation was 5.0.

Non-test Predictors

In addition to the predictive tests which have been described, both predictive batteries contained two non-test

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measures. The first of these was a dichotomized indication of the student's graduation from a military or a nonmilitary high school. The second was the North-Hatt Occupational Prestige Scale.

For the purposes of this study, each student was classified as either a graduate of a military high school or a graduate of a nonmilitary high school. Students were classified in this way in an attempt to determine the extent to which previous experience in a military environment would correlate with academic achievement at a military school.

It was not possible to locate any other study which had classified the subjects on such a basis; however, the use of another dichotomized predictor was reported by Vineyard. In his study, the students were classified according to sex, and he discovered the existence of significant differences between the best types of predictors of success for males and for females.

The North-Hatt Occupational Prestige Scale was devised at the National Opinion Research Center by Cecil C. North and Paul K. Hatt. Few empirical studies have achieved the high position of this instrument in the scientific literature of sociology. This scale, which attempts to rate the prestige of eighty-eight


occupations, was derived on the basis of interviews which were conducted with 2,920 people during March, 1947. The individuals to be interviewed were selected from four geographical regions of the United States, four different population concentrations, eight different occupational levels, three different age groups, four different educational backgrounds, three different economic levels, and both sexes.

Although the scale contains ninety items, only eighty-eight separate occupations are actually included. The construction of the scale explained this difference. It included two pairs of identical occupations which were described differently in order to check the consistency of the rater. The first member of one pair was described as an instructor in the public schools; its partner was called public school teacher. The second pair consisted of automobile repairman and garage mechanic. The raters were consistent enough that no significant difference was discovered for these items. The scale was so arranged that the high prestige occupations were assigned the low numbers.33

One indication of the reliability of the scale was reported in a study by Inkeles and Rossi34 in which this scale was used to determine the prestige of occupations in the United States.

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33Ibid., pp. 62-64.

Japan, Great Britain, U.S.S.R., New Zealand, and Germany. When intercorrelations between the ratings from various countries were computed, it was found that twelve of the fifteen coefficients of correlation exceeded .90. The smallest of the fifteen coefficients was .74 between U.S.S.R. and Japan; the largest was .97 between Germany and Great Britain. In 1950, the mean occupational prestige was reported by Shartel as being 59.5.35 No studies using the North-Hatt Occupational Prestige Scale as a predictor of academic success were available.

Multiple Correlation

The literature included a number of studies which made use of the techniques of multiple correlation. These techniques assured an increase in the coefficient of correlation for each increase in the number of predictors in the battery. However, the size of this increase was not always significant and several studies found that one or more members of the predictive battery could be deleted without significantly decreasing the size of the coefficient of multiple correlation. A number of studies containing detailed procedures for each step in the determination of the coefficient of multiple correlation and for the construction of the accompanying multiple regression equation were helpful to this study.

Most of the studies determined coefficients of multiple correlation in an attempt to discover the predictive validity of a battery of objective predictors. Often these predictors were college entrance examinations and the criterion was college grade point average. One excellent source of information about multiple R and its ability to increase validity when predicting academic success was provided by Johnson. His detailed example of a University of Minnesota study used 213 agriculture students as subjects. The criterion, grade point average, was measured on a scale using 4.0 for A, 3.0 for B, 2.0 for C, 1.0 for D, and 0 for F. The five predictors were age, the Iowa Silent Reading Test, the Otis Quick-Scoring Mental Maturity Test, previous education, and the School of Agriculture Reading Test. The resulting multiple R was .7096, which was significant at better than the .01 level.36

Hertel and De Vesta37 also studied students at an agricultural college. They used a test battery containing the Ohio State Psychological Test, the Cooperative Mathematics Pre-Test, and the Cooperative Natural Science Test. The criterion was first term average expressed as a percentile range as follows: 90-99, 80-89, 70-79, 60-69, and below 60. The best single


predictor of this criterion was the Ohio State Psychological Test which produced a coefficient of correlation of .447. The coefficient of multiple correlation between the predictive battery and the criterion was .57, which was significant at better than the one per cent level but failed to reach the level of significance of the R reported by Johnson.\textsuperscript{38}

Holland, who limited his studies to National Merit Scholars, obtained a coefficient of multiple correlation of .156 between his two predictors, the Scholastic Aptitude Test and high school class rank, and the criterion of first semester grades.\textsuperscript{39}

MacLachlan and Burnett, in attempting to identify the superior freshman, obtained a coefficient of multiple correlation which was significant at the one per cent level. Their predictors were the Ohio State Psychological Examination subsections and first quarter grade point average was the criterion.\textsuperscript{40}

Boyce and Paxson used a large battery of predictors in an attempt to estimate the predictive values of tests on a local level. They administered a battery of eleven predictors to 100 freshman general education students at Troy State College, Alabama. These eleven predictors were the American College Testing Program, the California Test of Mental Maturity, the

\textsuperscript{38}Johnson, op. cit.

\textsuperscript{39}J. C. Holland, "Prediction of Scholastic Success for a High Aptitude Sample," School and Society, LXXXVI (June 21, 1956), 290-293.

\textsuperscript{40}P. S. MacLachlan and C. W. Burnett, "Who Are the Superior Freshmen in College?" Personnel and Guidance Journal, XXII (February, 1954), 345-349.
California Capacity Questionnaire, the American Council on Education Psychological Examination for College Freshmen, the Cooperative School and College Ability Tests, the College Entrance Examination Board Scholastic Aptitude Test, the College Qualification Test, the Rokeach's Dogmatism Scale, the California F Scale, the Cree Questionnaire, and the California Achievement Tests. First quarter grade point average was used as the criterion measure. The multiple R's obtained for the various predictors ranged from .482 for high school grades to .365 for American College Testing Program scores.41

In contrast to some studies in which unrelated measures were incorporated into a predictive battery, Jex and Sorenson studied the subsection scores of a single instrument, the General Aptitude Test Battery, as predictors of college grades. The coefficient of multiple correlation between this battery and the criterion of first quarter grade point average was .41.42

Jensen and Clark used a random procedure to select the 500 students to be used in their study from the 1957 freshman class at Brigham Young University. Their predictive battery consisted of the subsections of the Cooperative English Tests.


They obtained a coefficient of multiple correlation of .574 between this battery and the criterion of freshman grade point average.43

Interest in the prediction of college achievement has been extremely high. Travers and Wallace administered this large battery of predictors: the American Council on Education Psychological Examination, the MacQuarrie Test for Mechanical Ability, the Bennett Test of Mechanical Comprehension, the Revised Minnesota Paper Form Board Test, the Interpretation of Reading Materials in Natural Science: College Level, the Tests of General Educational Development, and the Cooperative English Test: Effectiveness of Expression. The coefficients of multiple correlation obtained with the criteria of grade point averages for the 1947 and the 1948 classes were not in agreement. The difference between the two values was significant at the 5 per cent level. They cautioned that results of studies which use grade point average as a criterion must not be applied indiscriminately because the values of the coefficients of correlation were not constant from year to year.44

Samenfeld reported that the Ohio State Psychological Examination combined with high school percentile rank to give a


coefficient of multiple correlation of .68 when using first year grade point average as a criterion.45

Not all studies used grade point average for the criterion. After giving the Minnesota Multiphasic Personality Inventory to 281 freshman students at New Mexico State University, Himelstein used the following seven subscales as predictors: Academic Achievement, College Achievement, Graduate School Potential, Honor Point Ratio, Intellectual Efficiency, Originality, and Underachievement. Scores on the American College Testing Program and grade point average were used as co-criteria. Six of the seven subscales correlated positively with both of these criteria. Intercorrelations were given, and the multiple R was computed but was not reported.46

In a study of predictive validity, Swanson and Berdie reported on results obtained at the University of Minnesota using 620 freshman college students all of whom were 1960 graduates of Minnesota high schools. The researchers had a file on each subject which contained results of the following instruments: high school percentile rank; Minnesota Scholastic Aptitude Test; Cooperative English Test, Form Z; Institute of Technology Mathematics Test; subscale and composite scores on


the American College Testing Program; and both the Verbal and the Mathematical sections of the College Entrance Examination Boards. The intercorrelations among the predictors were computed and the best single predictor was the Institute of Technology Mathematics Test which had a coefficient of correlation of .63 with the criterion of first quarter grade point average. The best combination of predictors was the Institute of Technology Mathematics Test and high school percentile rank which had a coefficient of correlation of .66. The addition of other scores did not increase this value significantly.47

Anderson and Stegman administered the following battery to beginning freshmen at Kansas State University: the American Council on Education Psychological Examination for College Freshman, the American Council on Education Cooperative Biology Test, the Cooperative General Achievement Test, the Schramm-Gray High School and College Reading Test, the Barrett-Ryan English Test, a 100-item test in physical science, and a 40-item test in modern civilization. The best single predictor of freshman grade point average was the Barrett-Ryan English Test, which produced a coefficient of correlation of .563. The coefficient of multiple correlation was .667.48


In a study using Michigan State University freshman, Jackson found that increasing the size of a predictive battery does not always increase the coefficient of correlation. His Pearson's product-moment coefficient of correlation of .50 between the Michigan State Reading Test and freshman grade point average was not increased by the addition of three other predictors, the American Council on Education Psychological Examination, and locally constructed English usage and arithmetic proficiency tests.

Webb and McCall made use of 180 freshman students in their study which used the Mathematics, Verbal, and English sections of the College Entrance Examination Board and the Cooperative English Test: Total Reading as predictors. They obtained a coefficient of multiple correlation of .790 with the criterion of first year grade point average.

In an attempt to predict grade point averages, Spaulding used the following battery of seven predictors: The Verbal, Information, Number, and Total scores on the College Qualifying Test; the Verbal, Mathematical, and Total scores on the Scholastic Aptitude Test; and the Ohio State Psychological Test. The subjects were 208 female students who had entered

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Colby Junior College in the fall of 1957. Approximately half of these were liberal arts students; the others were in the vocational program. The criterion of grade point average was computed from a scale on which a value of 11 was assigned to A, 10 to A-, 9 to B+, and on down to 0 for F. The best single predictor was the Ohio State Psychological Test which had an r of .42; the multiple R was .633.51

Webb and Goodling also used the Ohio State Psychological Test in their battery of predictors. The other members of their battery were the Cooperative English Test, the Cooperative General Culture Test, the Minnesota Multiphasic Personality Inventory, the Guilford-Zimmerman Temperament Survey, and the Strong Vocational Interest Blank. A reduced battery containing only the Cooperative English Test: Total English and the Cooperative General Culture Test: General Culture produced a coefficient of multiple correlation of .617 with the criterion of first semester grade point average.52

The subjects of Vick and Hornaday's study at Greensboro College were 164 women who entered in the fall of 1960. A battery of thirteen predictors was used; the criterion was grade point average at the end of the first year. The predictors


were the Verbal and Mathematical scores on the Scholastic Aptitude Test; the Verbal, Quantitative, and Total converted scores on the Cooperative School and College Ability Test, Form 1A; high school rank converted to a T-score; and high school grade point average. A multiple R of .71 was obtained using only the Cooperative English Test scores and converted high school rank. A non-significant increase of .02 was obtained by the addition of the remaining predictors.53

Michael, Haney, and Brown also limited their study to female subjects. However, their entire sample was composed of nursing students rather than the diversified sample used in the Greensboro study or the liberal arts and vocational students of the study at Colby. Although a large predictive battery was listed, no coefficients of multiple correlation were reported.54

Garrett used student nurses as the subjects of his study too. His battery contained the Ohio University Psychological Test, the Iowa Silent Reading Test, the George Washington University Series: Arithmetic Test for Prospective Nurses, the Minnesota Vocational Test for Clerical Workers, the MacQuarrie Test for Mechanical Aptitude, the Shipley-Harford Retreat Scale,

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and high school average. The best single predictor of grade point average at the end of the first year of training was the Iowa Silent Reading Test, which produced a coefficient of correlation of .345 with this criterion. A reduced battery composed of high school average, the Iowa Silent Reading Test, the George Washington University Series: Arithmetic Test for Prospective Nurses, and the Minnesota Vocational Test for Clerical Workers was obtained by excluding those predictors which did not reach the chosen significance level of 5 per cent when entered into the statistical procedure. The coefficient of multiple correlation between this reduced battery and the criterion was .641.55

While the previous studies considered overall academic success, many limited their study to a specific subject matter area. C. F. Meizbacher correlated his predictive program with the single criterion of first semester chemistry grades. He found that only two of this battery of seven measures were significant predictors of success in freshman chemistry. The quantitative section of the A.C.E. and the science section of the Iowa High School Content Examination produced a multiple R of .559 with the criterion.56

Boyce also attempted to predict grades in a subject matter area. His predictive battery contained the Cooperative

55Garrett, op. cit.

56C. F. Meizbacher, "Correlation Between Freshman Testing Program and First Semester Chemistry at San Diego State College," Journal of Chemical Education, XXVI (September, 1949), 466-467.
Mathematics Pre-Test for College Students, the School and College Ability Tests: O-Scores and the American College Testing Program: Mathematics Test. The best single predictor of college algebra grades was the Cooperative Mathematics Pre-Test, which produced a coefficient of simple correlation of .41 with this criterion. A coefficient of multiple correlation of .54 was obtained between the complete battery and the same criterion.57

The batteries used in the preceding studies were, for the most part, composed of aptitude and achievement tests. R.M.W. Travers suggested that such tests may be an inadequate basis upon which to predict success.58 Sopchak administered a battery composed of high school average expressed as a percentile, scores of the California Reading and Language Tests, three American Council of Education scores, and the Rorschach results. The criterion of college performance was based on grade point average with A receiving the value of 3.0. The intercorrelations produced were most interesting. The ACE, California tests, and high school grades correlated highly with each other and were found to be good predictors of college success. However, the use of all three did not significantly increase the level of significance over the use of any one of them as a predictor.


The scores on the Rorschach had very low correlation with its co-predictor of high school grades and would, therefore, appear to be concerned with a different type of behavior than the other three highly correlated measures. The score of the Rorschach did not contribute significantly to the predictive validity of the battery, nor was it successful in such prediction when considered by itself.\(^{59}\)

In a study which may have been more typical of the normal battery, Henderson selected 299 subjects from the 1964 freshman class at Hofstra College. His predictive battery consisted of the American Council of Education Psychological Examination for College Freshman (1952) and Cooperative Reading Test (C-2 Form I); The New York State Regents Examination; and high school academic record. For his study, Henderson made use of three criteria: first semester grade point average, second semester grade point average, and cumulative grade point average for the entire first year. Intercorrelations among the predictors were computed for each criterion as was the correlation among the three criteria. The best single predictor was the Cooperative Reading Test and its predictive value was as high as that of the entire battery for first semester grades. However, the value of the R from the battery was significantly

greater when second semester and cumulative grades were being considered.60

Henderson and Masten also provided the details of a similar study which was conducted at the same school. This study used 332 students who entered a New York State college. Scores were obtained for each student on all of these items: The New York State Regents Examinations, the Cooperative Reading Test (C-2 Form Y), the Cooperative Effectiveness of Expression Test (Form B2), the American Council of Education Psychological Examination for Freshmen (Form 1952), and a percentile expression of grades at the end of the freshman year. It was found that the English section of the Regents Examination and the Cooperative Effectiveness of Expression Test could be eliminated from the battery without significant reduction of the multiple R. The value of the R from this reduced battery was .673.61

Vineyard's study is of particular interest because the predictive instrument was administered several years before the criteria information was collected and because the results differed between the sexes. The subjects were 108 students who entered Panhandle Agricultural and Mechanical


College in the fall of 1953 or 1954 and subsequently completed two semesters of work. All of these students had taken the Differential Aptitude Test several years earlier, when they were high school freshmen. The following eight sections of that test were used as predictors: Verbal Reasoning, Numerical Ability, Abstract Reasoning, Space Relationships, Mechanical Reasoning, Clerical Speed and Accuracy, Spelling, and Sentences. The criterion was grade point average at the end of the first year.

The means, standard deviations, and intercorrelations were computed and a multiple R was determined. Those members which could be eliminated without significantly decreasing the R were found to be different for the boys than for the girls. The reduced battery for the boys consisted of the Clerical Speed and Accuracy, Verbal Reasoning, Abstract Reasoning, and Numerical Ability sections. The multiple R was .631. For the girls the reduced battery substituted Spelling for the Clerical Speed and Accuracy section of the boys' battery. The multiple R for the girls was .563. 

Summary

This chapter was divided into two sections. The first contained a description of each instrument used in the study.

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and such information as was necessary to establish its predictive validity. The second section contained the reviews of several studies which had used multiple correlation in an attempt to establish the validity of a predictive battery.

The reported studies have provided some indication of the usefulness of multiple correlation by giving information relative to the size of the R's obtained and by suggesting applications of the technique. The largest value to be found in these studies was .79. Although the researcher cannot expect such significant results in every case, the multiple R value was more meaningful in ten of the twenty-five reported studies than was any single instrument from the battery. The literature indicated a widespread use of precollege tests. Two of the most popular were the American College Testing Program and the American Council on Education Psychological Examination. These predictors were either used individually or incorporated into a battery. When used individually, the R's obtained by correlating the subscores with the criterion were significant. However, this significance was augmented considerably when they were combined with several other valid instruments into a predictive battery.

\[^{63}\text{Webb and McCall, op. cit.}\]
CHAPTER III

PROCEDURES FOR THE COLLECTION AND
TREATMENT OF THE DATA

Description of the Subjects

The subjects of this study were selected male members of the 1964 college freshman class of a Southwestern military school. This school accepted young men who were in the final three years of high school—tenth, eleventh, and twelfth graders; and the first two years of college—freshmen and sophomores. Enrollment was limited to 965 full-time cadets, all of whom were required to live on the campus and conform to the prevailing military environment. Each year the students are distributed almost equally between the high school and college divisions. Nearly every state and many foreign countries were represented in this freshman class. Most of the students who were from other countries were United States citizens who had been living abroad; however, some were citizens of the foreign country from which they came. Although most of the students came from the upper-middle socio-economic level, students from all class and income groups were a part of the sample.

The official records of the school registrar classified 282 students as freshmen in 1964. However, not all of these students were included in this study. Fifty-one of these were
left out of the sample because, in spite of their freshman status, they were actually second-year students who had not accumulated enough hours to be classified as sophomores. Eight were excluded because they did not complete at least one full semester at this school. Finally, it was not possible to study those nine students whose records failed to provide scores on all of the predictive instruments. The two foreign national students were retained in the sample because they were products of United States high schools. The resulting sample included a total of 214 military school students who had entered as freshmen in the fall of 1964 and were administered the predictive instruments.

Description of the Criteria

All three of the criteria used in this study were measures of academic achievement. The first criterion was freshman cumulative grade point average. This was determined by multiplying the number of grade points earned in the various courses (4.0 for A, 3.0 for B, 2.0 for C, 1.0 for D, and 0 for F) by the number of credit hours received for the courses. Then, the sum of these values was divided by the total number of hours attempted.

The second criterion was grade point average in selected subject matter areas. Zwilling's method\(^1\) of combining courses

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into these subject matter areas was used. These areas consisted of all the courses within a particular discipline which were taught at the same level. According to this method, algebra, trigonometry, geometry, and integrated mathematics were all considered together as freshman mathematics. Grade point average for each subject matter area was computed in the manner described above, using the grades from all courses within an area at a given level.

The third criterion, cumulative grade point average at the end of the sophomore year, was computed in the same manner as the freshman cumulative grade point average.

Procedures for Collection of Data

Scores on all of the predictive tests were obtained from the official records of the school where the subjects were enrolled. The tests in predictive battery I were given under the direction of the school's department of guidance and counseling. For testing purposes the students were divided into groups of about twenty-five boys. In order to make the most effective use of available administrators, different groups did not take the tests in the same order. However, all groups completed the entire testing program during the designated week.

Prior to his admission, the applicant must complete the American College Testing Program and request that a report of his scores be made available to this school. This examination is offered at convenient locations several times each year.
All administrators are approved by the publishing organization. Scoring is done by the publisher, and scores are provided to those schools previously indicated by the student.

Information concerning the type of high school from which the student was graduated appeared on his official transcript. With two exceptions, the military school graduates were products of the high school division of the school where this study was conducted.

In order to properly rank the fathers of the students on the North-Hatt Occupational Prestige Scale, it was necessary to determine the father's occupation. This information was obtained from the permanent records of the various administrative offices of the school.

Procedures for Treatment of the Data

The official records provided a raw score for the Cooperative Mathematics Pre-Test, a percentile band for the Cooperative English Test: English Expression, a percentile for the Iowa Aptitude Test in Chemistry, Intelligence Quotients for the California Short-Form Test of Mental Maturity, and a standard score for the Iowa Silent Reading Test. However, some of these forms of the test scores were not acceptable to the statistical procedure which was used in their treatment, making it necessary to obtain workable raw scores.

Raw scores for the Cooperative English Test: English Expression were taken directly from the test answer sheets. The
norms table was used to convert the Iowa Aptitude Test in Chemistry percentiles to raw scores. The students' profile sheets provided raw scores for the California Short-Form Test of Mental Maturity. The Iowa Silent Reading Test results were entered into the statistical procedure as standard scores which are more representative of the total performance of the student on all parts of the test. The standard scores for this instrument were so constructed that the mean score was 166, the standard deviation was 16, and the standard error of measurement was two.²

Standard scores of the four sections of the American College Testing Program were obtained directly from the official records. These scores were designed on a scale having a range of 1 to 36, a mean of 20 for college-preparatory high school seniors, a standard deviation of 5, and a standard error of measurement of one. All research reports issued by the publisher indicated the effectiveness of standard scores when these tests were used as predictors. For this reason, standard scores were entered into the statistical procedure and no attempt was made to convert to another form.

