

A LONGITUDINAL ANALYSIS OF COLLEGE-WIDE
AND MAJOR FIELD GRADING STANDARDS.

by

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Chapter 1

INTRODUCTION

Since 1948, the Scholastic Aptitude Test (SAT) has been developed and administered by the Educational Testing Service (ETS) and sponsored by the College Entrance Examination Board (CEEB) (Angoff, 1971). The Test provides verbal and quantitative aptitude scores that can be compared with scores from any time within this period (CEEB, 1977). From the 1951-52 academic year to the 1962-63 year, the fluctuations between consecutive yearly means ranged from +5 to -6 points for the SAT Verbal (SAT-V) and from +6 to -5 for the SAT Math (SAT-M) (CEEB, 1977). Over a thirteen year period since 1962-63, the national mean SAT-V score has consistently decreased an average of 3.8 points per year with a range of differences between consecutive yearly means from -1 to -8. During this same period, the mean SAT-M decreased an average of 2.5 points per year with a range from 0 to -5. Since the 1975-76 year when the national mean SAT-V and SAT-M scores were 429 and 270 respectively, the annual rate of score declines slowed to an average of 1.75 and .857 points respectively (CEEB, 1979, 1980). The 1979-80 College Board Annual Report (CEEB, 1980) cited the national averages for that year as 424 and 466 respectively. A tabular summary of mean SAT scores is presented in Appendix A.

A longitudinal decline in scores is not unique to just the SAT. In a survey of other tests' score patterns, Cleary and McCandless (1977)

report that the overall score decline for both the SAT and the American College Testing (ACT) Program have been approximately three percent of their respective standard deviations per year. Score declines have been observed in a variety of different test areas as well as at many different grade levels. Generally, the magnitude of the declines have been greatest from the older students. Score declines are almost nonexistent in grades one through four (i.e. Iowa Basic Skills (Reading), SRA Assessment Surveys: Language Arts, Reading, Social Studies). In tests where score declines have been shown, the researchers conclude that 1965 appears to have been the pivotal year in that in this one year almost all score declines either started or became larger.

In 1975, the Advisory Panel on the Scholastic Aptitude Test Score Decline was appointed by the ETS and CEEB to study the factors associated with the steady decline in SAT scores (CEEB, 1977). The Panel, headed by Willard Wirtz, cites a change in the composition of the college student population as a primary factor that contributed to score decline in the sixties. In successive studies to estimate student retention rates from fifth grade through the first year of college, the National Center for Educational Statistics (Grant & Lind, 1979) reports that of 1,000 fifth graders in 1962, three-fourths graduated from high school in 1970 and almost one-half entered college. This compares to about two-thirds and one-third respectively for the 1960 high school graduates and one-half and one-quarter for the 1950 graduates. "What is clearest from this data is that, starting in about the mid-1960's,

cumulatively larger percentages of students with comparatively lower high school grade averages were going on to college (CEEb, 1977) (p.14)."

Since 1970, factors associated with the secondary school curriculum are suggested as likely explanations for the continued decline in SAT scores. Getler and Baker (1972) report that from the academic year 1960-61 to 1970-71, there was a national declining enrollment pattern in the broad traditional academic courses (i.e. world history, Latin, American history). During this period, secondary schools created many new courses in response to students' contentions that curriculums were not relevant to their lives and concerns. Enrollments in elective and speciality courses (i.e. ecology, environmental science, black literature, radio/television/film) began increasing as student abilities, needs and interests dictated. In addition, the Panel speculates that grade promotions have become more automatic while homework appears to have been reduced (CEEb, 1977). As retention rates increased, attendance rates have decreased. Not only does this impact on the absent student; but it retards the progress of those present since a portion of each class is devoted to review in an effort to keep the class at the same pace.

These trends may be responsible for the fact that not only are the SAT means being pulled down by more lower ability students; but, in addition, fewer high ability students are scoring as well as their peers of earlier years. In research commissioned by the Advisory Panel, Jackson (1977) found that the number of students who scored on or above 600 on the SAT-V increased and then remained relatively constant from

the test years 1966-67 to 1969-70. From this latter test year, with 189,300 (11.8% of all tests administered) SAT-V scores on or above 600, the number of scores declined to 108,200 (7.6% of all tests) in 1975-76. A similar pattern was found for the SAT-M in that scores on or above 600 increased and then remained almost constant from 1966-67 to 1970-71 with 278,600 (18.1% of all tests) scores on or above 600 for the latter year. This number dropped to 213,900 (15.1% of all tests) in 1975-76. Appendix B presents the percentage of SAT-V and SAT-M scores in each of the three consecutive 200 point ranges from 1966-67 to 1975-76.

In a further examination of this declining trend in the number of high SAT scores, the Panel also commissioned a special study of the scores of some 1,500 valedictorians and salutatorians in 145 secondary schools between 1960 and 1974 (Donlon & Echternacht, 1977). No significant changes were found in the average scores of these top students during the earlier years. By 1970, however, these students' scores declined at about the same rate as the national trend on both the SAT-V and SAT-M.

While SAT scores have steadily declined over the past 17 years, the rate of decline has slowed recently. Initially, this decline appears to be a broader diversity in the levels of students' abilities; but later was more likely influenced by changes in secondary school curriculums that affect all levels of students.

GRADE INFLATION

During the period of declining SAT test scores, there has been increasing concern over the deterioration of the standards by which college grades have been awarded (Carnegie Foundation for the Advancement of Teaching, 1977). Based on the 1975 Carnegie Council of Policy Studies in Higher Education survey, 75% of the faculty surveyed felt that grade inflation was a real problem (Carnegie Foundation for the Advancement of Teaching, 1979). Over 60% of the students surveyed responded that ". . .it was possible to get good grades without really understanding the material (p. 27)." According to Carnegie surveys, A and B grade point averages (GPA) rose from 35 to 59% while C or less GPA's declined from 25 to 13% for the calendar years 1969 to 1976.

The Carnegie Foundation for the Advancement of Teaching (1977) attributes this grade inflation to various factors including: student demands in the 1960's to reform grading policies; use of lenient grading in classes to ensure course enrollments; professors' fears that low grades will deprive graduates of good jobs or admission to medical or law schools; and, the use of such grading options as pass/fail which frequently have little or no effect on the students' grade point averages. One of many results of this grade inflation has been the elimination of a Dean's List by colleges where the number of students with high semester grades has become disproportionately large.

In a comparison of student attitudes concerning grading, the Carnegie Foundation for the Advancement of Teaching (1977) surveys

found that fewer students were attracted to the abolishment of grades in 1976 than in 1969. Over half of the 1969 students surveyed reported satisfaction with their own college's method of grading. The number of students who expressed dissatisfaction with the grading policies was apparently sufficient, however, to encourage colleges to explore other grading methods and options including, among other things, grading individual students in relation to those grades earned by the other students.

APTITUDE/PERFORMANCE RELATIONSHIP

The impact of a greater diversification of students' abilities and increased grade inflation has been paradoxical. It is evident that between departments within the same institution, the diversity in student abilities is not consistently represented in the grades awarded (Carnegie Foundation for the Advancement of Teaching, 1977). While a diversity in students enables colleges to serve larger portions of society and pursue institutionally determined missions, ". . .it also leaves colleges without generally recognized reference points in the quest for quality (p. 27)."

The average class performance level against which each individual student is often graded can be explained by the Adaptation-Level Theory (Goldman, Schmidt, Hewitt & Fisher, 1975). Originally developed to explain shifts in visual perception resulting from changes in comparison or anchoring stimuli, this theory concerns the effect of background stimuli on the perceptions of focal stimuli (Helson, 1947). Goldman

and his associates (1974) theorized that if individual student grades were considered focal stimuli and the general level of class performance considered to be background stimuli, grades assigned to individual students would be influenced by the performance level of the entire class. A shift in grading standards, therefore, could be inferred if higher or lower grades are awarded from one group to another without a corresponding change in ability level. The Goldman study utilized regression analysis wherein the total GPA of students within each of twelve different major fields were regressed onto SAT-V, SAT-M and secondary school GPA's of the students in that field. Students were grouped into three performance levels on the basis of their total GPA's. Within each performance group, a projected GPA was made as if the students in one major field and ability level had pursued a second field of study with its own unique grading standards. This was accomplished by using the regression equation for the second major as a measure of grading standards and applying that equation to the ability measures of the first major: SAT scores and secondary school GPA. As postulated by the Adaptation-Level Theory, it was found there was an interaction between the major field grading policies and the abilities for the low and middle GPA level groups. It was projected that Science majors (i.e. Biology, Chemistry, Mathematics) would have generally higher college GPA's if they had majored in one of the Social Science or Humanities fields. The reverse was true for the latter two fields if they had majored in one of the Sciences. This interaction was diminished for the high GPA level, however, indicating a more consistent grading