In order to facilitate the handling of the data as it was being collected, all information was entered on two master work sheets, one for each battery. Each work sheet included the converted scores of all predictive members, grade point averages

in the selected subject matter areas, and cumulative grade point averages at the end of the first and the second years of college for each student.

The statistical treatment of the data used standard techniques for the determination of the following information: the means and standard deviations of all predictor variables, the means and standard deviations of all criteria, the intercorrelations among all the predictors and the various selected criteria, and the standard errors of measurement.

The values thus obtained were entered into the equation for the determination of the coefficient of multiple correlation. This equation, as described by McNemar, used only two independent variables but may easily be expanded to include as many as necessary.

\[
R = \frac{r_{12}^2 - r_{13}^2 - 2r_{12}r_{13}r_{23}}{1-r_{23}^2}
\]

In the equation, \( R \) represented the coefficient of multiple correlation between the criterion and the independent variables taken together. Additionally, \( r_{12} \) represented the coefficient of correlation between the criterion and the first independent variable, \( r_{13} \) represented the coefficient of correlation between the criterion and the second independent variable, and \( r_{23} \)

---

represented the coefficient of correlation between the two independent variables.

The $\beta$ weights, which were necessary to the determination of the multiple regression equation, were computed again using the intercorrelations previously determined: 4

$$\begin{align*}
\beta_2 &= \frac{r_{12} - r_{13}r_{23}}{1-r_{23}^2} \\
\beta_3 &= \frac{r_{13} - r_{12}r_{23}}{1-r_{23}^2}
\end{align*}$$

Here, $\beta_2$ represented the weighting factor which is applied to scores on the first independent variable and $\beta_3$ represented the same factor for the second independent variable. These weights were used to develop this multiple regression equation: 5

$$z_1 = \beta_2 z_2 + \beta_3 z_3$$

which used scores on two variables to predict success. The predictor scores were converted to $z$ scores with this formula:

$$z = \frac{X-M}{S.D.}$$

where $X$ represented the score on the predictor, $M$ its mean, and $S.D.$ its standard deviation.

A variation of this multiple regression equation was utilized in this study to predict grade point averages for the selected criteria. This variation required the conversion of the beta weights from the previous equation to $b$ weights or normative coefficients. The formula for this conversion was

4 Ibid., p. 173.  
5 Ibid.
given by DuBois.\(^6\) His procedure converted each z score back to the raw scores by inserting the z score into the conversion formula:

\[
\frac{X_1 - M_1}{S_1} = 2 \frac{X_2 - M_2}{S_2} + 3 \frac{X_3 - M_3}{S_3}
\]

then multiplying both sides of the equation by the standard deviation of the criterion measure to obtain this multiple regression equation:

\[
X_1 = b_2(\text{raw score on predictor 1}) + b_3(\text{raw score on predictor 2}) + K.
\]

The constant, K, was obtained by solving the following equation:

\[
K = M_0 - \beta_1 \frac{S_0}{S_1} M_1 - \beta_2 \frac{S_1}{S_2} M_2
\]

where \(M_0\) was the mean of the criterion, \(\beta_1\) was the beta weight for predictor one, \(S_0\) was the standard deviation of the criterion, and \(S_1\) was the standard deviation of the first predictor. The values in the third term were similar. This equation may be expanded to include as large a battery as is desired.\(^7\)

The above multiple regression equation produced a score for the criterion measure. A range of values could be created by adding or subtracting the standard error of measurement to this predicted score which would, according to the laws of probability, include the actual score of a student 68 per cent of the time.


\(^7\)McNemar, *op. cit.*, p. 173.
Once the coefficient of multiple correlation had been determined, its significance was established by the use of an F test. The equation, taken from McNemar, for this procedure was:

\[
F = \frac{R^2/m}{(1-R^2)(N-m-1)}. \]

In this equation \( R^2 \) represented the square of the coefficient of multiple correlation, \( m \) the number of independent variables, and \( N \) the number of students. The computed value of \( F \) was converted to a probability value by reference to an \( F \) table such as was found in the appendices of most statistical textbooks. The procedure that tested for a significant increase of the coefficient of multiple correlation over that of the best single predictor also used an F test. However, in this procedure a different formula was used:

\[
F = \frac{(R_1^2-r_2^2)/(m_1-m_2)}{(1-R_1^2)/(N-m_1-1)}. \]

Here \( R_1^2 \) represented the square of the coefficient of multiple correlation, \( r_2^2 \) the square of the simple correlational coefficient, \( m_1 \) the number of predictors in the complete battery, \( m_2 \) the number of predictors in the reduced battery, and \( N \) the number of students in the sample. This formula was an adaptation of the one used by McNemar to determine the significance of the difference between two multiple correlations.\(^9\)

---

\(^8\)Ibid., p. 283.  \(^9\)Ibid., p. 284.
Available statistics textbooks failed to yield a procedure for testing the significance of the difference between the coefficients of multiple correlation for two different batteries. However, DuBois' description of multiple correlation indicated that these coefficients could be compared in the same manner as coefficients of simple correlation.

Like all other types of correlation, a multiple correlation shows the relationship between two and only two variables. It is a product-moment correlation which (with considerable unnecessary effort) could actually be computed by means of a basic formula for r. It is the correlation between an unmodified variable (the "dependent variable" or "criterion") and a second variable consisting of the weighted sum of scores in two or more "independent" or "predictor" variables (the weights of which are such that the correlation of the sum variable with the unmodified criterion is at a maximum for the particular sample of observations used in computing it).10

On this basis, Fischer's r to z transformation was used to compare the significance of the difference between the values obtained. This comparison was summarized by the equation

\[
C.R. = \frac{z_1 - z_2}{\frac{1}{N_1 - 3} + \frac{1}{N_2 - 3}}
\]

where C.R. was a critical ratio, \( z_1 \) was \( R_1 \) transformed to \( z \) scores, \( z_2 \) was \( R_2 \) transformed to \( z \) scores, and \( N \) was the number of students in each sample.11

The actual statistical computations necessary for the determination of the coefficient of multiple correlation and

10DuBois, op. cit., p. 165.
11McNemar, op. cit., p. 140.
the construction of the multiple regression equations was
done at the computer center at North Texas State University.
The determinations of the F levels necessary to the testing
of the hypotheses were done on a machine calculator. The F
tables used in this study were found in the appendix of *Psych-
ological Statistics*.*

Summary

Chapter III contains descriptions of the students, cri-
teria, and research methods employed in this multiple correla-
tion study. The students were members of the 1964 freshman
class at a Southwestern military school. Indications of
academic achievement, based upon grade point averages, were
used as criteria. Various research techniques were required
in order to most efficiently gather and compose the pertinent
data.

Information concerning the involved students was avail-
able in the school's permanent records. Of interest to this
study were the occupations of the students' fathers and an
indication of whether the student had been graduated from a
military or non-military high school. Also required were
scores on the instruments which comprised the test batteries.
Those in battery I were the Cooperative English Test; English
Expression, the Iowa Silent Reading Test, the Iowa Aptitude

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12DuBois, op. cit.
Test in Chemistry, the Cooperative Mathematics Pre-Test and the California Short-Form Test of Mental Maturity. Battery II was composed of the four sections of the American College Testing Program.

The last portion of this chapter describes the procedures used to convert the test scores to a form that could be used in a computerized stepwise multiple regression analysis. Also described here are the procedures used in determining the coefficient of multiple correlation and for obtaining the multiple regression equation.
CHAPTER IV

RELATIONSHIPS AND INTERCORRELATIONS AMONG THE PREDICTORS AND CRITERIA INCLUDED IN PREDICTIVE BATTERIES I AND II

The method used for obtaining the statistical data pertinent to this study was a stepwise multiple linear regression analysis. The first products of this procedure were the means and standard deviations of all variables, both predictor and criterion. The next step determined the intercorrelations between the various predictors and the criteria. At this point the procedure became selective and combined the predictor having the highest value of simple correlation with the second most significant predictor, although not necessarily the one with the next best r. The procedure then applied an F test of significance to the newly obtained R and continued the selection process until the rank order and significance of all the predictors had been established. Finally, a multiple R for the entire battery was computed. The procedure also yielded the standard error of measurement at each step and the data necessary for the construction of a multiple regression equation.

The point at which the addition of another predictor did not significantly increase the value of R was determined by the application of an F test after the addition of each predictor.
The procedure then repeated the selection process for each criterion, stopping when the level of significance for the next predictor failed to reach the previously chosen 5 per cent level of confidence.

All data were summarized and presented in tables which were arranged in the same order as the hypotheses being tested.

**Criterion of Freshman Grade Point Average**

In Table 1 are contained the means and standard deviations of all independent and dependent variables. Also included here are the intercorrelations among the various predictors and with the selected criterion of grade point average at the end of the first year of college. All predictor tests correlated positively with each other and with the criterion. All intercorrelations were significant at better than the 5 per cent level.

This, however, was not true of the non-test members of the battery. The dichotomized variable regarding graduation from a military or non-military type high school, using a scale in which 0 indicated non-military and 1 indicated military, had a nonsignificantly negative coefficient of correlation with scores on the *Iowa Aptitude Test in Chemistry*. The coefficient of correlation between this variable and scores on the *California Short-Form Test of Mental Maturity* was also negative but in this case was significant at better than the 5 per cent level.
TABLE I

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>F.G.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.29</td>
<td>.46</td>
<td>.041*</td>
<td>.140*</td>
<td>.351</td>
<td>-.104*</td>
<td>.099*</td>
<td>-.314</td>
<td>.135*</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>31.68</td>
<td>16.51</td>
<td>.047*</td>
<td>.070*</td>
<td>.056*</td>
<td>-.138*</td>
<td>-.042*</td>
<td>.066*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>43.89</td>
<td>10.78</td>
<td>.585</td>
<td>.538</td>
<td>.477</td>
<td>.473</td>
<td>.461</td>
<td>.424</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>178.29</td>
<td>14.27</td>
<td>.442</td>
<td>.401</td>
<td>.417</td>
<td>.417</td>
<td>.424</td>
<td>.467</td>
<td>.439</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>57.76</td>
<td>23.83</td>
<td>.576</td>
<td>.611</td>
<td>.561</td>
<td>.611</td>
<td>.439</td>
<td>.457</td>
<td>.316</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>81.63</td>
<td>11.39</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.G.P.</td>
<td>1.82</td>
<td>.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School
Variable 2 = North-Hatt Occupational Prestige Scale
Variable 3 = Cooperative English Test
Variable 4 = Iowa Silent Reading Test
Variable 5 = Iowa Aptitude Test in Chemistry
Variable 6 = Cooperative Mathematics Pre-Test
Variable 7 = California Short-Form Test of Mental Maturity

*Not significant at the 5 per cent level.
The other nontest member of the battery, the North-Hatt Occupational Prestige Scale, did not produce a significant coefficient of correlation with the criterion or with any other variable. Coefficients of correlation with scores on the Iowa Aptitude Test in Chemistry, the Cooperative Mathematics Pre-Test, and the California Short-Form Test of Mental Maturity were negative. However, since the North-Hatt Occupational Prestige Scale assigned the lower numbers to the higher prestige occupations, a negative coefficient actually indicated a positive relationship.

The best single predictor of grade point average at the end of the first year of college was the Cooperative Mathematics Pre-Test, which had a coefficient of correlation of .467. The r between the criterion and scores on the next best predictor, the Cooperative English Test: English Expression, was .461. The remaining coefficients of correlation ranged downward to a value of .066 for the North-Hatt Occupational Prestige Scale.

In Table II the predictor variables are presented in the order of their ability to predict grade point average at the end of the first year of college. Also, lists of all resulting F tests and standard errors of estimate, as well as the coefficients of multiple correlation and coefficients of multiple determination, R²'s, for the complete and reduced batteries are given here. R² is a measure of the variance accounted for by the battery, therefore, an R² of .33 accounts for
33 per cent of the variance when predicting a criterion value.

TABLE II
RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>$R^2$</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coop. Math.</td>
<td>58.977</td>
<td>.606</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coop. English</td>
<td>21.860</td>
<td>.578</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa Silent Reading</td>
<td>6.347</td>
<td>.571</td>
<td>.31189</td>
<td>.558**</td>
</tr>
<tr>
<td>Iowa Chemistry</td>
<td>3.094</td>
<td>.568</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>2.431</td>
<td>.566</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>.694</td>
<td>.567</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calif. Short-Form</td>
<td>.568</td>
<td>.568</td>
<td>.33265</td>
<td>.577*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.

An inspection of Table II indicated that the Cooperative Mathematics Pre-Test was the best single predictor of grade point average at the end of the first year of college. This instrument produced a coefficient of correlation of .467 with the criterion. Following the addition of the other significant predictors, the coefficient of multiple correlation for the
reduced battery was .558. This compared with .577 for the entire battery.

Multiple regression equations for the complete and the reduced batteries were developed from the information given in Tables I and II. The equation for the entire battery was

\[ \text{PG} = -0.478 + (0.055)(\text{THS}) + (0.014)(\text{NH}) + (0.011)(\text{CE}) + (0.005)(\text{IR}) + (0.005)(\text{IC}) + (0.019)(\text{CM}) - (0.002)(\text{SF}), \]

where PG was the predicted grade point average at the end of the first year of college, -.478 was the constant for this equation, THS indicated military or nonmilitary type high school, NH was the North-Hatt Occupational Prestige Scale rating, CE was the Cooperative English Test: English Expression raw score, IR was the Iowa Silent Reading Test standard score, IC was the Iowa Aptitude Test in Chemistry raw score, CM was the Cooperative Mathematics Pre-Test raw score, and SF was the California Short-Form Test of Mental Maturity raw score.

The standard error of estimate for this equation was .568.

The equation for the reduced battery was simpler because it involved only those scores and b weights which made a significant contribution to the overall prediction. The multiple regression equation for the reduced battery was

\[ \text{PG} = -0.756 + (0.014)(\text{CE}) + (0.009)(\text{IR}) + (0.021)(\text{CM}). \]

The constant for this equation was -.756; the standard error of estimate was .571.
Hypothesis 1, which stated that the value of the multiple R found between the predictors in battery I and the criterion of grade point average at the end of the first year of college is significantly larger than the value obtained when a simple r is determined between the best single predictor and the same criterion, was accepted since the multiple R of .577 was larger than the simple r of .467 at the 5 per cent level of confidence.

Intercorrelations among the members of predictive battery II and with the criterion of grade point average at the end of the first year of college were presented in Table III. All of the predictive tests produced positive, significant coefficients of correlation with the other test members of the battery and with the criterion.

Again, this did not hold true for the non-test predictors. Correlations between military or nonmilitary type high school and the other members of the battery were all positive, but none were significant at the 5 per cent level.

The North-Hatt Occupational Prestige Scale correlated negatively with the Social Studies and Natural Science Tests of the American College Testing Program. None of the coefficients of correlation between this predictor and the other members of the predictive battery reached the 5 per cent level.

The best single predictor within predictive battery II was the Mathematics Test of the American College Testing Program.
TABLE III
MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS AMONG THE
PREDICTORS AND THE CRITERION OF GRADE POINT AVERAGE AT
THE END OF THE FIRST YEAR OF COLLEGE (F.G.P.)
(N = 214)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>F.G.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.29</td>
<td>.46</td>
<td></td>
<td>.041*</td>
<td>.116*</td>
<td>.131*</td>
<td>.117*</td>
<td>.120*</td>
<td>.135*</td>
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<tr>
<td>2</td>
<td>31.68</td>
<td>16.51</td>
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<td>.046*</td>
<td>-.024*</td>
<td>-.006*</td>
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<td></td>
<td>.066*</td>
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<td>.572</td>
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<td>.443</td>
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<td></td>
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</tr>
<tr>
<td>6</td>
<td>20.83</td>
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<td>.495</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>F.G.P.</td>
<td>1.82</td>
<td>.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School
Variable 2 = North-Hatt Occupational Prestige Scale
Variable 3 = American College Testing Program, English test
Variable 4 = American College Testing Program, Mathematics test
Variable 5 = American College Testing Program, Social Studies test
Variable 6 = American College Testing Program, Natural Science test

*Not significant at the 5 per cent level.
The coefficient of correlation of this test with the criterion was .535. Correlational coefficients ranged downward from this value to .066 for the North-Hatt Occupational Prestige Scale.

The Mathematics Test of the American College Testing Program was the best single predictor of grade point average at the end of the first year of college. Its coefficient of correlation with this criterion was .535. The information presented in Table IV makes it possible to compare this with coefficients of multiple correlation of .609 for the complete battery and .603 for the reduced battery.

**TABLE IV**

RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>R²</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT, Math.</td>
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<td>ACT, English</td>
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<td></td>
<td>.558</td>
<td></td>
</tr>
<tr>
<td>ACT, Nat. Sci.</td>
<td>7.764</td>
<td></td>
<td>.549</td>
<td>.36349</td>
</tr>
<tr>
<td>ACT, Soc. St.</td>
<td>.906</td>
<td></td>
<td>.549</td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>.757</td>
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<td>.550</td>
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</tr>
<tr>
<td>Type High School</td>
<td>.665</td>
<td></td>
<td>.550</td>
<td>.37055</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.
Multiple regression equations for the complete and the reduced batteries were developed from the information given in Tables III and IV. The equation which considered all the members of the battery was

\[ PG = -0.112 + (0.068)(THS) + (0.02)(NH) + (0.031)(AE) + \\
(0.037)(AM) + (0.010)(AN) + (0.022)(AS), \]

where \( PG \) was the predicted grade point average at the end of the first year of college, \(-0.112\) was the constant for this equation, \( THS \) indicated military or nonmilitary type high school, \( NH \) was the North-Hatt Occupational Prestige Scale, \( AE \) was the American College Testing Program, English Test, \( AM \) was the American College Testing Program, Mathematics Test, \( AN \) was the American College Testing Program, Natural Science Test, and \( AS \) was the American College Testing Program, Social Studies Test. All scores on the American College Testing Program were expressed in the standard score units developed by the publisher. The standard error of estimate for this equation was \( 0.550 \).

The multiple regression equation for the battery which contained only those predictors significant at the 5 per cent level was

\[ PG = -0.023 + (0.035)(AE) + (0.040)(AM) + (0.025)(AS). \]

The constant for this equation was \(-0.023\), and the standard error of estimate was \( 0.549 \).

Hypothesis 2, which stated that the value of the multiple \( R \) found between the predictors in battery II and the criterion of grade point average at the end of the first year of college is
significantly larger than the value obtained when a simple \( r \) is determined between the best single predictor and the same criterion was accepted since the multiple \( R \) of .609 was larger than the simple \( r \) of .535 at the 5 per cent level of confidence.

Criteria of Subject Matter Areas

According to the information contained in Table V, the coefficients of correlation between the test members of battery I and the criterion of grade point average in freshman business administration were all positive and significant at better than the 5 per cent level of confidence.

Concerning the nontest predictors, military or nonmilitary type high schools produced coefficients of correlation significant at the 5 per cent level with the Iowa Silent Reading Test, with the California Short-Form Test of Mental Maturity, and with the criterion. Negative coefficients of correlation resulted with the North-Hatt Occupational Prestige Scale, the Iowa Aptitude Test in Chemistry, and the California Short-Form Test of Mental Maturity.

With the exception of the Cooperative English Test: English Expression, coefficients of correlation between the North-Hatt Occupational Prestige Scale and the other members of the battery were all negative. The coefficient of correlation between the North-Hatt Occupational Prestige Scale and the Cooperative Mathematics Pre-Test was significant at the 5 per
### Table V

Means, standard deviations, and intercorrelations among the predictors and the criterion of grade point average in freshman business administration (F.B.A.)

(N = 89)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>F.B.A.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>.44</td>
<td>-.040*</td>
<td>.171*</td>
<td>.343</td>
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<td>.157*</td>
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<td>-.013*</td>
<td>-.159*</td>
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<td>-.137*</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Variable 1** = Type High School  
**Variable 2** = North-Hatt Occupational Prestige Scale  
**Variable 3** = Cooperative English Test  
**Variable 4** = Iowa Silent Reading Test  
**Variable 5** = Iowa Aptitude Test in Chemistry  
**Variable 6** = Cooperative Mathematics Pre-Test  
**Variable 7** = California Short Term Test of Mental Maturity

*Not significant at the 5 per cent level.*
cent level, all others failed to reach this level of significance.

The best single predictive member of this battery was the Iowa Silent Reading Test which gave a coefficient of correlation of .479 with the criterion. The other coefficients of correlation ranged downward from this point to -.157 for the North-Hatt Occupational Prestige Scale.

The information contained in Table VI permitted a comparison of the coefficient of correlation for the best single predictor with the coefficients of multiple correlation for the reduced and complete batteries. The R for the complete battery was .547. This value for the reduced battery was .522.

The development of multiple regression equations for the complete and reduced batteries was based on the information contained in Tables V and VI. The equation for the complete battery was

\[ PG = -1.137 + (.135)(THS) - (.005)(NH) + (.004)(CE) + (.015)(IR) + (.006)(IC) + (.007)(CM) + (.001)(SF). \]

Here, PG was the predicted grade point average in freshman business administration. The constant for this equation was -1.137, and the standard error of estimate was .665.