pattern among majors and an increased likelihood that a student at this level would do equally as well in any major. The authors note that only a small portion of the college GPA variance was accounted for by the secondary school GPA and the SAT-V and SAT-M scores (ranging from 14% to 52% depending upon the major). Also, since the college GPA's were based on all courses, they were diluted with grades for courses that were common to all majors and therefore diminished the GPA differences between major areas. Goldman suggested that a similar study of shifts in grading standards would yield sharper differences between major fields if the GPA's were derived from courses in only the major fields. The authors cautioned that the conclusion of easier grading by some departments would be inappropriate since diligence, creativity and other unmeasured traits were not accounted for in this study. Similar results were found in a replicated study one year later involving over 2,400 students (Goldman & Hewitt, 1975).

STATEMENT OF THE PURPOSE

As colleges seek expanded student markets to maintain enrollments, many have lowered their minimum entrance requirements. While normally not detectable through changes in grading distributions, such marginal students could affect grading standards if they concentrated in only a few departments. Using aptitude and performance data from the 1960's as a baseline, this study will examine the longitudinal deviations in departmental grading standards within a single liberal arts college over a twenty year period.

This study will establish whether the national trends of declining SAT scores and college grade inflation are evident at a small liberal arts college in southwest Virginia. Specifically, this study will:

- 1) examine the extent to which SAT scores have declined and college GPA's have simultaneously increased for the College generally and for individual major fields;
- 2) examine shifts in grading standards associated with ability level differences between major fields in three distinct time periods;
- 3) examine shifts in college-wide grading standards associated with ability level differences between time periods; and,
- 4) examine shifts in the grading standards of individual major fields associated with ability level differences between time periods.

STUDY IMPLICATIONS

Frequently, an analysis of departmental grading standards is based primarily on just a review of the percentage of each grade assigned by that department in comparison to the total college pattern. As evidenced by the Goldman research, the grade assigned to any one student is influenced by the grades assigned to others. Such an influence results in a percentage consistency of grades assigned between departments even though student ability levels differ.

For colleges that are considering adjusting their minimum freshman entrance requirements, this study provides a model for predicting subsequent enrollment pattern changes in their academic majors. If lower ability students are admitted, they would probably be more

likely to pursue major fields in which their GPA potential is higher and avoid those where it is lower. As the number of such students increase, colleges should anticipate possible pressures for changes in curriculum, grading, and resource allocation (i.e. funding, staffing).

Finally, many colleges determine student admissions on SAT scores and secondary school class rank without regard to the intended major field of study. This study examines the variability of grading standards between major fields which influences the measure of total academic success.

GLOSSARY OF TERMS

The following terms are defined in order to provide consistency and clarification of meaning throughout the study:

1. Major GPA - grade point average computed from only courses taken in the major field on or above the 200 course number level.
2. Total GPA - grade point average computed from all courses appearing on the academic record.
3. Cohort - group of students enrolled during a specified period of time.
4. Rank - secondary school class rank in deciles with 1 being the top rank.
5. SAT-M - Scholastic Aptitude Test - Mathematics.
6. SAT-V - Scholastic Aptitude Test - Verbal.

Chapter 2

REVIEW OF THE LITERATURE

SCHOLASTIC APTITUDE TEST RESEARCH

In a report prepared for the Advisory Panel, Fort and Campos (1977) summarized eleven reporting years of the Admissions Testing Program Validity Study Service. Included in the summaries were colleges that reported: the criteria of freshman grade point averages; samples of at least 50 students; college entrance years between 1964 and 1974; no more than two entering classes combined; and the three predictors of SAT-V, SAT-M and secondary school achievement index (i.e. grade point averages, ranks). The number of colleges reporting for any one of the eleven years ranged from 32 to 129. In each year the secondary school achievement index was the best single predictor of college GPA with median correlations ranging from .48 to .56. The second best single predictor was consistently the SAT-V (.33 - .42) with the SAT-M third (.28 - .39). The combination of the three preceding predictors was substantially higher than just the achievement index alone with medians ranging from .53 to .62.