A simplified equation for the reduced battery considered only those scores and b weights which contributed significantly to the overall prediction. This equation was

\[ PG = -1.692 + (.019)(IR) + (.008)(IC). \]
In this case, the constant was -1.692, and the standard error of estimate was .658.

TABLE VI

RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>$R^2$</th>
<th>R</th>
</tr>
</thead>
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<tr>
<td>Iowa Silent Reading</td>
<td>25.963</td>
<td>.673</td>
<td>.27231</td>
<td>.522**</td>
</tr>
<tr>
<td>Iowa Chemistry</td>
<td>5.019</td>
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<td></td>
</tr>
<tr>
<td>North-Hatt</td>
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</tr>
<tr>
<td>Coop. Math.</td>
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</tr>
<tr>
<td>Type High School</td>
<td>.485</td>
<td>.657</td>
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<td></td>
</tr>
<tr>
<td>Coop. English</td>
<td>.189</td>
<td>.661</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calif. Short-Form</td>
<td>.034</td>
<td>.665</td>
<td>.29936</td>
<td>.547*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.

Hypothesis 3 stated that the value of the multiple R found between the predictors in battery I and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple r is determined between the best single predictor and the same criterion. That portion of hypothesis 3 which was concerned
with freshman business administration was rejected since the multiple R of .547 was not significantly larger than the simple r of .479.

Presented in Table VII are the means and standard deviations of all dependent and independent variables; also, the intercorrelations of the predictors with the other members of the battery and with the criterion. All coefficients of correlation between the predictor tests and grade point average in freshman biology were positive and all reached the 5 per cent level of significance.

This was not true of the nontest members of battery I. Negative coefficients of correlation were obtained between military or nonmilitary type high school and both the Iowa Aptitude Test in Chemistry and the California Short-Form Test of Mental Maturity. Significant coefficients of correlation were obtained with the Iowa Silent Reading Test, the California Short-Form Test of Mental Maturity, and with the criterion.

The North-Hatt Occupational Prestige Scale correlated positively with only the Cooperative English Test: English Expression and the Iowa Silent Reading Test. Coefficients of correlation, significant at the 5 per cent level, were obtained with the Cooperative Mathematics Pre-Test and with grade point average in freshman biology. All other correlations failed to reach this chosen level of significance.

The best single predictor of freshman biology grades within battery I was the Cooperative Mathematics Pre-Test,
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>F.B.</th>
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<tbody>
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<td>.018*</td>
<td>.152*</td>
<td>.255</td>
<td>-.039*</td>
<td>.053*</td>
<td>-.247</td>
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<td>2</td>
<td>30.96</td>
<td>17.41</td>
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<td>.056*</td>
<td>-.086*</td>
<td>-.261</td>
<td>-.003*</td>
<td>-.199</td>
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<td>3</td>
<td>43.01</td>
<td>10.31</td>
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<td>.489</td>
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<td>.433</td>
<td>.359</td>
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<tr>
<td>4</td>
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<td>.362</td>
<td>.518</td>
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<tr>
<td>5</td>
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</tr>
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<td>.505</td>
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<td>79.57</td>
<td>11.11</td>
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<td>.353</td>
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<tr>
<td>F.B.</td>
<td>1.96</td>
<td>.90</td>
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<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School  
Variable 2 = North-Hatt Occupational Prestige Scale  
Variable 3 = Cooperative English Test  
Variable 4 = Iowa Silent Reading Test  
Variable 5 = Iowa Aptitude Test in Chemistry  
Variable 6 = Cooperative Mathematics Pre-Test  
Variable 7 = California Short Form Test of Mental Maturity

*Not significant at the 5 per cent level.
which produced a coefficient of correlation of .505. The remaining coefficients decreased in value to -.199 for the North-Hatt Occupational Prestige Scale.

The coefficients of multiple correlation for the complete and reduced batteries given in Table VIII made it possible to compare these values with the .505 coefficient of correlation for the best single predictor. The R for the complete battery was .651 and was .637 for the reduced battery.

**TABLE VIII**

RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>R²</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa Chemistry</td>
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<td>.743</td>
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<td>9.640</td>
<td>.711</td>
<td>.40552</td>
<td>.637**</td>
</tr>
<tr>
<td>North-Hatt</td>
<td>1.217</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Calif. Short-Form</td>
<td>1.125</td>
<td>.709</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coop. English</td>
<td>.254</td>
<td>.712</td>
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<td></td>
</tr>
<tr>
<td>Iowa Silent Reading</td>
<td>.042</td>
<td>.716</td>
<td>.42316</td>
<td>.651*</td>
</tr>
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</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.
The multiple regression equation for the complete battery was developed from the information given in Tables VII and VIII. This equation was

\[
P_G = -0.057 + (0.570)(THS) - (0.006)(NH) + (0.004)(CE) + (0.061)(IR) + (0.011)(IC) + (0.024)(CM) + (0.008)(SF),
\]
in which PG was the predicted grade point average in freshman biology. The constant for this equation was -0.057 and 0.716 was the standard error of estimate.

The multiple regression equation for the reduced battery considered only the three significant predictors.

\[
P_G = 0.561 + (0.537)(THS) + (0.014)(IC) + (0.031)(CM)
\]
The constant for this equation was 0.561; the standard error of estimate was 0.711.

Hypothesis 3 stated that the value of the multiple R found between the predictors in battery I and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple r is determined between the best single predictor and the same criterion. That portion of hypothesis 3 which was concerned with freshman biology was accepted since the multiple R of 0.651 was larger than the simple r of 0.505 at the 5 per cent level of confidence.

The information in Table IX indicates positive coefficients of correlation among all predictive tests in battery I and with
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<tr>
<th>Variable</th>
<th>Mean</th>
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<th>3</th>
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<th>6</th>
<th>7</th>
<th>F.C.</th>
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<td>1</td>
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<td>-.043*</td>
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<td>.007*</td>
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<td>-.228</td>
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<td>67.73</td>
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</tr>
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</table>

Variable 1 = Type High School  
Variable 2 = North-Hatt Occupational Prestige Scale  
Variable 3 = Cooperative English Test  
Variable 4 = Iowa Silent Reading Test  
Variable 5 = Iowa Aptitude Test in Chemistry  
Variable 6 = Cooperative Mathematics Pre-Test  
Variable 7 = California Short Form Test of Mental Maturity

*Not significant at the 5 per cent level.
the criterion of grade point average in freshman chemistry. All values reached the 5 per cent level of significance.

However, two negative coefficients of correlation were produced with military or nonmilitary type high school, a non-test predictor. Although the coefficients of correlation for the Iowa Aptitude Test in Chemistry and the California Short-Form Test of Mental Maturity were negative, they did reach the 5 per cent level of significance. The positive coefficients of correlation for the Cooperative English Test: English Expression and the Iowa Silent Reading Test were also significant at the 5 per cent level.

In the case of the other non-test predictor, the North-Hatt Occupational Prestige Scale, only the coefficient of correlation with the Cooperative Mathematics Pre-Test reached the chosen 5 per cent level of significance. With the exception of the Iowa Silent Reading Test and the criterion, coefficients of correlation with the other members of the battery were all negative.

Both the Cooperative English Test: English Expression and the Iowa Aptitude Test in Chemistry produced coefficients of correlation of .398 with the criterion. However, the procedure selected the Cooperative English Test: English Expression as the best single predictor. The remaining coefficients of correlation decreased to .043 for military or nonmilitary type high school.
Information concerning the coefficients of multiple correlation for the complete and the reduced batteries is given in Table X. This made it possible to compare these values with the r of .398 for the best single predictor. The coefficient of multiple correlation for the complete battery was .544. For the reduced battery this value was .539.

**TABLE X**

RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>R²</th>
<th>R</th>
</tr>
</thead>
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<tr>
<td>Coop. English</td>
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<tr>
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<tr>
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<tr>
<td>North-Hatt</td>
<td>4.071</td>
<td>.950</td>
<td>.29057</td>
<td>.539**</td>
</tr>
<tr>
<td>Type High School</td>
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<td></td>
</tr>
<tr>
<td>Calif. Short-Form</td>
<td>.146</td>
<td>.957</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa Silent Reading</td>
<td>.214</td>
<td>.961</td>
<td>.29640</td>
<td>.544*</td>
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</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.

Multiple regression equations for the complete and the reduced batteries were developed from the information given
in Tables IX and X. The equation for the complete battery was

\[ PG = -1.637 + (.033)(THS) + (.012)(NH) + (.021)(CE) + (.005)(IR) + (.014)(IC) + (.030)(CM) - (.007)(SF), \]

where PG was the predicted grade point average in freshman chemistry. The constant for this equation was -1.637. The standard error of estimate was .961.

The multiple regression equation for the reduced battery was

\[ PG = -1.332 + (.013)(HN) + (.023)(CE) + (.012)(IC) + (.028)(CM), \]

for which the constant was -1.332. The standard error of estimate was .950.

Hypothesis 3 stated that the value of the multiple R found between the predictors in Battery I and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple r is determined between the best single predictor and the same criterion. That portion of hypothesis 3 which was concerned with freshman chemistry was accepted since the multiple R of .544 was larger than the simple r of .398 at the 5 per cent level of confidence.

Intercorrelations among the members of the battery and with the criterion of grade point average in freshman English are given in Table XI. This information indicated that all these values for the predictor tests and the criterion were positive and significant at the 5 per cent level.
### Table XI

Means, standard deviations, and intercorrelations among the predictors and the criterion of grade point average in freshman English (F.E.)

(N = 211)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
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<th>3</th>
<th>4</th>
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<td>.143*</td>
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<td>2</td>
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<td>-.144*</td>
<td>-.055*</td>
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</tbody>
</table>

Variable 1 = Type High School
Variable 2 = North-Matt Occupational Prestige Scale
Variable 3 = Cooperative English Test
Variable 4 = Iowa Silent Reading Test
Variable 5 = Iowa Aptitude Test in Chemistry
Variable 6 = Cooperative Mathematics Pre-Test
Variable 7 = California Short Form Test of Mental Maturity

*Not significant at the 5 per cent level.
The nonetest predictor of military or nonmilitary type high school produced negative coefficients of correlation with the Iowa Aptitude Test in Chemistry and the California Short-Form Test of Mental Maturity. Significant coefficients of correlation were produced with only the Iowa Silent Reading Test, the California Short-Form Test of Mental Maturity, and the criterion. All others failed to reach the 5 per cent level.

All coefficients of correlation between the North-Hatt Occupational Prestige Scale and the other members of the battery were significant at the 5 per cent level. Negative values were obtained between this predictor and the Iowa Aptitude Test in Chemistry, the Cooperative Mathematics Pre-Test, and the California Short-Form Test of Mental Maturity.

The best single predictor of grade point average in freshman English was the Cooperative Mathematics Pre-Test which produced a coefficient of correlation of .540 with that criterion. The r for the next best predictor followed very closely with a value of .539. The coefficients of correlation for the other predictors ranged down to .016 for the North-Hatt Occupational Prestige Scale.

In Table XII the coefficients of multiple correlation for the complete and for the reduced batteries are provided. The multiple R for the complete battery was .660 and for the reduced battery this value was .655. These coefficients of
multiple correlation may be compared with the coefficient of
simple correlation of .540 for the best single predictor of
grade point average in freshman English.

TABLE XII
RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION
TO THE MULTIPLE CORRELATION SHOWING F LEVEL,
STANDARD ERROR, COEFFICIENT OF MULTIPLE
DETERMINATION, AND MULTIPLE
CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>R^2</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coop. Math.</td>
<td>85.919</td>
<td>.738</td>
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<td></td>
</tr>
<tr>
<td>Coop. English</td>
<td>35.762</td>
<td>.683</td>
<td></td>
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</tr>
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<td>Iowa Silent Reading</td>
<td>12.181</td>
<td>.665</td>
<td>.42690</td>
<td>.655**</td>
</tr>
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<td>.664</td>
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</tr>
<tr>
<td>North-Hatt</td>
<td>.546</td>
<td>.665</td>
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</tr>
<tr>
<td>Iowa Chemistry</td>
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</tr>
<tr>
<td>Type High School</td>
<td>.023</td>
<td>.668</td>
<td>.43578</td>
<td>.666*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.
**Coefficient of multiple correlation for reduced battery.

A multiple regression equation for the complete battery
was developed from the information given in Tables XI and XII.
This equation was as follows:

PG = -2.000 + (.020)(TH3) + (.002)(NH) + (.021)(CE) +
     (.014)(IR) + (.001)(IC) + (.033)(CM) - (.007)(SF).
Here, PG was the predicted grade point average in freshman English. The constant for this equation was -2.000; the standard error of estimate was .668.

The multiple regression equation for the reduced battery was

$$PG = -2.303 + (.020)(CE) + (.014)(IR) + (.030)(CM).$$

The constant for this equation was -2.303. The standard error of estimate was .665.

Hypothesis 3 stated that the value of the multiple $R$ found between the predictors in battery I and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple $r$ is determined between the best single predictor and the same criterion. That portion of hypothesis 3 which was concerned with freshman English was accepted since the multiple $R$ of .660 was larger than the simple $r$ of .540 at the 5 per cent level of confidence.

In Table XIII are presented the means, standard deviations, and intercorrelations of all predictive instruments between themselves and the criterion of grade point average in freshman foreign language. Two of the test predictors, the Iowa Silent Reading Test and the Cooperative Mathematics Pre-Test, produced coefficients of correlation with the criteria which failed to reach the 5 per cent level of significance. This value for the Iowa Silent Reading Test was negative; for the Cooperative Mathematics Pre-Test, it was positive. All
TABLE XIII
MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS AMONG THE
PREDICTORS AND THE CRITERION OF GRADE POINT AVERAGE IN
FRESHMAN FOREIGN LANGUAGE (F.F.L.)
(N = 51)

<table>
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<th>7</th>
<th>F.F.L.</th>
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<tbody>
<tr>
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<td>.461</td>
<td>-.157</td>
<td>-.015*</td>
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<td>-.110*</td>
<td>.160*</td>
<td>-.142*</td>
<td>.141*</td>
</tr>
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<td></td>
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<td>.452</td>
<td>.466</td>
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<td>.214</td>
</tr>
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<td>.324</td>
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<td>5</td>
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<td>21.06</td>
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<td>.513</td>
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<td></td>
<td></td>
<td>.243</td>
<td>.102*</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School
Variable 2 = North-Hatt Occupational Prestige Scale
Variable 3 = Cooperative English Test
Variable 4 = Iowa Silent Reading Test
Variable 5 = Iowa Aptitude Test in Chemistry
Variable 6 = Cooperative Mathematics Pre-Test
Variable 7 = California Short Form Test of Mental Maturity

*Not significant at the 5 per cent level.
other test predictors were positive and significant at the 5 per cent level.

Coefficients of correlation with the nontest predictor of military or nonmilitary type high school were all positive with the exception of the California Short-Form Test of Mental Maturity and the criterion. The North-Hatt Occupational Prestige Scale, the Iowa Aptitude Test in Chemistry, and the criterion failed to produce coefficients of correlation significant at the 5 per cent level of confidence when correlated with this predictor.

Only one other predictor, the Iowa Silent Reading Test, produced a coefficient of correlation which reached the 5 per cent significance level with the North-Hatt Occupational Prestige Scale, the second nontest predictor. Positive coefficients of correlation were obtained with the Iowa Silent Reading Test and the criterion; all others were negative.

The best single predictor, the Iowa Aptitude Test in Chemistry, produced a coefficient of correlation of .275 with the criterion. The values for the remaining members of the battery decreased to .015 for military or nonmilitary type high school.

Information contained in Table XIV indicates that no coefficient of correlation between any member of the battery and the criterion produced a significant F test. Therefore, no reduced battery was produced and the best single predictor
was compared with the complete battery only. The single $r$ for the best single predictor was .275. The coefficient of multiple correlation for the complete battery was .501.

**TABLE XIV**

RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>$R^2$</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa Chemistry</td>
<td>3.994</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Calif. Short-Form</td>
<td>7.593</td>
<td>1.102</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coop. English</td>
<td>1.807</td>
<td>1.101</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa Silent Reading</td>
<td>3.262</td>
<td>.999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>3.467</td>
<td>.963</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coop. Math.</td>
<td>1.884</td>
<td>.953</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>.108</td>
<td>.965</td>
<td>.36098</td>
<td>.601*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

A multiple regression equation which considered all the predictors in battery I was developed. This equation was

$$PG = 7.403 + (.051)(THS) + (.013)(NH) + (.051)(CE) - (.032)(IR) + (.030)(IC) - (.033)(CM) - (.039)(SF).$$

Here, $PG$ was the predicted grade point average in freshman
foreign language. For this equation the constant was 7.403. The standard error of estimate was .965.

Hypothesis 3 stated that the value of the multiple $R$ found between the predictors in battery I and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple $r$ is determined between the best single predictor and the same criterion. That portion of hypothesis 3 which was concerned with freshman foreign language was accepted since the multiple $R$ of .601 was larger than the simple $r$ of .275 at the 5 per cent level of confidence.

An examination of Table XV furnishes the information that all coefficients of correlation among the test predictors in battery I and with the criterion of grade point average in freshman mathematics were positive. With the exception of the coefficient of correlation between the California Short-Form Test of Mental Maturity and the criterion, all were significant at the 5 per cent level.

For the first non-test predictor of military or nonmilitary type high school coefficients of correlation significant at the 5 per cent level were obtained with the *Iowa Silent Reading Test*, the *California Short-Form Test of Mental Maturity*, and the criterion. All but two coefficients of correlation, those for the *Iowa Aptitude Test in Chemistry* and for the *California Short-Form Test of Mental Maturity* were positive.
TABLE XV
MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS AMONG THE PREDICTORS AND THE CRITERION OF GRADE POINT AVERAGE IN FRESHMAN MATHEMATICS (F.M.)
(N = 176)

<table>
<thead>
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<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>F.H.</th>
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<tbody>
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<td>.45</td>
<td></td>
<td>.069*</td>
<td>.162*</td>
<td>.376</td>
<td>-.126*</td>
<td>.034*</td>
<td>-.327</td>
<td>.233</td>
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<tr>
<td>2</td>
<td>31.84</td>
<td>16.96</td>
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<td></td>
<td></td>
<td>.034*</td>
<td>.064*</td>
<td>-.078*</td>
<td>-.172</td>
<td>-.119*</td>
</tr>
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<td>44.77</td>
<td>10.36</td>
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<td>.562</td>
<td>.503</td>
<td>.442</td>
<td>.409</td>
</tr>
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<td>4</td>
<td>179.58</td>
<td>13.80</td>
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<td>.411</td>
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<td>.341</td>
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<td>.572</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.455</td>
</tr>
<tr>
<td>7</td>
<td>83.05</td>
<td>10.76</td>
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</tr>
<tr>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School
Variable 2 = North-Hatt Occupational Prestige Scale
Variable 3 = Cooperative English Test
Variable 4 = Iowa Silent Reading Test
Variable 5 = Iowa Aptitude Test in Chemistry
Variable 6 = Cooperative Mathematics Pre-Test
Variable 7 = California Short Form Test of Mental Maturity

*Not significant at the 5 per cent level.
Only one other member of the battery, the Cooperative Mathematics Pre-Test, reached the 5 per cent level of significance with the North-Hatt Occupational Prestige Scale. Negative coefficients of correlation were obtained between this non-test predictor and the Iowa Aptitude Test in Chemistry, the Cooperative Mathematics Pre-Test, and the California Short-Form Test of Mental Maturity.

The best single predictor within this battery was the Cooperative Mathematics Pre-Test which produced a coefficient of correlation with the criterion of .350. The other correlational coefficients decreased in value to .082 for the North-Hatt Occupational Prestige Scale.

Multiple R's for the complete and reduced batteries are given in Table XVI. This made it possible to compare these values with the r of .350 for the best single predictor. The coefficient of multiple correlation for the complete battery was .464. This value for the reduced battery was .443.

The following multiple regression equation for the complete battery was developed, taking into consideration all the predictive members of battery I:

\[ PG = .177 + (.418)(THS) + (.006)(NH) + (.006)(CE) - (.001)(IR) + (.007)(IC) + (.022)(CM) - (.002)(SF). \]

Here, PG was the predicted grade point average in freshman mathematics. The constant for this equation was .177, and the standard error of estimate was .787.
TABLE XVI

RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>R²</th>
<th>R</th>
</tr>
</thead>
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<tr>
<td>Coop. Math.</td>
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<td>.816</td>
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<tr>
<td>Type High School</td>
<td>3.673</td>
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<tr>
<td>Iowa Chemistry</td>
<td>6.711</td>
<td>.786</td>
<td>.19600</td>
<td>.433**</td>
</tr>
<tr>
<td>North-East</td>
<td>3.214</td>
<td>.783</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coop. English</td>
<td>.925</td>
<td>.783</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa Silent Reading</td>
<td>.078</td>
<td>.785</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calif. Short-Form</td>
<td>.040</td>
<td>.787</td>
<td>.21565</td>
<td>.464*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.

The multiple regression equation for the reduced battery considered only the significant predictors within the battery.

\[ PG = .300 + (.468)(THS) + (.008)(IC) + (.020)(CM) \]

The constant for this equation was .300. The standard error of estimate was .788.

Hypothesis 3 stated that the value of the multiple R found between the predictors in battery I and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple r
is determined between the best single predictor and the same criterion. That portion of hypothesis 3 which was concerned with freshman mathematics was accepted since the multiple $R$ of .464 was larger than the simple $r$ of .350 at the 5 per cent level of confidence.

The information in Table XVII indicates that the coefficients of correlation among the predictive tests in battery I and with the criterion of grade point average in military schools training were all positive and significant at better than the 5 per cent level.

The same was not true for the two non-test members of the battery. Military or nonmilitary type high school produced negative coefficients of correlation with the Cooperative English Test: English Expression, the Iowa Aptitude Test in Chemistry, and the California Short-Form Test of Mental Maturity. Only the coefficient of correlation with the Iowa Silent Reading Test reached the chosen 5 per cent level of significance.

The North-Hatt Occupational Prestige Scale produced a coefficient of correlation significant at the 5 per cent level with only one other member, the Cooperative Mathematics Pre-Test. This value was negative, as were those for the Iowa Aptitude Test in Chemistry and the California Short-Form Test of Mental Maturity.

The best single predictor in battery I was the Iowa Aptitude Test in Chemistry which produced a coefficient of
TABLE XVII
MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS AMONG THE PREDICTORS AND THE CRITERION OF GRADE POINT AVERAGE IN FRESHMAN MILITARY SCHOOLS TRAINING (F.M.S.)
(N = 156)

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<th>7</th>
<th>F.M.S.</th>
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<td>-.100*</td>
<td>.056*</td>
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<td>2</td>
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<td>.077*</td>
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</tr>
<tr>
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<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School
Variable 2 = North-Hatt Occupational Prestige Scale
Variable 3 = Cooperative English Test
Variable 4 = Iowa Silent Reading Test
Variable 5 = Iowa Aptitude Test in Chemistry
Variable 6 = Cooperative Mathematics Pre-Test
Variable 7 = California Short Form Test of Mental Maturity

*Not significant at the 5 per cent level.
correlation of .460 with the criterion. The other values ranged
down to .020 for the North-Hatt Occupational Prestige Scale.

In Table XVIII the coefficients of multiple correlation
for the complete and for the reduced batteries are provided.
The multiple R for the complete battery was .517, and for the
reduced battery this value was .495. These coefficients of
multiple correlation may be compared with the coefficient of
simple correlation of .460 for the best single predictor of
grade point average in freshman military schools training.

TABLE XVIII

RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION
TO THE MULTIPLE CORRELATION SHOWING F LEVEL,
STANDARD ERROR, COEFFICIENT OF MULTIPLE
DETERMINATION, AND MULTIPLE
CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>R^2</th>
<th>R</th>
</tr>
</thead>
<tbody>
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<td>.2456</td>
<td>.495**</td>
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<tr>
<td>Coop. Math.</td>
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<tr>
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<td></td>
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<tr>
<td>North-Hatt</td>
<td>.971</td>
<td>.712</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coop. English</td>
<td>.578</td>
<td>.713</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>.138</td>
<td>.715</td>
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<td></td>
</tr>
<tr>
<td>Calif. Short-Form</td>
<td>.002</td>
<td>.718</td>
<td>.26717</td>
<td>.517*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.
This multiple regression equation was developed for the complete battery:

$$PG = .315 + (.114)(THS) + (.003)(NH) + (.006)(CE) + (.005)(IR) + (.008)(IC) + (.018)(CM) - (.000)(SF),$$

in which PG was the predicted grade point average in military schools training. The constant for this equation was .315 and the standard error of estimate was .718.

A multiple regression equation was developed which considered only the two significant predictors:

$$PG = 1.343 + (.011)(IC) + (.019)(CM),$$

where 1.343 was the constant and .716 was the standard error of estimate.

Hypothesis 3 stated that the value of the multiple R found between the predictors in battery I and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple r is determined between the best single predictor and the same criterion. That portion of hypothesis 3 which was concerned with freshman military schools training was accepted since the multiple R of .516 was larger than the simple r of .460 at the 5 per cent level of confidence.

The information contained in Table XIX indicates that all coefficients of correlation of the test measures of battery I with themselves and with the criterion of grade point average
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
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<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>F.P.</th>
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</thead>
<tbody>
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<td>.45</td>
<td>-.035*</td>
<td>.211</td>
<td>.386</td>
<td>-.013*</td>
<td>.143*</td>
<td>-.222</td>
<td>.001*</td>
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</tr>
<tr>
<td>2</td>
<td>32.77</td>
<td>16.70</td>
<td>-.044*</td>
<td>.065*</td>
<td>-.092*</td>
<td>-.233</td>
<td>.051*</td>
<td>-.110*</td>
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<td>.477</td>
<td>.286</td>
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<tr>
<td>5</td>
<td>66.26</td>
<td>23.99</td>
<td>.527</td>
<td>.634</td>
<td>.423</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>24.29</td>
<td>11.02</td>
<td>.594</td>
<td>.452</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>7</td>
<td>83.43</td>
<td>12.22</td>
<td>.335</td>
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<td></td>
</tr>
<tr>
<td>F.P.</td>
<td>2.48</td>
<td>.97</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School  
Variable 2 = North-Matt Occupational Prestige Scale  
Variable 3 = Cooperative English Test  
Variable 4 = Iowa Silent Reading Test  
Variable 5 = Iowa Aptitude Test in Chemistry  
Variable 6 = Cooperative Mathematics Pre-Test  
Variable 7 = California Short Form Test of Mental Maturity

*Not significant at the 5 per cent level.
in freshman physics were positive and significant at the 5 per cent level.

Coefficients of correlation between only three other members and the nonetest predictor of military or nonmilitary type high school reached this level of significance. These significant predictors were the Cooperative English Test: English Expression, the Iowa Silent Reading Test, and the California Short-Form Test of Mental Maturity. Negative coefficients of correlation were obtained with the North-Hatt Occupational Prestige Scale, the Iowa Aptitude Test in Chemistry, and the California Short-Form Test of Mental Maturity.

The other nonetest predictor, the North-Hatt Occupational Prestige Scale, produced positive coefficients of correlation with the Iowa Silent Reading Test and the California Short-Form Test of Mental Maturity. Only the Cooperative Mathematics Pre-Test was significant at the 5 per cent level.

The Cooperative Mathematics Pre-Test was the best single predictor of grade point average in freshman physics. Its coefficient of correlation with this criterion was .452. These values for the other members of the battery decreased to .001 for military or nonmilitary type high school.

Information in Table XX makes it possible to compare coefficients of multiple correlation of .529 for the complete battery and .502 for the reduced battery with the .452 coefficient of correlation between the best single predictor and the criterion.
<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>R²</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coop. Math.</td>
<td>19.298</td>
<td>.378</td>
<td>.25161</td>
<td>.502**</td>
</tr>
<tr>
<td>Iowa Chemistry</td>
<td>4.643</td>
<td>.353</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa Silent Reading</td>
<td>.991</td>
<td>.353</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>.931</td>
<td>.353</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calif. Short-Form</td>
<td>.670</td>
<td>.368</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>.086</td>
<td>.365</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coop. English</td>
<td>.057</td>
<td>.872</td>
<td>.27936</td>
<td>.529*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.

The multiple regression equation for the complete battery was

\[
PG = - .668 - (.332)(THS) - (.002)(NH) - (.003)(CE) + (.016)(IR) + (.008)(IC) + (.028)(CM) - (.009)(SF),
\]

where \( PG \) was the predicted grade point average in freshman physics. The constant for this equation was \(- .668\). The standard error of estimate was .372.
The multiple regression equation for the reduced battery considered only the Cooperative Mathematics Pre-Test and the Iowa Aptitude Test in Chemistry.

\[ PG = 1.111 + (0.010)(IC) + (0.028)(CM) \]

Here, the constant was 1.111, and the standard error of estimate was .858.

Hypothesis 3 stated that the value of the multiple R found between the predictors in battery I and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple r is determined between the best single predictor and the same criterion. That portion of hypothesis 3 which was concerned with freshman physics was rejected since the multiple R of .529 was not significantly larger than the simple r of .452.

Information provided in Table XXI made it possible to examine the intercorrelations among the independent and dependent variables within battery I. All coefficients of correlation for the predictive tests with themselves and with the criterion of grade point average in freshman world history were positive and all reached the 5 per cent level of significance.

Most of the coefficients of correlation for the nontest members of the battery failed to reach these levels. Only two predictors, the Iowa Silent Reading Test and the California Short-Form Test of Mental Maturity, reached the 5 per cent level of significance with military or nonmilitary type high
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>F.H.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>-.059*</td>
<td>.069*</td>
<td>.343</td>
<td>-.131*</td>
<td>-.080*</td>
<td>-.361</td>
<td>.034*</td>
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<tr>
<td>2</td>
<td>30.76</td>
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<td>.004*</td>
<td>-.126*</td>
<td>-.202</td>
<td>-.034*</td>
<td>.033*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>42.66</td>
<td>10.59</td>
<td>.574</td>
<td>.477</td>
<td>.388</td>
<td>.440</td>
<td>.352</td>
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<tr>
<td>4</td>
<td>177.11</td>
<td>13.77</td>
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<td>.367</td>
<td>.339</td>
<td>.339</td>
<td>.380</td>
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<tr>
<td>5</td>
<td>54.80</td>
<td>23.17</td>
<td></td>
<td>.502</td>
<td>.559</td>
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<tr>
<td>6</td>
<td>19.73</td>
<td>9.32</td>
<td></td>
<td></td>
<td>.473</td>
<td>.330</td>
<td></td>
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<td>7</td>
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<td>.377</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>F.H.</td>
<td>1.87</td>
<td>.85</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School  
Variable 2 = North-Hatt Occupational Prestige Scale  
Variable 3 = Cooperative English Test  
Variable 4 = Iowa Silent Reading Test  
Variable 5 = Iowa Aptitude Test in Chemistry  
Variable 6 = Cooperative Mathematics Pre-Test  
Variable 7 = California Short Form Test of Mental Maturity

*Not significant at the 5 per cent level.
school. This predictor correlated positively with the **Cooperative English Test: English Expression**, the **Iowa Silent Reading Test**, and the criterion of grade point average in freshman history.

The **North-Hatt Occupational Prestige Scale** produced coefficients of correlation significant at the 5 per cent level with only one other predictor, the **Cooperative Mathematics Pre-Test**. These values were negative for the **Iowa Aptitude Test in Chemistry**, the **Cooperative Mathematics Pre-Test**, and the **California Short-Form Test of Mental Maturity**.

The best single predictor of grade point average in freshman world history was the **Iowa Silent Reading Test**, which produced a coefficient of correlation of .380 with the criterion. The other coefficients of correlation decreased in value to .033 for the **North-Hatt Occupational Prestige Scale**.

Much of the information necessary for a comparison of the best single predictor with the complete and reduced batteries is provided in Table XXII. The coefficient of multiple correlation for the complete battery was .486. This value for the reduced battery was .463. The coefficient of correlation for the best single predictor was .380.

Multiple regression equations were developed for the complete and reduced batteries. The equation for the complete battery was

\[
\]
TABLE XXII

RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>R²</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa Silent Reading</td>
<td>24.573</td>
<td>.767</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Calif. Short-Form</td>
<td>12.893</td>
<td>.757</td>
<td>.21395</td>
<td>.463**</td>
</tr>
<tr>
<td>Coop. Math.</td>
<td>2.215</td>
<td>.754</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Coop. English</td>
<td>.936</td>
<td>.754</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>North-Hatt</td>
<td>.750</td>
<td>.755</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Type High School</td>
<td>.179</td>
<td>.757</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Iowa Chemistry</td>
<td>.178</td>
<td>.760</td>
<td>.23602</td>
<td>.480*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.

Here, PG was the predicted grade point average in freshman world history. The constant for this equation was -2.174, and the standard error of estimate was .760.

A somewhat simpler multiple regression equation was developed for the reduced battery.

\[
PG = -2.371 + (.017)(IR) + (.020)(SF).
\]

The constant for this equation was -2.371; the standard error of estimate was .757.
Hypothesis 3 stated that the value of the multiple $R$ found between the predictors in battery I and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple $r$ is determined between the best single predictor and the same criterion. That portion of hypothesis 3 which was concerned with freshman world history was accepted since the multiple $R$ of .46 was larger than the simple $r$ of .380 at the 5 per cent level of confidence.

According to information contained in Table XXIII, two test measures produced coefficients of correlation with the criterion of grade point average in sophomore English which failed to reach the 5 per cent level of significance. These were the Iowa Aptitude Test in Chemistry and the California Short-Form Test of Mental Maturity; the criterion was grade point average in sophomore English. All other test predictors were positive and significant at the 5 per cent level.

Concerning the nontest predictors, only two other members, the North-Hatt Occupational Prestige Scale and the Cooperative English Test: English Expression, failed to produce coefficients of correlation significant at the 5 per cent level with military or nonmilitary type high school. Positive coefficients of correlation were obtained for the Cooperative English Test: English Expression, the Iowa Silent Reading Test, and the Cooperative Mathematics Pre-Test. All others were negative.
### TABLE XXIII

Means, standard deviations, and intercorrelations among the predictors and the criterion of grade point average in sophomore English (S.E.)

\( \text{(N = 63)} \)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>S.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.35</td>
<td>.47</td>
<td></td>
<td>-.061*</td>
<td>.019*</td>
<td>.339</td>
<td>-.221</td>
<td>.367</td>
<td>-.392</td>
<td>-.066*</td>
</tr>
<tr>
<td>2</td>
<td>31.59</td>
<td>17.65</td>
<td></td>
<td></td>
<td>-.004*</td>
<td>-.055*</td>
<td>-.014*</td>
<td>-.037*</td>
<td>-.096*</td>
<td>.004*</td>
</tr>
<tr>
<td>3</td>
<td>46.38</td>
<td>9.54</td>
<td></td>
<td></td>
<td></td>
<td>.423</td>
<td>.463</td>
<td>.367</td>
<td>.394</td>
<td>.313</td>
</tr>
<tr>
<td>4</td>
<td>181.56</td>
<td>12.73</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.338</td>
<td>.394</td>
<td>.313</td>
<td>.238</td>
</tr>
<tr>
<td>5</td>
<td>59.71</td>
<td>23.49</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.507</td>
<td>.691</td>
<td>.192*</td>
</tr>
<tr>
<td>6</td>
<td>21.06</td>
<td>8.13</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>.287</td>
<td>.315</td>
</tr>
<tr>
<td>7</td>
<td>82.59</td>
<td>10.62</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.172*</td>
</tr>
</tbody>
</table>

| S.E.     | 2.52 | .72  |     |        |       |       |       |       |       |      |

Variable 1 = Type High School  
Variable 2 = North-Hatt Occupational Prestige Scale  
Variable 3 = Cooperative English Test  
Variable 4 = Iowa Silent Reading Test  
Variable 5 = Iowa Aptitude Test in Chemistry  
Variable 6 = Cooperative Mathematics Pre-Test  
Variable 7 = California Short Form Test of Mental Maturity

*Not significant at the 5 per cent level.*
All coefficients of correlation obtained between the other members of the battery and the second nontest predictor, the North-Hatt Occupational Prestige Scale, were negative and failed to reach the 5 per cent level of significance. The value obtained between this predictor and the criterion was positive but also failed to reach the significance level of 5 per cent.

The best single predictor of grade point average in sophomore English was the Cooperative Mathematics Pre-Test which had a coefficient of correlation of .315 with the criterion. The coefficients of correlation for the other predictors decreased to .004 for the North-Hatt Occupational Prestige Scale.

Information in Table XXIV indicates a reduced battery composed entirely of the best single predictor, the Cooperative Mathematics Pre-Test. All other coefficients of correlation failed to give a significant F test. The significant coefficient of correlation of .315 for this predictor was compared with the coefficient of multiple correlation of .464 for the complete battery.

The multiple regression equation for the complete battery was

\[ PG = -.012 - (.57)(THS) - (.000)(NH) + (.014)(CE) + \\
(.012)(IR) - (.007)(IC) + (.038)(CM) - (.007)(SF), \]

where PG was the predicted grade point average in sophomore English. The constant for the equation was -.012; the standard error of estimate was .630.
TABLE XXIV
RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>R^2</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coop. Math.</td>
<td>6.775</td>
<td>.692</td>
<td>.09941</td>
<td>.315**</td>
</tr>
<tr>
<td>Coop. English</td>
<td>3.150</td>
<td>.680</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>1.183</td>
<td>.675</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa Chemistry</td>
<td>1.124</td>
<td>.674</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa Silent Reading</td>
<td>1.167</td>
<td>.670</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calif. Short-Form</td>
<td>.319</td>
<td>.674</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>.001</td>
<td>.680</td>
<td>.21520</td>
<td>.464*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.
**Coefficient of multiple correlation for reduced battery.

The multiple regression equation for the reduced battery considered only the best single predictor, the Cooperative Mathematics Pre-Test. This equation was

\[ PG = 1.936 + (.026)(CM), \]

for which 1.936 was the constant. The standard error of estimate was .692.

Hypothesis 3 stated that the value of the multiple R found between the predictors in battery I and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple r
is determined between the best single predictor and the same criterion. That portion of hypothesis 3 which was concerned with sophomore English was rejected since the multiple R of .464 was not significantly larger than the simple r of .315.

Listed in Table XXV are the positive coefficients of correlation found among all test predictors and with the criterion of grade point average in sophomore government. With two exceptions, the Iowa Aptitude Test in Chemistry and the Cooperative Mathematics Pre-Test, the coefficients of correlation between these predictors and the criterion were all significant at better than the 5 per cent level.

The nontest predictor of military or nonmilitary type high school produced negative coefficients of correlation with the North-Hatt Occupational Prestige Scale, the Iowa Aptitude Test in Chemistry, and the California Short-Form Test of Mental Maturity. Only coefficients of correlation between this predictor and the Iowa Silent Reading Test and the California Short-Form Test of Mental Maturity reached the five per cent level of significance.

All coefficients of correlation with the North-Hatt Occupational Prestige Scale were negative and only the Cooperative Mathematics Pre-Test produced a coefficient of correlation significant at the 5 per cent level.

The Iowa Silent Reading Test was the best single predictor of grade point average in sophomore government. This instrument
TABLE XXV

MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS AMONG THE
PREDICTORS AND THE CRITERION OF GRADE POINT AVERAGE IN
SOPHOMORE GOVERNMENT (S.G.)
(N = 53)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>S.G.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.34</td>
<td>.47</td>
<td>-.028*</td>
<td>.023*</td>
<td>.350</td>
<td>-.164*</td>
<td>.168*</td>
<td>-.281</td>
<td>.094*</td>
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</tr>
<tr>
<td>2</td>
<td>20.12</td>
<td>17.45</td>
<td>-.012*</td>
<td>-.153*</td>
<td>-.125*</td>
<td>-.239</td>
<td>-.217*</td>
<td>-.011*</td>
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<td>3</td>
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<td>.497</td>
<td>.531</td>
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</tr>
<tr>
<td>7</td>
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<tr>
<td>S.G.</td>
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<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School
Variable 2 = North-Hatt Occupational Prestige Scale
Variable 3 = Cooperative English Test
Variable 4 = Iowa Silent Reading Test
Variable 5 = Iowa Aptitude Test in Chemistry
Variable 6 = Cooperative Mathematics Pre-Test
Variable 7 = California Short Form Test of Mental Maturity

*Not significant at the 5 per cent level.
produced a coefficient of correlation of .401 with the criterion. The coefficients of correlation obtained for the other predictors ranged downward to .011 for the North-Hatt Occupational Prestige Scale.

In Table XXVI is provided the coefficient of multiple correlation of .438 for the complete battery as well as the information that the reduced battery contained only the Iowa Silent Reading Test, which was the best single predictor. The coefficient of simple correlation for this instrument was .401.

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>R²</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa Silent Reading</td>
<td>9.753</td>
<td>.618</td>
<td>.16052</td>
<td>.401**</td>
</tr>
<tr>
<td>Calif. Short-Form</td>
<td>.979</td>
<td>.618</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>.553</td>
<td>.620</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coop. Math.</td>
<td>.098</td>
<td>.626</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa Chemistry</td>
<td>.088</td>
<td>.632</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>.151</td>
<td>.638</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coop. English</td>
<td>.014</td>
<td>.645</td>
<td>.19192</td>
<td>.438*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.
The multiple regression equation for the complete battery was developed from the information provided in Tables XXV and XXVI. This equation was

\[ PG = -1.515 + (0.097)(THS) + (0.003)(NH) - (0.002)(CE) + \\
(0.015)(IR) + (0.003)(IC) + (0.008)(CM) + (0.013)(SF), \]

where \( PG \) was the predicted grade point average in sophomore government. The constant for this equation was -1.515. The standard error of estimate was .645.

The multiple regression equation for the reduced battery, which considered only the best single predictor, was

\[ PG = -1.105 + (0.019)(IR), \]

for which -1.105 was the constant. The standard error of estimate for this equation was .618.

Hypothesis 3 stated that the value of the multiple \( R \) found between the predictors in battery I and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple \( r \) is determined between the best single predictor and the same criterion. That portion of hypothesis 3 which was concerned with sophomore government was rejected since the multiple \( R \) of .438 was not significantly larger than the simple \( r \) of .401.

Information given in Table XXVII indicates significant, positive coefficients of correlation between all predictive tests and with the criterion, with one exception. The Iowa Silent Reading Test failed to produce a coefficient of
### TABLE XXVII

Means, Standard Deviations, and Intercorrelations Among the Predictors and the Criterion of Grade Point Average in Sophomore Military Schools Training (S.M.S.)