The CEEB's assertion that the SAT is an unchanging and reliable measurement (CEEb, 1977) has been verified by the high internal-consistency reliability of both the SAT-V and SAT-M (Angoff, 1971). Of twelve different test forms introduced between December 1966 and May 1969, reliability estimates for the SAT-V ranged from .89 to .91

while the SAT-M's reliability ranges from .88 to .91 (p. 28). Estimates for the 1975-76 year were .90 and .88 respectively (Educational Testing Service, 1977) (p. 22).

In order to compare the SAT-V's longitudinal reliability, over 3000 secondary school students were administered both the 1963 and 1973 editions of the test (each pair of test editions were given in counterbalanced order to two different groups to control for examinee fatigue and test wiseness) (Modu & Stern, 1977). Results indicated about a nine point difference between the means of the two editions with the mean score of 444 for the 1963 edition and 453 on the 1973 (p. 17). This gradual shift was important in that it tends to underestimate the score decline over that period of time. Little shift was detected in the upper score extremes of 650 and above, however.

NORM-REFERENCED GRADING

Consistent with previously cited studies, Baird and Feister (1972) also concluded that, as a whole, faculty tend to award about the same grades regardless of whether the students are brighter or duller than the year before. In a national study encompassing over 250 colleges, the authors found that while ACT scores declined over the three year period studied, college grades remained relatively constant. They also noted a slight tendency toward a wider or narrower range of college grades assigned as the range of ACT scores fluctuated.

The phenomenon of college grade consistency has not been limited to studies involving decreases in external measures. Hills (1964) noted this same grading consistency over a three year period at a college in which the yearly mean SAT scores increases.

Acknowledging that SAT scores rarely account for more than 25% of the college GPA variance, Goldman and Widawski (1976) subsequently restudied variations within departmental grading patterns. Rather than comparing overall college GPA's as previously done, only specific grades were analyzed via pairwise comparison for those courses that were common to the two majors being compared. With 17 college majors compared, 136 nonredundant pairwise comparisons were possible. In each cell of 17 by 17 matrix, the difference between the mean grades in the common courses for the two majors were entered. The reported multiple correlation between the cell values and row effects was .94 (accounting for 88% of the variance) which indicated the significance of the choice of major on college grades.

Contrary to Goldman and associates' earlier reservation about the appropriateness or validity of college GPA's across all departments, Schoenfeldt and Brush (1975) concluded ". . .that the current system of grades could be considered singular for most predictive purposes (p. 321)." On the basis of the factor analysis of secondary school GPA's, SAT scores and the mean departmental course grade for all courses taken by each student, three factors emerged. The largest factor, accounting for 25% of all variance, was named "General Academic Achievement." All variables correlated positively with this factor

while the secondary school GPA and all but two of the mean departmental averages had their highest loadings on this factor. The second factor was defined by the mean Agriculture and Education grades while the SAT scores loaded most heavily on the third.

Research does indicate, however, that the predictive power of college admission tests and secondary school achievement indices decrease in their ability to predict semester GPA's as students progress from freshman to senior years (Humphreys, 1968). Based on the records of graduating college seniors to control for attrition, secondary school rank correlations with semester GPA's decreased from .513 in the first semester to .216 in the eighth (p. 376). A similar decrease was found with the ACT composite scores from .475 to .160 (p. 377).

The previous studies have consistently revealed differences in grading standards between college departments. Students are aware of these differences (Hewitt & Jacobs, 1978). Students were asked to estimate the expected GPA of fictitious students in various departments based only on a brief one paragraph description of that student's ability (i.e. SAT scores). From these perceptions, the major fields were ranked in terms of grading severity and compared to the actual departmental rankings at the same institution as abstracted from the Goldman and Widawski study (1976). While the rank order correlation between the two sets of data was not significant, student perceptions were in accord with the empirical rankings in that the natural sciences were perceived to have higher grading standards than the humanities

and social sciences. It was also determined that the student perceptions were not affected by the sex of the fictitious student.

In addition to the student perceptions of grading standards within individual departments or academic areas, students also have a very realistic perception of their own academic capabilities (Holen & Newhouse, 1976). When asked, prior to the first test, to predict their course grades in a course taught by a new instructor, student perceptions of their own grades correlated more highly with the actual earned grades than did their secondary or college GPA's. Indications were that students knew something about their own educational capabilities that were not accounted for by typical achievement measurements.

It is apparent from the previous two studies that, in addition to their own likes or dislikes of an academic major, students' choice of majors can be influenced by their own accurate assessment of their major GPA potential in various departments.