(N = 133)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>S.M.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.41</td>
<td>.49</td>
<td>.619*</td>
<td>.128*</td>
<td>.320</td>
<td>-.101*</td>
<td>.082*</td>
<td>-.354</td>
<td>-.382</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>32.42</td>
<td>17.34</td>
<td>-.002*</td>
<td>.060*</td>
<td>-.034*</td>
<td>-.175*</td>
<td>-.068*</td>
<td>-.021*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>44.56</td>
<td>10.64</td>
<td></td>
<td>.505</td>
<td>.523</td>
<td>.434</td>
<td>.447</td>
<td>.279</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>179.92</td>
<td>13.28</td>
<td></td>
<td></td>
<td>.395</td>
<td>.307</td>
<td>.355</td>
<td>.147*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>57.56</td>
<td>23.79</td>
<td></td>
<td></td>
<td></td>
<td>.534</td>
<td>.604</td>
<td>.502</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>21.10</td>
<td>10.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.501</td>
<td>.362</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>60.91</td>
<td>11.42</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.517</td>
<td></td>
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</tr>
<tr>
<td>S.M.S.</td>
<td>2.37</td>
<td>.77</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School  
Variable 2 = North-Hatt Occupational Prestige Scale  
Variable 3 = Cooperative English Test  
Variable 4 = Iowa Silent Reading Test  
Variable 5 = Iowa Aptitude Test in Chemistry  
Variable 6 = Cooperative Mathematics Pre-Test  
Variable 7 = California Short Form Test of Mental Maturity

*Not significant at the 5 per cent level.*
correlation significant at the 5 per cent level with the criterion of grade point average in sophomore military schools training.

Negative coefficients of correlation were produced between the nontest predictor of military or nonmilitary type high school and the Iowa Aptitude Test in Chemistry, the California Short-Form Test of Mental Maturity, and the criterion. Coefficients of correlation reaching the 5 per cent level of significance were obtained between this predictor and the Iowa Silent Reading Test, the California Short-Form Test of Mental Maturity, and the criterion.

The other nontest member of the battery, the North-Hatt Occupational Prestige Scale, produced a positive coefficient of correlation with only the Iowa Silent Reading Test. All coefficients of correlation between this predictor and the other variables failed to be significant at the 5 per cent level of confidence.

The California Short-Form Test of Mental Maturity, which was the best single predictor of grade point average in sophomore military schools training, produced a coefficient of correlation of .517 with this criterion. From this point the values for the remaining predictors decreased to .021 for the North-Hatt Occupational Prestige Scale.

Table XXVIII permits a comparison of the coefficients of multiple correlation for the complete and the reduced batteries
with the coefficient of correlation of .517 for the best single predictor. The R for the complete battery was .636 and was .623 for the reduced battery.

**TABLE XXVIII**

RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>$R^2$</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calif. Short-Form</td>
<td>47.826</td>
<td>.668</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa Chemistry</td>
<td>10.894</td>
<td>.644</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>13.293</td>
<td>.615</td>
<td>.38736</td>
<td>.623**</td>
</tr>
<tr>
<td>Coop. Math.</td>
<td>3.021</td>
<td>.610</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coop. English</td>
<td>.265</td>
<td>.612</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>.198</td>
<td>.614</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa Silent Reading</td>
<td>.129</td>
<td>.616</td>
<td>.40438</td>
<td>.636*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.

The following multiple regression equation was developed from the information provided in Tables XXVII and XXVIII:

$$PG = .627 - (.533)(THS) + (.001)(NH) + (.003)(CE) + (.002)(IR) + (.009)(IC) + (.012)(CM) + (.008)(SF).$$
Here, PG was the predicted grade point average in sophomore military schools training. The constant for this equation was .627. The standard error of estimate was .616.

This multiple regression equation for the reduced battery considered the three significant predictors.

\[ \text{PG} = .741 - (.429)(\text{THS}) + (.011)(\text{IC}) + (.014)(\text{SF}) \]

For this equation the constant was .741, and the standard error of estimate was .615.

Hypothesis 3 stated that the value of the multiple R found between the predictors in battery I and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple r is determined between the best single predictor and the same criterion. That portion of hypothesis 3 which was concerned with sophomore military schools training was accepted since the multiple R of .636 was larger than the simple r of .517 at the 5 per cent level of confidence.

Provided in Table XXIX is the information that the intercorrelations among all test predictors and with the criterion of grade point average in sophomore United States history were positive and significant at the 5 per cent level.

The nontest predictor of military or nonmilitary type high school produced positive coefficients of correlation with the Cooperative English Test: English Expression, the Iowa Silent Reading Test, and the Cooperative Mathematics Pre-Test.
TABLE XXIX
MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS AMONG THE
PREDICTORS AND THE CRITERION OF GRADE POINT AVERAGE IN
SOPHOMORE UNITED STATES HISTORY (S.H.)
(N = 104)

<table>
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<tr>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>S.H.</th>
</tr>
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<tr>
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<td>.46</td>
<td></td>
<td>-.025*</td>
<td>.257</td>
<td>.415</td>
<td>-.078*</td>
<td>.214</td>
<td>-.210</td>
<td>-.192*</td>
</tr>
<tr>
<td>2</td>
<td>30.70</td>
<td>15.97</td>
<td></td>
<td>-.035*</td>
<td>-.010*</td>
<td>-.072*</td>
<td>-.128*</td>
<td>-.037*</td>
<td>.020*</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>44.91</td>
<td>11.15</td>
<td></td>
<td>.518</td>
<td>.544</td>
<td>.429</td>
<td>.428</td>
<td>.216</td>
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<td></td>
</tr>
<tr>
<td>4</td>
<td>179.26</td>
<td>14.05</td>
<td></td>
<td>.362</td>
<td>.348</td>
<td>.396</td>
<td>.254</td>
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</tr>
<tr>
<td>5</td>
<td>59.46</td>
<td>24.49</td>
<td></td>
<td>.535</td>
<td>.613</td>
<td>.262</td>
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<td>22.54</td>
<td>10.45</td>
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<td>.460</td>
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<tr>
<td>7</td>
<td>82.63</td>
<td>10.91</td>
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<td></td>
<td></td>
<td>.227</td>
<td></td>
</tr>
</tbody>
</table>

S.H. | 2.31 | .76  |       |       |       |       |       |       |       |

Variable 1 = Type High School
Variable 2 = North-Hatt Occupational Prestige Scale
Variable 3 = Cooperative English Test
Variable 4 = Iowa Silent Reading Test
Variable 5 = Iowa Aptitude Test in Chemistry
Variable 6 = Cooperative Mathematics Pre-Test
Variable 7 = California Short Form Test of Mental Maturity

*Not significant at the 5 per cent level.
Coefficients of correlation for the North-Hatt Occupational Prestige Scale, the Iowa Aptitude Test in Chemistry, and the criterion failed to reach the 5 per cent level of significance.

No coefficients of correlation between the North-Hatt Occupational Prestige Scale and the other predictors or the criterion reached the 5 per cent level of significance. A positive coefficient of correlation was obtained with the criterion of grade point average in sophomore United States history but those for all the other predictors were negative.

The best single predictor of grade point average in sophomore United States history was the Iowa Aptitude Test in Chemistry, which produced a coefficient of correlation of .262 with that criterion. The values for the remaining predictors decreased to .020 for the North-Hatt Occupational Prestige Scale.

As seen in Table XXX, the best single predictor was the only member of the reduced battery. Coefficients of correlation between the other predictors and the criterion did not give significant F tests. The coefficient of correlation for the best single predictor was .262, which compared with a multiple R of .379 for the complete battery.

This multiple regression equation, which considered all the predictive instruments in battery I, was developed.

$$PG = -0.431 - (0.444)(THS) - (0.135)(NH) + (0.05)(CE) + (0.15)(IR) + (0.02)(IC) + (0.10)(CM) - (0.06)(SF).$$
Here, PG was the predicted grade point average in sophomore United States history. The constant for this equation was -.431, and the standard error of estimate was .730.

**TABLE XXX**

RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>$R^2$</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa Chemistry</td>
<td>7.548</td>
<td>.738</td>
<td>.06890</td>
<td>.262**</td>
</tr>
<tr>
<td>Iowa Silent Reading</td>
<td>3.261</td>
<td>.730</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>3.434</td>
<td>.721</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coop. Math.</td>
<td>1.080</td>
<td>.721</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calif. Short-Form</td>
<td>.290</td>
<td>.723</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coop. English</td>
<td>.335</td>
<td>.726</td>
<td>.14328</td>
<td>.379*</td>
</tr>
<tr>
<td>North-Hatt</td>
<td>.001</td>
<td>.730</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.

The multiple regression equation for the reduced battery, which involved only one predictive measure, was

$$PG = 1.825 + (.008)(IC).$$

The constant was 1.825, and the standard error of estimate for this equation was .738.
Hypothesis 3 stated that the value of the multiple $R$ found between the predictors in battery I and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple $r$ is determined between the best single predictor and the same criterion. That portion of hypothesis 3 which concerned sophomore United States history was rejected since the multiple $R$ of .379 was not significantly larger than the simple $r$ of .262.

As seen in Table XXXI, the coefficients of correlation among the test members of battery II and with the criterion of grade point average in freshman business administration were all positive and significant at better than the 5 per cent level.

Concerning the nontest predictors, military or nonmilitary type high school produced coefficients of correlation significant at the 5 per cent level with only the criterion. A negative coefficient of correlation resulted with the North-Hatt Occupational Prestige Scale; all others were positive.

The coefficients of correlation between the North-Hatt Occupational Prestige Scale and all other members of the battery were negative, and all failed to reach the 5 per cent level of significance.

The best single predictive member of this battery was the American College Testing Program, Natural Science Test which
### TABLE XXXI

**MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS AMONG THE PREDICTORS AND THE CRITERION OF GRADE POINT AVERAGE IN FRESHMAN BUSINESS ADMINISTRATION (F.B.A.) (N = 89)**

<table>
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<tr>
<th>Variable</th>
<th>Mean</th>
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<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>F.B.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.27</td>
<td>.44</td>
<td></td>
<td>-.046*</td>
<td>.106*</td>
<td>.055*</td>
<td>.123*</td>
<td>.071*</td>
<td>.200</td>
</tr>
<tr>
<td>2</td>
<td>30.49</td>
<td>15.62</td>
<td></td>
<td></td>
<td>-.010*</td>
<td>-.133*</td>
<td>-.148*</td>
<td>-.082*</td>
<td>-.157*</td>
</tr>
<tr>
<td>3</td>
<td>15.16</td>
<td>4.12</td>
<td></td>
<td></td>
<td></td>
<td>.572</td>
<td>.556</td>
<td>.631</td>
<td>.440</td>
</tr>
<tr>
<td>4</td>
<td>16.75</td>
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<td>.517</td>
<td>.562</td>
<td>.443</td>
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<td>18.02</td>
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<td></td>
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<td></td>
<td></td>
<td>.662</td>
<td>.491</td>
</tr>
<tr>
<td>6</td>
<td>18.96</td>
<td>5.77</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.574</td>
</tr>
<tr>
<td>F.B.A.</td>
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<td>.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School  
Variable 2 = North-Hatt Occupational Prestige Scale  
Variable 3 = American College Testing Program, English test  
Variable 4 = American College Testing Program, Mathematics test  
Variable 5 = American College Testing Program, Social Studies test  
Variable 6 = American College Testing Program, Natural Science test

*Not significant at the 5 per cent level.*

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gave a coefficient of correlation of .574 with the criterion. These values ranged downward from this point to a low coefficient of correlation of -.157 between the North-Hatt Occupational Prestige Scale and the criterion.

Table XXXII contains the information that the reduced battery was composed entirely of the best single predictor, the American College Testing Program, Natural Science Test. Coefficients of correlation between all the other predictive members of the battery and the criterion failed to produce a significant F test. The coefficient of correlation of .574 for the American College Testing Program, Natural Science Test was compared with the coefficient of multiple correlation of .627 for the complete battery.

The multiple regression equation for the complete battery was developed from the information contained in Tables XXXI and XXXII. This equation was

\[ PG = 0.371 + (0.245)(THS) - (0.004)(NH) + (0.009)(AE) + \\
(0.013)(AM) + (0.017)(AN) + (0.050)(AS), \]

where PG was the predicted grade point average in freshman business administration. The constant for the equation was .371, and .615 was the standard error of estimate.

The multiple regression equation for the reduced battery was

\[ PG = 0.580 + (0.075)(AS), \]

for which the constant was .580, and the standard error of estimate was .656.
### Table VIII

**Rank Order of Predictors with Regard to Contribution to the Multiple Correlation Showing F Level, Standard Error, Coefficient of Multiple Determination, and Multiple Correlation**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>$R^2$</th>
<th>$R$</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT Natural Science</td>
<td>42.689</td>
<td>.628</td>
<td>.32916</td>
<td>.574**</td>
</tr>
<tr>
<td>Type High School</td>
<td>3.415</td>
<td>.619</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Mathematics</td>
<td>2.803</td>
<td>.613</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Social Studies</td>
<td>1.426</td>
<td>.611</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>.877</td>
<td>.612</td>
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<td></td>
</tr>
<tr>
<td>ACT English</td>
<td>.165</td>
<td>.615</td>
<td>.39345</td>
<td>.627*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.

Hypothesis 4 stated that the value of the multiple $R$ found between the predictors in battery II and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple $r$ is determined between the best single predictor and the same criterion. That portion of hypothesis 4 which was concerned with freshman business administration was rejected since the multiple $R$ of .627 was not significantly larger than the simple $r$ of .574.
In Table XXXIII are presented the means and standard
deviations of all dependent and independent variables; also,
the intercorrelations of the predictors with the other members
of the battery and with the criterion. All coefficients of
correlation between the predictor tests and grade point average
in freshman biology were positive and all reached the 5 per
cent level of significance.

This was not true of the non-test members of battery II.
Although all coefficients of correlation obtained between mil-
itary or nonmilitary type high school and the other members
of the battery and the criterion were positive, only those values
for the American College Testing Program, Mathematics and
Social Studies Tests and the criterion reached the 5 per cent
level of significance.

The North-Hatt Occupational Prestige Scale correlated pos-
itively with only the American College Testing Program, English
Test. A coefficient of correlation significant at the 5 per
cent level was obtained with the criterion of grade point aver-
age in freshman biology. All others failed to reach this
chosen level of significance.

The best single predictor of grade point average in fresh-
man biology within battery II was the American College Testing
Program, Natural Science Test, which produced a coefficient of
correlation of .637. The remaining coefficients of correlation
decreased in value to -.196 for the North-Hatt Occupational
Prestige Scale.
# TABLE XXXIII

MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS AMONG THE PREDICTORS AND THE CRITERION OF GRADE POINT AVERAGE IN FRESHMAN BIOLOGY (F.B.)

\( (N = 97) \)

<table>
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<th>Variable</th>
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<th>4</th>
<th>5</th>
<th>6</th>
<th>F.B.</th>
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<tbody>
<tr>
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<td>.23</td>
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<td>.018*</td>
<td>.123*</td>
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<td>.165</td>
<td>.102*</td>
<td>.253</td>
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</tr>
<tr>
<td>2</td>
<td>30.96</td>
<td>17.41</td>
<td>.087*</td>
<td>-.022*</td>
<td>-.082*</td>
<td>-.091*</td>
<td>-.199</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>15.70</td>
<td>4.11</td>
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<td>.567</td>
<td>.498</td>
<td>.498</td>
<td>.525</td>
<td>.583</td>
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</tr>
<tr>
<td>4</td>
<td>17.43</td>
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<td>.494</td>
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<td>.466</td>
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<td></td>
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<td>5.10</td>
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<td></td>
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<td></td>
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</tr>
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</tr>
</tbody>
</table>

Variable 1 = Type High School  
Variable 2 = North-Hatt Occupational Prestige Scale  
Variable 3 = American College Testing Program, English test  
Variable 4 = American College Testing Program, Mathematics test  
Variable 5 = American College Testing Program, Social Studies test  
Variable 6 = American College Testing Program, Natural Science test

*Not significant at the 5 per cent level.
The coefficients of multiple correlation for the complete and reduced batteries given in Table XXXIV made it possible to compare these values with the .637 coefficient of correlation for the best single predictor. The R for the complete battery was .743 and was .733 for the reduced battery.

**TABLE XXXIV**

**RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>$R^2$</th>
<th>$R$</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT Natural Science</td>
<td>65.148</td>
<td>.703</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Mathematics</td>
<td>15.790</td>
<td>.654</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>4.306</td>
<td>.643</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>4.640</td>
<td>.630</td>
<td>.53789</td>
<td>.733**</td>
</tr>
<tr>
<td>ACT English</td>
<td>2.281</td>
<td>.626</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Social Studies</td>
<td>.557</td>
<td>.628</td>
<td>.55196</td>
<td>.743*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.

The multiple regression equation for the complete battery was

Here, PG was the predicted grade point average in freshman biology. The constant for this equation was -.376, and the standard error of estimate was .638.

The multiple regression equation for the reduced battery considered the four significant predictors.

\[ PG = -.278 + (.334)(THS) - (.008)(NH) + (.056)(AM) + (.071)(AN). \]

The constant for this equation was -.278; the standard error of estimate was .630.

Hypothesis 4 stated that the value of the multiple R found between the predictors in battery II and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple r is determined between the best single predictor and the same criterion. That portion of hypothesis 4 which was concerned with freshman biology was accepted since the multiple R of .743 was larger than the simple r of .638 at the 5 per cent level of confidence.

Information contained in Table XXXV indicates positive coefficients of correlation among all predictive tests in battery II and with the criterion of grade point average in freshman chemistry. All values reached the 5 per cent level of significance.

All coefficients of correlation between military or non-military type high school, a non-test predictor, and the other members of the battery were positive. Only the coefficient of
### TABLE XXXV

Means, standard deviations, and intercorrelations among the predictors and the criterion of grade point average in freshman chemistry (F.C.)

$$N = 103$$

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>F.C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.30</td>
<td>0.46</td>
<td></td>
<td>0.034*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.043*</td>
</tr>
<tr>
<td>2</td>
<td>31.04</td>
<td>15.54</td>
<td></td>
<td></td>
<td>0.040*</td>
<td>-0.116*</td>
<td>-0.084*</td>
<td>-0.131*</td>
<td>0.083*</td>
</tr>
<tr>
<td>3</td>
<td>17.29</td>
<td>3.33</td>
<td></td>
<td></td>
<td></td>
<td>0.452</td>
<td></td>
<td></td>
<td>0.409</td>
</tr>
<tr>
<td>4</td>
<td>20.33</td>
<td>4.13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.407</td>
<td></td>
<td>0.401</td>
</tr>
<tr>
<td>5</td>
<td>20.34</td>
<td>4.43</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.519</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>22.51</td>
<td>4.44</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.C.</td>
<td>0.165</td>
<td>1.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Variable 1** = Type High School  
**Variable 2** = North-Hatt Occupational Prestige Scale  
**Variable 3** = American College Testing Program, English test  
**Variable 4** = American College Testing Program, Mathematics test  
**Variable 5** = American College Testing Program, Social Studies test  
**Variable 6** = American College Testing Program, Natural Science test

*Not significant at the 5 per cent level.*
correlation between this predictor and the American College Testing Program, English Test reached the 5 per cent level of significance.

In the case of the other non-test predictor, the North-Hatt Occupational Prestige Scale, all coefficients of correlation with the other members of the battery failed to reach the chosen 5 per cent level of significance. With the exceptions of the American College Testing Program, English Test and the criterion, coefficients of correlation with the other members of the battery were all negative.

The best single predictor of grade point average in freshman chemistry was the American College Testing Program, Natural Science Test. The coefficient of correlation between this predictor and the criterion was .495. The coefficients of correlation between the criterion and the other members of battery II ranged downward from this value to .043 for the non-test predictor of military or nonmilitary type high school.

Information concerning the coefficients of multiple correlation for the complete and the reduced batteries is given in Table XXXVI. This information made it possible to compare these values with the r of .495 for the best single predictor. The coefficient of multiple correlation for the complete battery was .581. For the reduced battery this value was .572.

A multiple regression equation, which considered all of the predictors contained in battery I, was developed from the
information provided by Tables XXXV and XXXVI. This equation was

\[ \text{PG} = -2.695 - (.061)(\text{THS}) + (.011)(\text{NH}) + (.042)(\text{AE}) + (.061)(\text{AM}) - (.004)(\text{AS}) + (.094)(\text{AN}). \]

**TABLE XXXVI**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>( R^2 )</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT Natural Science</td>
<td>32.758</td>
<td>.966</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Mathematics</td>
<td>7.787</td>
<td>.935</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>4.117</td>
<td>.920</td>
<td>.32742</td>
<td>.572**</td>
</tr>
<tr>
<td>ACT English</td>
<td>1.376</td>
<td>.919</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>.093</td>
<td>.923</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Social Studies</td>
<td>.024</td>
<td>.926</td>
<td>.33753</td>
<td>.581*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.

Here, PG was the predicted grade point average in freshman chemistry. The constant for this equation was -2.695. The standard error of estimate was .926.

The multiple regression equation for the reduced battery was as follows:
PG = -2.529 + (.012)(NH) + (.071)(AM) + (.103)(AN),
for which the constant was -2.529. The standard error of 
estimate was .920.

Hypothesis 4 stated that the value of the multiple R found 
between the predictors in battery II and the criterion of grade 
point average in selected individual subject matter areas is 
significantly larger than the value obtained when a simple r 
is determined between the best single predictor and the same 
criterion. That portion of hypothesis 4 which was concerned 
with freshman chemistry was accepted since the multiple R of 
.581 was larger than the simple r of .495 at the 5 per cent 
level of confidence.

Intercorrelations among the members of the battery and 
with the criterion of grade point average in freshman English 
were given in Table XXXVII. This information indicated that 
all these values for the predictor tests and the criterion were 
positive and significant at the 5 per cent level.

Coefficients of correlation between the nontest predictor, 
military or nonmilitary type high school, and the other members 
of the battery were all positive. With the exception of the 
criterion, all coefficients of correlation between this pre-
dictor and the other predictors failed to reach the 5 per cent 
level of significance.

Negative coefficients of correlation were obtained between 
the North-Hatt Occupational Prestige Scale and the American
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>F.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.29</td>
<td>.45</td>
<td></td>
<td>.056*</td>
<td>.132*</td>
<td>.130*</td>
<td>.124*</td>
<td>.124*</td>
<td>.190</td>
</tr>
<tr>
<td>2</td>
<td>31.60</td>
<td>16.44</td>
<td></td>
<td></td>
<td>.032*</td>
<td>.028*</td>
<td>-.032*</td>
<td>-.018*</td>
<td>.016*</td>
</tr>
<tr>
<td>3</td>
<td>16.31</td>
<td>4.05</td>
<td></td>
<td></td>
<td></td>
<td>.601</td>
<td></td>
<td>569</td>
<td>593</td>
</tr>
<tr>
<td>4</td>
<td>18.59</td>
<td>5.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>536</td>
<td></td>
<td>566</td>
</tr>
<tr>
<td>5</td>
<td>19.32</td>
<td>5.19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.636</td>
</tr>
<tr>
<td>6</td>
<td>20.79</td>
<td>5.46</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.E.</td>
<td>1.69</td>
<td>.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School  
Variable 2 = North-Hatt Occupational Prestige Scale  
Variable 3 = American College Testing Program, English test  
Variable 4 = American College Testing Program, Mathematics test  
Variable 5 = American College Testing Program, Social Studies test  
Variable 6 = American College Testing Program, Natural Science test

*Not significant at the 5 per cent level.
College Testing Program, Social Studies and Natural Science Tests. These values for the other predictors were positive. All coefficients of correlation between the North-Hatt Occupational Prestige Scale and the other members of the battery failed to reach the 5 per cent significance level.

The best single predictor of grade point average in freshman English was the American College Testing Program, English Test which produced a coefficient of correlation of .567 with that criterion. The coefficients of correlation for the other predictors ranged down to .016 for the North-Hatt Occupational Prestige Scale.

As seen in Table XXXVIII, the coefficient of multiple correlation for the complete battery was .626 and for the reduced battery was .614. These values may be compared with the coefficient of correlation of .567 for the best single predictor of the criterion.

A multiple regression equation for the complete battery was developed from the information given in Tables XXXVII and XXXVIII. This equation was

\[
P_G = -0.700 + (0.191)(\text{THS}) + (0.000)(\text{NH}) + (0.073)(\text{AE}) +
(0.044)(\text{AM}) + (0.000)(\text{AS}) + (0.016)(\text{AN}),
\]

where \( P_G \) was the predicted grade point average in freshman English. The constant for this equation was -0.700; the standard error of estimate was .691.
TABLE XXXVIII

RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>R²</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT English</td>
<td>98.308</td>
<td>.722</td>
<td>.694</td>
<td>.614*</td>
</tr>
<tr>
<td>ACT Mathematics</td>
<td>13.448</td>
<td>.694</td>
<td>.3762</td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>3.436</td>
<td>.690</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Natural Science</td>
<td>2.071</td>
<td>.688</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>.001</td>
<td>.691</td>
<td>.3926</td>
<td>.626*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.
**Coefficient of multiple correlation for reduced battery.

The multiple regression equation for the reduced battery was

\[ PG = -.619 + (.084)(AE) + (.051)(AM), \]

for which -.619 was the constant. The standard error of estimate was .694.

Hypothesis 4 stated that the value of the multiple R found between the predictors in battery II and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple r
is determined between the best single predictor and the same criterion. That portion of hypothesis 4 which was concerned with freshman English was accepted since the multiple R of .626 was larger than the simple r of .567 at the 5 per cent level of confidence.

In Table XXXIX are presented the means and standard deviations of all predictive instruments with themselves and with the criterion of grade point average in freshman foreign language. All coefficients of correlation among the test predictors were positive and all were significant at the 5 per cent level. Coefficients of correlation between these predictors and the criterion were also all positive but none reached the chosen level of significance.

Coefficients of correlation with the non-test predictor of military or non-military type high school were all positive. The American College Testing Program, English Test, and the criterion failed to produce coefficients of correlation significant at the 5 per cent level with this predictor.

The North-Hatt Occupational Prestige Scale produced positive coefficients of correlation with the American College Testing Program, English and Natural Science Tests. All others were negative. No coefficients of correlation between this predictor and the other members of the battery reached the chosen 5 per cent level of significance.

The best single predictor of grade point average in freshman foreign language was the American College Testing Program.
Table XXXIX

Means, standard deviations, and intercorrelations among the predictors and the criterion of grade point average in freshman foreign language (F.F.L.)
(N = 51)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>F.F.L.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.25</td>
<td>0.44</td>
<td>.085*</td>
<td>.294</td>
<td>.388</td>
<td>.212</td>
<td>.388</td>
<td>.015*</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>32.56</td>
<td>18.68</td>
<td></td>
<td>.003*</td>
<td>-.106*</td>
<td>-.015*</td>
<td>.009*</td>
<td>.141*</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>15.63</td>
<td>4.25</td>
<td></td>
<td></td>
<td>.531</td>
<td>.488</td>
<td>.533</td>
<td>.215*</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>17.04</td>
<td>4.46</td>
<td></td>
<td></td>
<td></td>
<td>.539</td>
<td>.572</td>
<td>.108*</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>19.22</td>
<td>5.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.586</td>
<td>.201*</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>20.18</td>
<td>5.53</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.120*</td>
<td></td>
</tr>
<tr>
<td>F.F.L.</td>
<td>2.01</td>
<td>1.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School
Variable 2 = North-Hatt Occupational Prestige Scale
Variable 3 = American College Testing Program, English test
Variable 4 = American College Testing Program, Mathematics test
Variable 5 = American College Testing Program, Social Studies test
Variable 6 = American College Testing Program, Natural Science test

*Not significant at the 5 per cent level.
English Test which produced a coefficient of correlation of .215 with this criterion. The values for the remaining members of the battery dropped down to .015 for military or non-military type high school.

Information found in Table XL indicates that no coefficient of correlation between any member of the battery and the criterion gave a significant F test. Since no reduced battery was produced, the r of .215 for the best single predictor was compared with the coefficient of multiple correlation of .229 for the complete battery.

**Table XL**

RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>R²</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT English</td>
<td>2.385</td>
<td>1.104</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>1.101</td>
<td>1.104</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Social Studies</td>
<td>.646</td>
<td>1.108</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>.532</td>
<td>1.114</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Natural Science</td>
<td>.023</td>
<td>1.126</td>
<td>.08966</td>
<td>.299*</td>
</tr>
<tr>
<td>ACT Mathematics</td>
<td>.000</td>
<td>1.138</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.
A multiple regression equation which considered all the predictors in battery I was developed. This equation was

\[ PG = 0.522 - (0.257)(TH3) + (0.009)(NH) + (0.048)(AE) + (0.027)(AM) + (0.033)(AS) - (0.006)(AN), \]

where PG was the predicted grade point average in freshman foreign language. For this equation the constant was 0.522. The standard error of estimate was 1.133.

Hypothesis 4 stated that the value of the multiple R found between the predictors in battery II and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple r is determined between the best single predictor and the same criterion. That portion of hypothesis 4 which was concerned with freshman foreign language was rejected since the multiple R of 0.299 was not significantly larger than the simple r of 0.215.

An examination of Table XLI furnishes the information that all coefficients of correlation among the test predictors in battery II and with the criterion of grade point average in freshman mathematics were positive and significant at the 5 per cent level.

For the first nontest predictor, military or nonmilitary type high school, a coefficient of correlation significant at the 5 per cent level was obtained only with the criterion. These values for all the other predictive members failed to reach this chosen level. All coefficients of correlation
TABLE XII

MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS AMONG THE PREDICTORS AND THE CRITERION OF GRADE POINT AVERAGE IN FRESHMAN MATHEMATICS (F.M.)
(N = 176)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>F.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.28</td>
<td>.45</td>
<td></td>
<td>.069*</td>
<td>.134*</td>
<td>.139*</td>
<td>.133*</td>
<td>.150*</td>
<td>.233</td>
</tr>
<tr>
<td>2</td>
<td>31.84</td>
<td>16.90</td>
<td></td>
<td></td>
<td>.012*</td>
<td>.010*</td>
<td>-.078*</td>
<td>-.067*</td>
<td>.082*</td>
</tr>
<tr>
<td>3</td>
<td>16.74</td>
<td>3.75</td>
<td></td>
<td></td>
<td></td>
<td>.573</td>
<td>.536</td>
<td>.569</td>
<td>.293</td>
</tr>
<tr>
<td>4</td>
<td>19.65</td>
<td>4.68</td>
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<td></td>
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<td></td>
<td>.509</td>
<td>.540</td>
<td>.495</td>
</tr>
<tr>
<td>5</td>
<td>19.82</td>
<td>4.93</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.609</td>
<td>.265</td>
</tr>
<tr>
<td>6</td>
<td>21.53</td>
<td>5.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.321</td>
</tr>
</tbody>
</table>

F.M. 1.38 .87

Variable 1 = Type High School
Variable 2 = North-Hatt Occupational Prestige Scale
Variable 3 = American College Testing Program, English test
Variable 4 = American College Testing Program, Mathematics test
Variable 5 = American College Testing Program, Social Studies test
Variable 6 = American College Testing Program, Natural Science test

*Not significant at the 5 per cent level.
between this predictor and the other members of the battery were positive.

Coefficients of correlation between the North-Hatt Occupational Prestige Scale and the remaining instruments in battery II all failed to reach the 5 per cent level of significance. Negative coefficients of correlation were obtained between this predictor and the American College Testing Program, Social Studies and Natural Science Tests.

The best single predictor of grade point average in freshman mathematics was the American College Testing Program, Mathematics Test. This instrument produced a coefficient of correlation of .495 with the criterion. The coefficients of correlation for the other members of battery II decreased in value to .082 for the North-Hatt Occupational Prestige Scale.

Multiple R's for the complete and reduced batteries are given in Table XLIII. This made it possible to compare these values with the r of .495 for the best single predictor. The coefficient of multiple correlation for the complete battery was .530. This value for the reduced battery was .522.

This multiple regression equation for the complete battery was developed using all the predictive members of battery II.

\[ PG = -.615 + (.308)(THS) + (.064)(NB) - (.006)(AE) + (.034)(AM) - (.003)(AS) + (.014)(AN). \]

Here, PG was the predicted grade point average in freshman mathematics. The constant for this equation was -.615, and the standard error of estimate was .752.
### TABLE XLII

RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>$R^2$</th>
<th>$R$</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT Mathematics</td>
<td>56.496</td>
<td>.759</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>6.556</td>
<td>.747</td>
<td>.27267</td>
<td>.522**</td>
</tr>
<tr>
<td>North-Hatt</td>
<td>1.032</td>
<td>.747</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Natural Science</td>
<td>.732</td>
<td>.748</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT English</td>
<td>.112</td>
<td>.750</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Social Studies</td>
<td>.044</td>
<td>.752</td>
<td>.28075</td>
<td>.530*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.

The multiple regression equation for the reduced battery considered only the significant predictors within the battery.

$$PG = -0.432 + (0.324)(THS) + (0.088)(AM).$$

The constant for the equation was -0.432. The standard error of estimate was .747.

Hypothesis 4 stated that the value of the multiple $R$ found between the predictors in battery II and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple $r$ is determined between the best single predictor and the same
criterion. That portion of hypothesis 4 which was concerned with freshman mathematics was rejected since the multiple $R$ of .530 was not significantly larger than the simple $r$ of .495.

It is indicated in Table XLIII that the coefficients of correlation among the predictive tests in battery II and with the criterion of grade point average in military schools training were all positive and significant at the 5 per cent level.

The same was not true for the two nontest members of the battery. Although all coefficients of correlation between military or nonmilitary type high school and the other members of the battery were positive, none reached the 5 per cent level of significance.

The North-Hatt Occupational Prestige Scale produced positive coefficients of correlation with one predictor, the American College Testing Program, English Test and the criterion of grade point average in freshman military schools training. Only the coefficient of correlation with the American College Testing Program, Social Studies Test was significant at the 5 per cent level.

The best single predictor of grade point average in freshman military schools training within battery II was the American College Testing Program, Mathematics Test, which produced a coefficient of correlation of .504 with the criterion. The values produced by the other predictors ranged down to .020 for the North-Hatt Occupational Prestige Scale.
TABLE XLIII
MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS AMONG THE PREDICTORS AND THE CRITERION OF GRADE POINT AVERAGE IN FRESHMAN MILITARY SCHOOLS TRAINING (F.M.S.)
\( (N = 156) \)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S. D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>F.M.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.84</td>
<td>.19</td>
<td>.022*</td>
<td>.054*</td>
<td>.139*</td>
<td>.058*</td>
<td>.106*</td>
<td>.034*</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>31.47</td>
<td>17.05</td>
<td>.037*</td>
<td>-.078*</td>
<td>-.083</td>
<td>-.077*</td>
<td>.020*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>16.03</td>
<td>4.22</td>
<td>.574</td>
<td>.549</td>
<td>.491</td>
<td>.431</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>18.37</td>
<td>4.98</td>
<td>.506</td>
<td>.569</td>
<td>.504</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>18.95</td>
<td>5.37</td>
<td>.649</td>
<td>.350</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>20.49</td>
<td>5.38</td>
<td>.430</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.M.S.</td>
<td>2.36</td>
<td>.82</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School
Variable 2 = North-Hatt Occupational Prestige Scale
Variable 3 = American College Testing Program, English test
Variable 4 = American College Testing Program, Mathematics test
Variable 5 = American College Testing Program, Social Studies test
Variable 6 = American College Testing Program, Natural Science test

*Not significant at the 5 per cent level.
Information contained in Table XLIV permits a comparison of the coefficients of multiple correlation for the complete and the reduced batteries with the coefficient of correlation of -.504 for the best single predictor. The multiple R for the complete battery was .549 and was .533 for the reduced battery.

**TABLE XLIV**

**RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>$R^2$</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT Mathematics</td>
<td>52.304</td>
<td>.710</td>
<td>.26392</td>
<td>.533**</td>
</tr>
<tr>
<td>ACT Natural Science</td>
<td>6.495</td>
<td>.698</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT English</td>
<td>2.800</td>
<td>.694</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>3.600</td>
<td>.695</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>.321</td>
<td>.696</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Social Studies</td>
<td>.002</td>
<td>.699</td>
<td>.30116</td>
<td>.549*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.
**Coefficient of multiple correlation for reduced battery.

This multiple regression equation was developed for the complete battery:

\[ PG = .318 - (.166)(THS) + (.003)(NH) + (.027)(AE) + (.056)(AM) + (.001)(AS) + (.024)(AN). \]
Here, PG was the predicted grade point average in military schools training. The constant for this equation was .318, and the standard error of estimate was .699.

A multiple regression equation was developed which considered only the two significant predictors:

\[ PG = .547 + (.063)(AM) + (.032)(AN) \]

In this equation the constant was .547, and .698 was the standard error of estimate.

Hypothesis 4 stated that the value of the multiple R found between the predictors in battery II and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple r is determined between the best single predictor and the same criterion. That portion of hypothesis 4 which was concerned with freshman military schools training was accepted since the multiple R of .549 was larger than the simple r of .504 at the 5 per cent level of confidence.

The information contained in Table XLV indicates that all coefficients of correlation of the test measures of battery II with themselves and with the criterion of grade point average in freshman physics were positive and significant at the 5 per cent level.

Coefficients of correlation between the nontest predictor of military and nonmilitary type high school and the other members of the battery were all positive. However, none of these values reached the 5 per cent level of significance.
TABLE XLV
MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS AMONG THE PREDICTORS AND THE CRITERION OF GRADE POINT AVERAGE IN FRESHMAN PHYSICS (F.P.)
(N = 77)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>F.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.29</td>
<td>.45</td>
<td></td>
<td>.035*</td>
<td>.136*</td>
<td>.146*</td>
<td>.113*</td>
<td>.173*</td>
<td>.001*</td>
</tr>
<tr>
<td>2</td>
<td>32.77</td>
<td>16.70</td>
<td></td>
<td>.087*</td>
<td>-.033*</td>
<td>.037*</td>
<td>-.022*</td>
<td>-.110*</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>16.84</td>
<td>3.91</td>
<td></td>
<td></td>
<td>.587</td>
<td>.597</td>
<td>.638</td>
<td>.332</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>20.19</td>
<td>4.78</td>
<td></td>
<td></td>
<td></td>
<td>.599</td>
<td>.564</td>
<td>.553</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>19.82</td>
<td>5.36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.701</td>
<td>.335</td>
<td></td>
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<td>6</td>
<td>21.57</td>
<td>5.54</td>
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<td>.441</td>
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</tr>
<tr>
<td>F.P.</td>
<td>2.48</td>
<td>.97</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School
Variable 2 = North-Hatt Occupational Prestige Scale
Variable 3 = American College Testing Program, English test
Variable 4 = American College Testing Program, Mathematics test
Variable 5 = American College Testing Program, Social Studies test
Variable 6 = American College Testing Program, Natural Science test

*Not significant at the 5 per cent level.
The other non-test predictor, the North-Hatt Occupational Prestige Scale, produced positive coefficients of correlation with the American College Testing Program, English and Social Studies Tests. However, no coefficients of correlation between this predictor and the other members of the battery reached a significance level of 5 per cent.

The American College Testing Program, Mathematics Test was the best single predictor of grade point average in freshman physics. Its coefficient of correlation with this criterion was .553. These values for the other members of the battery decreased to .001 for military or nonmilitary type high school.

Table XLVI contains information which indicates that the reduced battery was composed entirely of the best single predictor, the American College Testing Program, Mathematics Test. All other coefficients of correlation failed to give a significant F test. The significant coefficient of correlation of .553 for this predictor was compared with the coefficient of multiple correlation of .599 for the complete battery.

The multiple regression equation for the complete battery was

\[ PG = .188 - (.231)(THS) - (.005)(NH) - (.015)(AE) + (.103)(AM) - (.024)(AS) + (.053)(AN). \]

Here, PG was the predicted grade point average in freshman physics. The constant for this equation was .188. The standard error of estimate was .616.
### TABLE XLVI

**RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>$R^2$</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT Mathematics</td>
<td>33.123</td>
<td>.820</td>
<td>.30634</td>
<td>.553**</td>
</tr>
<tr>
<td>ACT Natural Science</td>
<td>2.677</td>
<td>.311</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>1.111</td>
<td>.311</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Social Studies</td>
<td>1.130</td>
<td>.309</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>.814</td>
<td>.311</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT English</td>
<td>.186</td>
<td>.816</td>
<td>.35982</td>
<td>.599*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.

The multiple regression equation for the reduced battery, which considered only the American College Testing Program, Mathematics Test, was as follows:

$$PG = .208 + (.112)(AM).$$

The constant for this equation was .208, and the standard error of estimate was .820.

Hypothesis 4 stated that the value of the multiple $R$ found between the predictors in battery II and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple $r$. 

is determined between the best single predictor and the same criterion. That portion of hypothesis 4 which was concerned with freshman physics was rejected since the multiple $R$ of .599 was not significantly larger than the simple $r$ of .553.

Information provided in Table XLVII made it possible to examine the intercorrelations among the independent and dependent variables within battery II. It was found that all coefficients of correlation for the predictive tests with themselves and with the criterion of grade point average in freshman world history were positive. Additionally, these values between the predictors and the criterion all reached the 5 per cent level of significance.

All coefficients of correlation between the two nontest members of the battery and the other predictive instruments failed to reach the chosen 5 per cent level of significance. With the exception of the North-Hatt Occupational Prestige Scale, coefficients of correlation between military or non-military type high school and the other members of the battery were positive. Positive coefficients of correlation were produced between the North-Hatt Occupational Prestige Scale and all other members of the battery.

The best single predictor of grade point average in freshman history was the American College Testing Program, Social Studies Test, which produced a coefficient of correlation of .517 with the criterion. The other coefficients of correlation
### TABLE XLVII

**Means, Standard Deviations, and Intercorrelations Among the Predictors and the Criterion of Grade Point Average in Freshman World History (F.H.)**  
(N = 148)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>F.H.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.26</td>
<td>.44</td>
<td></td>
<td>-.059*</td>
<td>.086*</td>
<td>.063*</td>
<td>.054*</td>
<td>.103*</td>
<td>.034*</td>
</tr>
<tr>
<td>2</td>
<td>30.76</td>
<td>16.69</td>
<td></td>
<td></td>
<td>.030*</td>
<td>.054*</td>
<td>.052*</td>
<td>.031*</td>
<td>.033*</td>
</tr>
<tr>
<td>3</td>
<td>15.99</td>
<td>4.01</td>
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<td></td>
<td></td>
<td>.536</td>
<td>.477</td>
<td>.524</td>
<td>.321</td>
</tr>
<tr>
<td>4</td>
<td>17.55</td>
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<td></td>
<td>.497</td>
<td>.540</td>
<td>.438</td>
</tr>
<tr>
<td>5</td>
<td>18.96</td>
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<td></td>
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<td>.566</td>
<td>.597</td>
</tr>
<tr>
<td>6</td>
<td>20.34</td>
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<td>.397</td>
</tr>
<tr>
<td>F.H.</td>
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<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School  
Variable 2 = North-Hatt Occupational Prestige Scale  
Variable 3 = American College Testing Program, English test  
Variable 4 = American College Testing Program, Mathematics test  
Variable 5 = American College Testing Program, Social Studies test  
Variable 6 = American College Testing Program, Natural Science test

*Not significant at the 5 per cent level.
decreased in value to .033 for the North-Hatt Occupational Prestige Scale.

The information necessary for a comparison of the best single predictor with the complete and reduced batteries is provided in Table XLVIII. The coefficient of multiple correlation for the complete battery was .564. This value for the reduced battery was .558. The coefficient of correlation for the best single predictor was .517.

**TABLE XLVIII**

**RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>R²</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT Social Studies</td>
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<td>.729</td>
<td>.31085</td>
<td>.558**</td>
</tr>
<tr>
<td>ACT Mathematics</td>
<td>9.197</td>
<td>.709</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>.924</td>
<td>.709</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Natural Science</td>
<td>.610</td>
<td>.711</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT English</td>
<td>.050</td>
<td>.712</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>.001</td>
<td>.715</td>
<td>.31839</td>
<td>.564*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.
Multiple regression equations were developed for the complete and for the reduced batteries. The equation for the complete battery was

\[ \text{PG} = -.321 - (.004)(\text{THS}) + (.003)(\text{NH}) - (.004)(\text{AE}) + (.040)(\text{AM}) + (.063)(\text{AS}) + (.013)(\text{AN}), \]

where \( \text{PG} \) was the predicted grade point average in freshman world history. The constant for the equation was -.321, and the standard error of estimate was .715.

A somewhat simpler multiple regression equation was developed for the reduced battery.

\[ \text{PG} = -.146 + (.043)(\text{AM}) + (.067)(\text{AS}). \]

The constant for this equation was -.146; the standard error of estimate was .709.

Hypothesis 4 stated that the value of the multiple \( R \) found between the predictors in battery II and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple \( r \) is determined between the best single predictor and the same criterion. That portion of hypothesis 4 which was concerned with freshman world history was accepted since the multiple \( R \) of .564 was larger than the simple \( r \) of .517 at the 5 per cent level of confidence.

According to information included in Table XLIX, all coefficients of correlation among the predictive tests and with the criterion of grade point average in sophomore English were positive and were significant at the 5 per cent level.
TABLE XLIX

MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS AMONG THE PREDICTORS AND THE CRITERION OF GRADE POINT AVERAGE IN SOPHOMORE ENGLISH (S.E.)
(N = 63)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>S.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.35</td>
<td>.48</td>
<td></td>
<td>-.061*</td>
<td>-.120*</td>
<td>.134*</td>
<td>.080*</td>
<td>.083*</td>
<td>-.066*</td>
</tr>
<tr>
<td>2</td>
<td>31.59</td>
<td>17.65</td>
<td></td>
<td>.128*</td>
<td>.068*</td>
<td>-.147*</td>
<td>.050*</td>
<td>.064*</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>16.94</td>
<td>3.49</td>
<td></td>
<td>.437</td>
<td>.595</td>
<td>.549</td>
<td>.355</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>18.25</td>
<td>4.08</td>
<td></td>
<td>.520</td>
<td>.635</td>
<td>.271</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>5</td>
<td>19.95</td>
<td>5.04</td>
<td></td>
<td>.573</td>
<td>.326</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>21.62</td>
<td>4.97</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.E.</td>
<td>2.52</td>
<td>.72</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School
Variable 2 = North-Hatt Occupational Prestige Scale
Variable 3 = American College Testing Program, English test
Variable 4 = American College Testing Program, Mathematics test
Variable 5 = American College Testing Program, Natural Science test
Variable 6 = American College Testing Program, Natural Science test

*Not significant at the 5 per cent level.
The nontest predictor, military or nonmilitary type high school, produced negative coefficients of correlation with the American College Testing Program, English and Mathematics Tests, and with the criterion. Coefficients of correlation between this predictor and the other members of the battery all failed to reach the chosen significance level of 5 per cent.

The North-Hatt Occupational Prestige Scale produced a negative coefficient of correlation with the American College Testing Program, Social Studies Test. All other values were positive. None of the coefficients of correlation between the North-Hatt Occupational Prestige Scale and the other predictive members of battery II were significant at the 5 per cent level.

The best single predictor of grade point average in sophomore English was the American College Testing Program, English Test, which had a coefficient of correlation of .355 with the criterion. The coefficients of correlation for the remaining predictors decreased to .004 for the North-Hatt Occupational Prestige Scale.

Information within Table I indicates a reduced battery composed entirely of the best single predictor, the American College Testing Program, English Test. All other coefficients of correlation failed to give a significant F test. The significant coefficient of correlation of .355 for this predictor was compared with the coefficient of multiple correlation of .403 for the complete battery.
TABLE I
RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>$R^2$</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT English</td>
<td>3.810</td>
<td>.681</td>
<td>.12620</td>
<td>.355**</td>
</tr>
<tr>
<td>ACT Social Studies</td>
<td>1.434</td>
<td>.679</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Mathematics</td>
<td>.471</td>
<td>.682</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Natural Science</td>
<td>.393</td>
<td>.685</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>.253</td>
<td>.690</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>.007</td>
<td>.696</td>
<td>.16287</td>
<td>.403*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.
**Coefficient of multiple correlation for reduced battery.

The multiple regression equation for the complete battery was

$$ PG = 1.091 - (.096)(THS) - (.01)(NH) + (.049)(AE) + (.027)(AN) + (.024)(AS) - (.015)(AN), $$

where PG was the predicted grade point average in sophomore English. The constant for the equation was 1.091; the standard error of estimate was .696.

A multiple regression was developed for the reduced battery. The simplified equation considered only the best single
predictor, the American College Testing Program, English Test. This equation was

\[ PG = 1.285 + (0.073)(AE), \]

where 1.285 was the constant and the standard error of estimate was .681.

Hypothesis 4 stated that the value of the multiple \( R \) found between the predictors in battery II and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple \( r \) is determined between the best single predictor and the same criterion. That portion of hypothesis 4 which was concerned with sophomore English was rejected since the multiple \( R \) of .403 was not significantly larger than the simple \( r \) of .355.

Listed in Table II are positive coefficients of correlation among all test predictors and with the criterion of grade point average in sophomore government. Additionally, all coefficients of correlation between these predictors and the criterion were significant at the 5 per cent level.

The non-test predictor of military or non-military type high school produced negative results with the North-Hatt Occupational Prestige Scale and the American College Testing Program, English and Natural Science Tests. All coefficients of correlation between this predictive instrument and the other instruments in battery II failed to reach the 5 per cent level of significance.
TABLE LI

MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS AMONG THE
PREDICTORS AND THE CRITERION OF GRADE POINT AVERAGE IN
SOPHOMORE GOVERNMENT (S.G.)
(N = 53)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>S.G.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.34</td>
<td>.47</td>
<td></td>
<td>-.028*</td>
<td>-.045*</td>
<td>.079*</td>
<td>.013*</td>
<td>-.072*</td>
<td>.094*</td>
</tr>
<tr>
<td>2</td>
<td>26.12</td>
<td>17.45</td>
<td></td>
<td></td>
<td>-.056*</td>
<td>.103*</td>
<td>-.228*</td>
<td>-.113*</td>
<td>.011*</td>
</tr>
<tr>
<td>3</td>
<td>16.70</td>
<td>3.70</td>
<td></td>
<td></td>
<td></td>
<td>.577</td>
<td>.655</td>
<td>.660</td>
<td>.329</td>
</tr>
<tr>
<td>4</td>
<td>17.92</td>
<td>4.19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.469</td>
<td>.605</td>
<td>.247</td>
</tr>
<tr>
<td>5</td>
<td>20.02</td>
<td>4.98</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>.556</td>
<td>.491</td>
</tr>
<tr>
<td>6</td>
<td>21.11</td>
<td>5.02</td>
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<td></td>
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<td>.387</td>
</tr>
<tr>
<td>S.G.</td>
<td>2.30</td>
<td>.66</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School
Variable 2 = North-Hatt Occupational Prestige Scale
Variable 3 = American College Testing Program, English test
Variable 4 = American College Testing Program, Mathematics test
Variable 5 = American College Testing Program, Social Studies test
Variable 6 = American College Testing Program, Natural Science test

*Not significant at the 5 per cent level.
Coefficients of correlation between the North-Hatt Occupational Prestige Scale and the American College Testing Program, English, Social Studies, and Natural Science Tests were negative. These values between this predictor and all other members of the battery failed to reach the 5 per cent level of significance.

The American College Testing Program, Social Studies Test was the best single predictor of grade point average in sophomore government. This instrument produced a coefficient of correlation of .491 with the criterion. The coefficients of correlation obtained for the other predictors ranged downward to .011 for the North-Hatt Occupational Prestige Scale.

Provided in Table LII are the coefficients of multiple correlation for the complete battery. It was also indicated that the reduced battery contained only the best single predictor, the American College Testing Program, Social Studies Test. No other predictor was able to produce a coefficient of correlation which would give a significant F test. The multiple R of .542 for the complete battery could be compared with the coefficient of correlation of .491 for the best single predictor.

The multiple regression equation for the complete battery was developed from the information provided in Tables LI and LII. This equation was:

\[ PG = .616 + (.154)(\text{THS}) + (.005)(\text{NH}) - (.017)(\text{AE}) - (.011)(\text{AM}) + (.063)(\text{AS}) + (.032)(\text{AN}) \]
TABLE LII
RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>R²</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT Social Studies</td>
<td>16.197</td>
<td>.587</td>
<td>.24104</td>
<td>.491**</td>
</tr>
<tr>
<td>ACT Natural Science</td>
<td>1.276</td>
<td>.586</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>1.035</td>
<td>.585</td>
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<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>.733</td>
<td>.587</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT English</td>
<td>.369</td>
<td>.591</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Mathematics</td>
<td>.164</td>
<td>.597</td>
<td>.29421</td>
<td>.542*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.

Here, PG was the predicted grade point average in sophomore government. The constant for this equation was .616. The standard error of estimate was .597.

This multiple regression equation for the reduced battery considered only the best single predictor:

$$PG = .997 + (.065)(AS),$$

for which .997 was the constant. According to Table LII, the standard error of estimate for this equation was .587.

Hypothesis 4 stated that the value of the multiple R found between the predictors in battery II and the criterion of grade
point average in selected individual subject matter areas is significantly larger than the value obtained when a simple \( r \) is determined between the best single predictor and the same criterion. That portion of hypothesis 4 which was concerned with sophomore government was rejected since the multiple \( R \) of .542 was not significantly larger than the simple \( r \) of .491.

Information found in Table LIII indicates significant, positive coefficients of correlation between all predictive tests and with the criterion of grade point average in sophomore military schools training.

Coefficients of correlation between one nontest predictor, military or nonmilitary type high school, and the other predictors in the battery were all positive, but they all failed to reach the 5 per cent level of significance. In contrast to this, the coefficient of correlation between this predictor and the criterion was negative but was significant at the chosen level.

None of the coefficients of correlation between the second nontest predictor, the North-Hatt Occupational Prestige Scale and the other members of the battery reached the 5 per cent level of significance. Negative coefficients of correlation were produced between this instrument and the American College Testing Program, Social Studies Test and the criterion.

Military or nonmilitary type high school, which was the best single predictor of grade point average in sophomore military schools training, produced a coefficient of correlation
### TABLE LIII

Means, standard deviations, and intercorrelations among the predictors and the criterion of grade point average in Sophomore Military Schools Training (S.M.S.)

\( N = 133 \)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>S.M.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.41</td>
<td>.49</td>
<td>.019*</td>
<td>.075*</td>
<td>.142*</td>
<td>.068*</td>
<td>.084*</td>
<td>-.382</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>32.42</td>
<td>17.34</td>
<td>.027*</td>
<td>.075*</td>
<td>-.011*</td>
<td>.057*</td>
<td>-.021*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>16.60</td>
<td>3.79</td>
<td>.559</td>
<td>.507</td>
<td>.538</td>
<td>.226</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>18.56</td>
<td>4.85</td>
<td>.559</td>
<td>.604</td>
<td>.365</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>19.83</td>
<td>4.93</td>
<td>.608</td>
<td>.257</td>
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<td></td>
<td></td>
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</tr>
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<td>6</td>
<td>21.14</td>
<td>5.50</td>
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<td></td>
<td></td>
<td>.358</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.M.S.</td>
<td>2.38</td>
<td>.77</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School  
Variable 2 = North-Hatt Occupational Prestige Scale  
Variable 3 = American College Testing Program, English test  
Variable 4 = American College Testing Program, Mathematics test  
Variable 5 = American College Testing Program, Social Studies test  
Variable 6 = American College Testing Program, Natural Science test  

*Not significant at the 5 per cent level.
of -.382 with this criterion. These values for the other predictors ranged downward to -.021 for the North-Hatt Occupational Prestige Scale.

Presented in Table LIV are the coefficient of multiple correlation for the complete battery and the coefficient of simple correlation for the reduced battery. This information facilitates the comparison of these values with the simple r of -.382 for the best single predictor. The R for the complete battery was .599 and was .595 for the reduced battery.

**TABLE LIV**

RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>R²</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type High School</td>
<td>22.344</td>
<td>.721</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Mathematics</td>
<td>34.620</td>
<td>.643</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Natural Science</td>
<td>5.883</td>
<td>.631</td>
<td>.35479</td>
<td>.595**</td>
</tr>
<tr>
<td>North-Hatt</td>
<td>.447</td>
<td>.633</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT English</td>
<td>.193</td>
<td>.635</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Social Studies</td>
<td>.029</td>
<td>.637</td>
<td>.35817</td>
<td>.599*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.
The following multiple regression equation was developed from the information provided in Tables LII and LIV:

\[ \text{PG} = 1.262 - (.697)(\text{THS}) - (.002)(\text{NH}) - (.008)(\text{AE}) + (.051)(\text{AM}) - (.003)(\text{AS}) + (.033)(\text{AN}), \]

where PG was the predicted grade point average in sophomore military schools training. The constant for this equation was 1.262. The standard error of estimate was .637.

This multiple regression equation for the reduced battery, which considered the three significant predictors, was:

\[ \text{PG} = 1.137 - (.697)(\text{THS}) + (.048)(\text{AM}) + (.030)(\text{AN}). \]

For this equation the constant was 1.137, and the standard error of estimate was .631.

Hypothesis 4 stated that the value of the multiple R found between the predictors in battery II and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple r is determined between the best single predictor and the same criterion. That portion of hypothesis 4 which was concerned with sophomore military schools training was accepted since the multiple R of .599 was larger than the simple r of .382 at the 5 per cent level of confidence.

In Table LV is provided the information that the intercorrelations among all test predictors and with the criterion of grade point average in sophomore United States history were positive and significant at the 5 per cent level.
TABLE LV

MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS AMONG THE PREDICTORS AND THE CRITERION OF GRADE POINT AVERAGE IN SOPHOMORE UNITED STATES HISTORY (S.H.)
(N = 104)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>S.H.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.31</td>
<td>.46</td>
<td></td>
<td>-.025*</td>
<td>.145*</td>
<td>.197</td>
<td>.058*</td>
<td>.099*</td>
<td>-.092*</td>
</tr>
<tr>
<td>2</td>
<td>30.69</td>
<td>15.97</td>
<td></td>
<td></td>
<td>.017*</td>
<td>.051*</td>
<td>-.075*</td>
<td>.013*</td>
<td>-.020*</td>
</tr>
<tr>
<td>3</td>
<td>16.68</td>
<td>3.89</td>
<td></td>
<td></td>
<td></td>
<td>.512</td>
<td>.506</td>
<td>.556</td>
<td>.165</td>
</tr>
<tr>
<td>4</td>
<td>18.81</td>
<td>4.68</td>
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<td></td>
<td></td>
<td></td>
<td>.498</td>
<td>.558</td>
<td>.212</td>
</tr>
<tr>
<td>5</td>
<td>19.85</td>
<td>5.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.596</td>
<td>.349</td>
</tr>
<tr>
<td>6</td>
<td>21.30</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.290</td>
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<td>S.H.</td>
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<td>.76</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School
Variable 2 = North-Matt Occupational Prestige Scale
Variable 3 = American College Testing Program, English test
Variable 4 = American College Testing Program, Mathematics test
Variable 5 = American College Testing Program, Social Studies test
Variable 6 = American College Testing Program, Natural Science test

*Not significant at the 5 per cent level.
The nontest predictor, military or nonmilitary type high school, produced negative coefficients of correlation with the North-Hatt Occupational Prestige Scale and the criterion. Only the coefficient of correlation between this predictor and the American College Testing Program, Mathematics Test was significant at the 5 per cent level.

No coefficients of correlation between the North-Hatt Occupational Prestige Scale and the other predictors or with the criterion reached the 5 per cent level of significance. Negative coefficients of correlation were obtained between this instrument and the American College Testing Program, Social Studies Test and the criterion.

The best single predictor of grade point average in sophomore United States history was the American College Testing Program, Social Studies Test. This instrument produced a coefficient of correlation of .349 with that criterion. The coefficients of correlation for the other predictive instruments within battery II decreased in value to -.020 for the North-Hatt Occupational Prestige Scale.

As seen in Table LVI, the best single predictor was the only member of the reduced battery. Coefficients of correlation between the other predictors and the criterion did not give significant F tests. The coefficient of correlation for the best single predictor was .349, which compared with a multiple R of .388 for the complete battery.
### TABLE LVI

**RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>$R^2$</th>
<th>$R$</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT Social Studies</td>
<td>14.156</td>
<td>.717</td>
<td>.12187</td>
<td>.349**</td>
</tr>
<tr>
<td>Type High School</td>
<td>1.477</td>
<td>.715</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Natural Science</td>
<td>1.146</td>
<td>.713</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT English</td>
<td>.195</td>
<td>.716</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Mathematics</td>
<td>.166</td>
<td>.719</td>
<td>.13017</td>
<td>.388*</td>
</tr>
<tr>
<td>North-Hatt</td>
<td>.003</td>
<td>.723</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.

This multiple regression equation for the complete battery was developed:

$$PG = 1.177 - (.202)(THS) - (.000)(NH) - (.012)(AE) + (.008)(AM) + (.042)(AS) + (.020)(AN),$$

where $PG$ was the predicted grade point average in sophomore United States history. The constant for this equation was 1.177, and the standard error of estimate was .723.

The multiple regression equation for the reduced battery, which involved only one predictive measure, was

$$PG = 1.128 + (.053)(AS).$$
Here, the constant was 1.128. The standard error of estimate for this equation was .736.

Hypothesis 4 stated that the value of the multiple R found between the predictors in battery II and the criterion of grade point average in selected individual subject matter areas is significantly larger than the value obtained when a simple r is determined between the best single predictor and the same criterion. That portion of hypothesis 4 which was concerned with sophomore United States history was rejected since the multiple R of .389 was not significantly larger than the simple r of .349.

Criterion of Sophomore Grade Point Average

In addition to the mean and standard deviation for each variable, the intercorrelations among all predictor variables and with the selected criterion are found in Table LVII. A difference between the test and the nontest members of battery I was immediately apparent. The coefficients of correlation for all predictive tests with themselves and with the criterion of grade point average at the end of the second year of college were positive and were significant at the 5 per cent level.

An inspection of Table LVII indicates that the coefficients of correlation for the nontest members of the battery did not reach the same levels of significance as those for the test members of the battery. The variable concerning military or nonmilitary type high school produced negative coefficients
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>S.G.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.31</td>
<td>.46</td>
<td></td>
<td>-.034*</td>
<td>.238</td>
<td>.368</td>
<td>-.059*</td>
<td>.218</td>
<td>-.238</td>
<td>.131*</td>
</tr>
<tr>
<td>2</td>
<td>31.41</td>
<td>17.20</td>
<td></td>
<td>.004*</td>
<td>.046*</td>
<td>.063*</td>
<td>.167</td>
<td>.093*</td>
<td>.081*</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>45.18</td>
<td>11.00</td>
<td></td>
<td>.506</td>
<td>.534</td>
<td>.411</td>
<td>.411</td>
<td>.396</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>179.56</td>
<td>14.00</td>
<td></td>
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<td>.343</td>
<td>.393</td>
<td>.337</td>
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<td></td>
</tr>
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<td>.601</td>
<td>.482</td>
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<td>.453</td>
<td>.431</td>
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</tr>
<tr>
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<td>82.38</td>
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<td></td>
<td>.241</td>
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</tr>
<tr>
<td>S.G.P.</td>
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</tbody>
</table>

Variable 1 = Type High School  
Variable 2 = North-Hatt Occupational Prestige Scale  
Variable 3 = Cooperative English Test  
Variable 4 = Iowa Silent Reading Test  
Variable 5 = Iowa Aptitude Test in Chemistry  
Variable 6 = Cooperative Mathematics Pre-Test  
Variable 7 = California Short Form Test of Mental Maturity

*Not significant at the 5 per cent level.
of correlation with the North-Hatt Occupational Prestige Scale, the Iowa Aptitude Test in Chemistry, and the California Short-Form Test of Mental Maturity. Coefficients of correlation with the North-Hatt Occupational Prestige Scale, the Iowa Aptitude Test in Chemistry, and the criterion were not significant at the 5 per cent level.

Although all coefficients of correlation between the North-Hatt Occupational Prestige Scale and the other members of the battery were positive, only the Cooperative Mathematics Pre-Test produced a coefficient of correlation with this predictor which reached the chosen 5 per cent level of significance.

The best single predictor of grade point average at the end of the second year of college was the Iowa Aptitude Test in Chemistry, which produced a coefficient of correlation with this criterion of .482. The value of these coefficients then decreased to a low of .081 for the North-Hatt Occupational Prestige Scale.

In Table LVIII are listed the coefficient of multiple correlation for the entire battery as .569 and for the reduced battery as .525. The values were compared with the coefficient of correlation of .482 which the best single predictor produced with the criterion.

The multiple regression equation for the complete battery was

\[ PG = .783 - (.049)(THS) - (.002)(NH) + (.007)(CE) + (.007)(IR) + (.009)(IC) + (.013)(CM) - (.001)(SF). \]
TABLE LVIII

RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>R²</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa Chemistry</td>
<td>34.527</td>
<td>.528</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coop. Math.</td>
<td>6.793</td>
<td>.515</td>
<td>.27593</td>
<td>.525**</td>
</tr>
<tr>
<td>Iowa Silent Reading</td>
<td>2.923</td>
<td>.511</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calif. Short-Form</td>
<td>3.000</td>
<td>.506</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coop. English</td>
<td>1.195</td>
<td>.506</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Hatt</td>
<td>.309</td>
<td>.507</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>.136</td>
<td>.510</td>
<td>.32312</td>
<td>.569*</td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.
**Coefficient of multiple correlation for reduced battery.

Here, PG was the predicted grade point average at the end of the second year of college. The constant for this equation was .783, and the standard error of estimate was .510.

A somewhat simplified multiple regression equation was developed from the data concerning the reduced battery.

\[
PG = 1.318 + (.009)(IC) + (.014)(CM)
\]

The constant for this equation was 1.318; the standard error of estimate was .515.

Hypothesis 5, which stated that the value of the multiple R found between the predictors in battery I and the criterion of
grade point average at the end of the second year of college is significantly larger than the value obtained between the best single predictor and the same criterion, was accepted since the multiple $R$ of .569 was larger than the simple $r$ of .482 at the 5 per cent level of confidence.

Table LIX contains the means and standard deviations for all predictors in battery II and for the criterion of grade point average at the end of the second year of college. Also included were the intercorrelations of the predictors with themselves and with the criterion. All coefficients of correlation among the predictor tests and with the criterion were positive; all were significant at better than the 5 per cent level.

The two nontest members of the battery did not produce this large number of significant correlations. Military or nonmilitary type high school produced significant coefficients of correlation with only one predictor, the American College Testing Program, Mathematics Test, and with the criterion.

The North-Hatt Occupational Prestige Scale failed to produce any coefficients of correlation which were significant at the 5 per cent level. With the exception of the American College Testing Program, English Test and the criterion, all coefficients of correlation with the North-Hatt Occupational Prestige Scale were negative.

The American College Testing Program, Natural Science Test, which had a coefficient of correlation of .513, was the best
TABLE LX

MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS AMONG THE
PREDICTORS AND THE CRITERION OF GRADE POINT AVERAGE AT
THE END OF THE SECOND YEAR OF COLLEGE (S.G.P.)
(N = 116)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>S.G.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.31</td>
<td>.46</td>
<td>-.034*</td>
<td>.112*</td>
<td>.185</td>
<td>.088*</td>
<td>.114*</td>
<td>.131</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>31.41</td>
<td>17.20</td>
<td></td>
<td>.025*</td>
<td>-.003*</td>
<td>-.071*</td>
<td>.009*</td>
<td>.081*</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>16.64</td>
<td>3.82</td>
<td></td>
<td></td>
<td>.545</td>
<td>.494</td>
<td>.541</td>
<td>.374</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>18.53</td>
<td>4.70</td>
<td></td>
<td></td>
<td></td>
<td>.516</td>
<td>.594</td>
<td>.475</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>19.83</td>
<td>4.93</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.587</td>
<td>.393</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>21.25</td>
<td>5.41</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.513</td>
<td></td>
</tr>
<tr>
<td>S.G.P.</td>
<td>2.14</td>
<td>.60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable 1 = Type High School
Variable 2 = North-Eastern Occupational Prestige Scale
Variable 3 = American College Testing Program, English test
Variable 4 = American College Testing Program, Mathematics test
Variable 5 = American College Testing Program, Social Studies test
Variable 6 = American College Testing Program, Natural Science test

*Not significant at the 5 per cent level.
single predictor of grade point average at the end of the second year of college. From this value the remaining coefficients of correlation ranged down to -0.081 between the North-Hatt Occupational Prestige Scale and this criterion.

An inspection of Table LX made it possible to compare the coefficient of correlation of .513 for the best single predictor with the R's for the complete and the reduced batteries. The coefficient of multiple correlation for the complete battery was .566; for the reduced battery this value was .555.

**TABLE LX**

**RANK ORDER OF PREDICTORS WITH REGARD TO CONTRIBUTION TO THE MULTIPLE CORRELATION SHOWING F LEVEL, STANDARD ERROR, COEFFICIENT OF MULTIPLE DETERMINATION, AND MULTIPLE CORRELATION**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>F Level</th>
<th>SE</th>
<th>R²</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT Social Studies</td>
<td>40.620</td>
<td>.518</td>
<td>.30756</td>
<td>.555**</td>
</tr>
<tr>
<td>ACT Mathematics</td>
<td>7.319</td>
<td>.504</td>
<td>.32046</td>
<td>.566*</td>
</tr>
<tr>
<td>North-Hatt</td>
<td>1.113</td>
<td>.504</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Natural Science</td>
<td>.464</td>
<td>.505</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type High School</td>
<td>.262</td>
<td>.506</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT English</td>
<td>.246</td>
<td>.508</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Coefficient of multiple correlation for complete battery.

**Coefficient of multiple correlation for reduced battery.
The following multiple regression equation included all the members of predictive battery II:

\[ PG = 0.674 + 0.052(THS) + 0.003(NH) + 0.008(AS) + 0.028(AM) + 0.007(AN) + 0.035(AS). \]

In this equation, \( PG \) was the predicted grade point average at the end of the second year of college. The constant for this equation was 0.674; the standard error of estimate was 0.504.

The multiple regression equation for the reduced battery, which included only those members significant at the 5 per cent level, was

\[ PG = 0.684 + 0.033(AM) + 0.039(AS). \]

The constant for this equation was 0.684; the standard error of estimate was 0.508.

Hypothesis 6, which stated that the value of the multiple \( R \) found between the predictors in battery II and the criterion of grade point average at the end of the second year of college is significantly larger than the value obtained between the best single predictor and the same criterion, was rejected since the multiple \( R \) of 0.566 was not significantly larger than the simple \( r \) of 0.513.

Comparison of the Batteries

Listed in Table LXI are the coefficients of multiple correlation between battery I and the selected criteria considered in this study, as are the coefficients of multiple correlation between battery II and the same criteria. Inspection of this
TABLE LXI

COMPARISON OF THE COEFFICIENTS OF MULTIPLE CORRELATION BETWEEN BATTERIES I AND II WITH THE VARIOUS SELECTED CRITERIA

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Battery I R</th>
<th>Battery II R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade point average at the end of the first year of college</td>
<td>.577</td>
<td>.609</td>
</tr>
<tr>
<td>Grade point average in:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman Business Admin.</td>
<td>.547</td>
<td>.627</td>
</tr>
<tr>
<td>Freshman Biology</td>
<td>.651</td>
<td>.743</td>
</tr>
<tr>
<td>Freshman Chemistry</td>
<td>.544</td>
<td>.581</td>
</tr>
<tr>
<td>Freshman English</td>
<td>.660</td>
<td>.727</td>
</tr>
<tr>
<td>Freshman Foreign Language</td>
<td>.601</td>
<td>.299</td>
</tr>
<tr>
<td>Freshman Mathematics</td>
<td>.464</td>
<td>.530</td>
</tr>
<tr>
<td>Freshman Military Sch. Train.</td>
<td>.517</td>
<td>.549</td>
</tr>
<tr>
<td>Freshman Physics</td>
<td>.529</td>
<td>.599</td>
</tr>
<tr>
<td>Freshman World History</td>
<td>.486</td>
<td>.564</td>
</tr>
<tr>
<td>Sophomore English</td>
<td>.464</td>
<td>.403</td>
</tr>
<tr>
<td>Sophomore Government</td>
<td>.438</td>
<td>.542</td>
</tr>
<tr>
<td>Sophomore Military Sch. Train.</td>
<td>.636</td>
<td>.599</td>
</tr>
<tr>
<td>Sophomore U. S. History</td>
<td>.379</td>
<td>.388</td>
</tr>
<tr>
<td>Grade point average at the end of the second year of college</td>
<td>.569</td>
<td>.566</td>
</tr>
</tbody>
</table>

The table indicated that battery I was a better predictor of grade point average in freshman foreign language, sophomore English,
sophomore military schools training, and of grade point average at the end of the second year of college than was battery II. However, battery II produced larger coefficients of multiple correlation with each of the other criterion areas than did battery I.

Hypothesis 7, which stated that in each instance the value of the multiple R from battery I is significantly larger than the value of the multiple R from battery II when using the same criterion, was rejected since no multiple R from battery I was significantly larger than the corresponding multiple R from battery II.

Summary

In this chapter were presented the data relative to the testing of the seven hypotheses set forth in chapter I. Two tables accompanied the consideration of each criterion. The first table contained the means, standard deviations, and intercorrelations among all the predictors and with the selected criterion. The second table included the rank order of the various predictors in the determination of a coefficient of multiple correlation, as well as the F ratios and standard errors of estimate after the addition of each predictor. Also found in this second table were columns providing coefficients of multiple correlation. Multiple R's were supplied at two points in the statistical procedure, for the complete battery and for a reduced battery.
Following the discussion of each criterion, a multiple regression equation was developed for both the complete and the reduced batteries. Such a collection of information made it possible to accept or reject each of the hypotheses being tested.

According to hypothesis one, it was expected that the coefficient of multiple correlation found between battery I and the criterion of grade point average at the end of the first year of college would be significantly larger than the value of the simple $r$ determined between the best single predictor and the same criterion. This hypothesis was accepted on the basis of the information presented in Tables I and II.

Hypothesis two was similar to hypothesis one, differing only in that it was concerned with battery II instead of battery I and was accepted on the basis of the information presented in Tables III and IV.

Hypothesis three stated that battery I would produce a coefficient of multiple correlation which would be significantly larger than the coefficient of simple correlation for the best single predictor when considered with each of the thirteen criterion areas. On the basis of the information presented in Tables V through XXX, this hypothesis was accepted in the areas of freshman biology, freshman chemistry, freshman English, freshman foreign language, freshman mathematics, freshman military schools training, freshman world history, and sophomore military schools training but was
rejected in the areas of freshman business administration, freshman physics, sophomore English, sophomore government, and sophomore United States history.

Hypothesis four was similar to hypothesis three except that battery II was substituted for battery I. On the basis of the information presented in Tables XXXI through LVI, this hypothesis was accepted in the areas of freshman biology, freshman chemistry, freshman English, freshman world history, freshman military schools training, and sophomore military schools training but was rejected in the areas of freshman business administration, freshman foreign language, freshman mathematics, freshman physics, sophomore English, sophomore government, and sophomore United States history.

Hypothesis number five predicted that the coefficient of multiple correlation between battery I and the criterion of grade point average at the end of the second year of college would be significantly larger than the simple r between the best single predictor and the same criterion. This hypothesis was accepted on the basis of the information presented in Tables LVII and LVIII.

Hypothesis number six predicted that the value of the multiple R between battery II and grade point average at the end of the second year of college would be significantly larger than the value of the simple r between the best single predictor and the same criterion. This hypothesis was rejected on the basis of the information presented in Tables LIX and LX.
The seventh hypothesis stated that the value of the multiple $R$ between battery I and the various criteria would be significantly larger than the value of the multiple $R$ between battery II and the same criteria. The fact that no multiple $R$ from battery I was significantly larger than the corresponding multiple $R$ from battery II necessitated the unqualified rejection of hypothesis seven.
CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

The problem of this study has been to establish the predictive validities of two batteries, using academic achievement as criteria. Both batteries were composed of test predictors as well as nontest predictors. Battery I contained the following tests: the Cooperative English Test: English Expression, the Iowa Silent Reading Test, the Iowa Aptitude Test in Chemistry, the Cooperative Mathematics Pre-Test, and the California Short-Form Test of Mental Maturity. Battery II contained the four tests which make up the American College Testing Program: English, Mathematics, Social Studies, and Natural Science. In addition, each battery contained these two nontest predictors, the North-Hatt Occupational Prestige Scale and a dichotomized indication of the type high school, military or nonmilitary, from which the student was graduated.

The criteria utilized in this study were grade point averages at the end of the first and second years of college and in selected subject matter areas. The thirteen subject matter areas having at least fifty students enrolled were those selected for study.
The eleven members which comprised the two predictive batteries were described and all pertinent information, such as their predictive validities, reliabilities, and standard errors of measurement, was given. All available literature dealing with multiple correlational analysis was surveyed, and those studies having the greatest applicability to this problem were reviewed.

The students included in the study were all beginning college freshmen at a Southwestern military school. The scores on all predictive instruments, as well as grade point averages in the criteria areas, were obtained from the official records of this school. The statistical method used for the determination of the coefficients of multiple correlation between the two batteries and the various selected criteria was a stepwise multiple linear regression analysis.

In order to accept hypothesis one, it would have been required that the coefficient of multiple correlation found between battery I and the criterion of grade point average at the end of the first year of college be significantly larger than the value of the simple r determined between the best single predictor and the same criterion. It was found that the coefficient of multiple correlation between battery I and this criterion was .577. The best single predictor, the Cooperative Mathematics Pre-Test, produced a coefficient of correlation of .467 with the same criterion. The F ratio, determined
by the methods described in chapter III, was 19.37, which was significant at better than the 5 per cent level. This information supported hypothesis one, which was accepted as stated.

Hypothesis two differed from hypothesis one only in that it was concerned with battery II instead of battery I and the requirements for its acceptance were equivalent. The coefficient of multiple correlation between battery II and the criterion of grade point average at the end of the first year of college was .609. The best single predictor within battery II was the American College Testing Program: Natural Science Test, which produced a coefficient of correlation of .467 with this criterion. The resulting F ratio of 9.31 was significant at better than the 5 per cent level. Therefore, hypothesis two was accepted on the basis of this information.

In order to accept hypothesis three, it would have been required that battery I produce a coefficient of multiple correlation significantly larger than the coefficient of simple correlation for the best single predictor when considered with each of the thirteen criterion areas. It was found that the F ratio between the multiple R with battery I and the simple r with the best single predictor was not significant at the 5 per cent level for grade point average in freshman business administration, freshman physics, sophomore English, sophomore government, and sophomore United States history. F levels for grade point average in all other subject matter areas reached
the desired 5 per cent level of significance. For those five areas in which nonsignificant F tests were obtained, it was necessary to reject hypothesis three. However, it was possible to accept this hypothesis for the remaining areas, which produced significant F tests.

Hypothesis four differed from hypothesis three only in that battery II was substituted for battery I and the requirements for its acceptance were equivalent. It was found that for the criteria of grade point average in freshman business administration, freshman mathematics, freshman physics, freshman foreign language, sophomore English, sophomore government, and sophomore history, the F ratio between the multiple R with battery II and the simple r with the best single predictor failed to reach the 5 per cent level of significance. For each of the remaining six criteria, the F ratio between the coefficients of multiple correlation and the coefficient of simple correlation was significant at better than the 5 per cent level. Hypothesis four was rejected for those seven areas which failed to produce significant F tests. It was accepted for the remaining six areas in which significant F tests were obtained.

In order to accept hypothesis number five, it would have been required that the coefficient of multiple correlation between battery I and the criterion of grade point average at the end of the second year of college be significantly larger
than the simple $r$ between the best single predictor and the same criterion. This multiple $R$ was found to be .569; the simple $r$ had a value of .432. The F test produced a value of 2.92, which was significant at the 5 per cent level of confidence. This significant F test permitted the acceptance of hypothesis five.

In order to accept hypothesis number six, it would have been required that the value of the multiple $R$ between battery II and grade point average at the end of the second year of college be significantly larger than the value of the simple $r$ between the best single predictor and the same criterion. It was found that the coefficient of multiple correlation was .566, and the coefficient of simple correlation was .513. The F test of significance was applied to these values and gave an F ratio of 2.29, which failed to be significant at the 5 per cent level. For this reason, hypothesis six was rejected.

In order to accept the seventh hypothesis, it would have been required that the value of the multiple $R$ between battery I and the various criteria be significantly larger than the value of the multiple $R$ between battery II and the same criteria. It was found that for only five of the fifteen criteria was the multiple $R$ for battery I larger than the multiple $R$ for battery II. An F test of the significance of the difference between these coefficients of multiple correlation was applied to the five areas of grade point average in freshman
English, freshman foreign language, sophomore English, sophomore military schools training, and grade point average at the end of the second year of college. The resulting F ratios all failed to reach the 5 per cent level of significance. The fact that no multiple R from battery I was significantly larger than the corresponding multiple R from battery II necessitated the unqualified rejection of hypothesis seven.

Findings

The data accumulated during the course of this study were statistically treated. This treatment produced a number of findings.

In ten of the fifteen criterion areas, the coefficient of multiple correlation produced with battery I was significantly larger than the coefficient of simple correlation produced with the best single predictor. This was true between only seven of the fifteen criterion areas and battery II.

For only one subject matter area was a non-test member of the battery the best single predictor. Within battery II, the best predictor of grade point average in sophomore military schools training was military or nonmilitary type high school.

The best predictor of success in certain subject matter areas was not always that instrument which had been designated as a predictor for that particular area. Further, it was found that a single predictive instrument was capable of predicting success in several areas.
Reduced batteries were indicated for fourteen of the fifteen criterion areas. In all of these fourteen cases, there was no significant decrease in the value of the coefficient of multiple correlation.

As nonsignificant members were dropped from a predictive battery, the standard error of estimate decreased. There was, however, no significant decrease in the coefficient of multiple correlation.

The test members of battery II were consistently better predictors of success in their related subject matter areas than were the test members of battery I. However, in no case was this difference significant.

The coefficients of multiple correlation ranged larger for first year subject matter areas than did the coefficients of multiple correlation from the second year of college. This was true for both predictive batteries.

Conclusions

Consideration of the findings of this study permitted the formulation of several conclusions.

Although batteries composed of several selected instruments are often more complete indicators of academic success, their predictive validities are not always significantly greater than those of the best single predictors.

The Cooperative Mathematics Pre-Test was designed to predict success in mathematics; however, it was additionally able
to predict success in freshman biology, freshman English, freshman physics, and sophomore English. The *Iowa Aptitude Test in Chemistry* is primarily intended as a chemistry predictor; however, it successfully predicted success in freshman military schools training and sophomore United States history. The *American College Testing Program: Natural Science Test* predicted success in freshman business administration as well as the related areas of freshman biology and freshman chemistry. In addition to predicting success in freshman mathematics, the *American College Testing Program: Mathematics Test* was the best single predictor of success in freshman military schools training and freshman physics. These overlapping abilities increase their values as members of a predictive battery.

Battery I, composed of the *Cooperative English Test: English Expression*, the *Iowa Silent Reading Test*, the *Iowa Aptitude Test in Chemistry*, the *Cooperative Mathematics Pre-Test*, the *California Short-Form Test of Mental Maturity*, along with two nontest predictors, the *North-Hatt Occupational Prestige Scale* and military or nonmilitary type high school, examined many of the same areas as battery II which contained, the *English, Mathematics, Social Studies, and Natural Science Tests of the American College Testing Program* and the same two nontest predictors. Therefore, little information would be gained from the results of battery I when the results of battery II have been studied previously.
The coefficient of multiple correlation between battery I and grade point average at the end of the first year of college was .577; this value at the end of the second year of college was .569. Between battery II and grade point average at the end of the first year of college the coefficient of multiple correlation was .609; this value at the end of the second year of college was .566. Therefore, it was concluded that the predictive validities of both batteries decrease with time.

Implications

The findings and conclusions of this study prompted two implications concerning the prediction of academic success at this military school.

First, battery I should not be administered to all entering college students as a part of their orientation routine. Since the previously administered battery II has already examined equivalent areas, this retesting would be an unnecessary duplication of effort. A great deal of superfluous testing could be eliminated by basing decisions concerning new students on the predictive information which is already on file.

Secondly, when it becomes necessary to determine the possibility of a student's success in any individual subject matter area, the results of the entire predictive battery should not be taken into consideration. The reduced battery indicated for the area in question will produce a coefficient of multiple
correlation not significantly smaller than for the complete battery but having a decreased standard error of estimate.

Recommendations for Further Research

On the basis of the findings and conclusions of this study, the following related research is recommended:

1. Research with either or both of the batteries considered in this study might be conducted using a population enrolled at a more typical college.

2. A test program which would administer both batteries to a large freshman class at a four-year school should be encouraged. This would make it possible to follow the students for their entire college career.

3. A study in which both batteries were included in one larger battery would provide intercorrelational information among all the predictors and with all selected criteria. At the same time, opportunity would be provided for further experimentation leading to a reduced battery capable of predicting success in several academic areas.

4. It is suggested that in future studies which would follow students through more than one year of college, the number of students in the original sample should be large enough that the enrollment in all criteria areas would be at least 100.
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