SIMILARITIES BETWEEN ACADEMIC AREAS

While the optimum method of comparing departmental grading standards would be to compare all students' grades in the same course, this is not possible since students take a variety of courses during their college careers. It is likely that in liberal arts colleges, however, students (regardless of major) will complete courses in areas that are common in terms of the study strategy necessary for mastering the subject matter content of the course.

Based on six factors derived from the Study Behavior Questionnaire, Biggs (1970a) found that liberal arts (non-science) students were more tolerant of ambiguity while science students were more intrinsically motivated and dogmatic. In addition, Biggs (1970b) concluded that liberal arts students tended to develop personal strategies that facilitated the categorizing and organizing of large amounts of unorganized material. Science students, on the other hand, were more heavily dependent upon the prior acquisition of relevant knowledge and the ability to integrate new material into an already existing hierarchy.

In similar research using study strategy questionnaire items, it appeared that responses differed between the four major areas represented: Physical Sciences, Biological Sciences, Social Sciences, and Humanities (Goldman & Warren, 1973). Further analysis indicated that response patterns could be represented by two orthogonal dimensions. The first appeared to be formal reasoning which discriminated between science and non-science majors. The second appeared to represent a personal desire for a practical application of material which arrayed the major groups differently.

In a further attempt to delineate ability and strategy differences between majors, Goldman and Hudson (1973) found that major fields differed significantly in both student study strategies and abilities. "Number facility was the best ability discriminator among fields, while formal reasoning and transformation-application were the best strategy discriminators (p. 368)." Science majors exhibited numerical facility and made more use of formal reasoning strategy. Non-science

majors utilized the transformation-application strategy. Even when student ability was partialled out, the strategy differences between majors became clearer. Ability differences between majors were no longer significant, however, when strategy measures were partialled out. "These results suggest that strategy differences between major fields exist independently of ability differences (p. 369)."

SUMMARY OF LITERATURE

While research indicates that the secondary school achievement index is a better predictor of freshman GPA's than either of the two SAT scores, the combination of all three predictors results in substantially higher correlations with the GPA's. These correlations do decrease, however, from the first semester GPA's to the GPA's of the last semester in college. Both the SAT-V and SAT-M tests have shown to have high internal-consistency reliability as well as high reliability between test editions.

The phenomenon of grading consistency in spite of the SAT score fluctuation has also been found in the score fluctuations of the ACT. While this phenomenon has more often been associated with steady declines in mean aptitude test scores, grading consistency has also been found when mean scores have increased.

Despite a wide variety in the courses available, the current grading systems have been found to be the singular most appropriate measure of achievement across major fields. Between major fields,

however, grading standards have not been consistent. Students have a very accurate perception of the differences in grading standards between fields as well as the likelihood of their own success in each area. In addition to differences in grading standards between major fields, the general academic disciplines differ in the way that their respective students master the material in the major fields.

Chapter 3

METHODS AND PROCEDURES

This chapter contains a description of the methods and analytical procedures used to identify shifts in grading standards. The two primary sections of this chapter include the rationale for selecting student records and the analytical procedures. Within the latter section are included procedures for determining: (1) the presence of shifts in grading standards, (2) comparisons of grading standards between major fields, (3) shifts in institutional grading standards across time, and (4) shifts in the grading standards of individual major fields across time.

SUBJECTS' RECORDS

The subjects were all students who had enrolled since August, 1960 in Roanoke College - a small, coeducational, liberal arts institution in Salem, Virginia. All academic records from the Office of Academic Affairs were selected for inclusion in this study if they satisfied the following criteria:

1. SAT scores and secondary school class ranks were available (Either SAT or ACT scores are required for freshman admission. Less than 1% of the students submitted only ACT scores).
2. The students completed less than 15 semester hours of transfer credit from other colleges (This excluded the records of

most transfer students where the major GPA was influenced by courses completed at other colleges yet included the records of those who started at Roanoke as new freshmen and completed electives elsewhere during the summers).

3. The students first enrolled at Roanoke after August, 1960 and had completed at least 75% of the total number of courses required for the baccalaureate degree (This insured a minimum diversity in the level of courses completed in the major).

4. The student's major consisted of at least 80% courses from a single department (This excluded multi-disciplined majors in which the grading patterns of several different departments comprised the grading pattern of the major).

ANALYTICAL PROCEDURES

From each selected student's record, the following data was retrieved:

1. SAT-V and SAT-M scores (In the event of multiple sets of scores the scores of the first test administration were used to minimize the influence of "test wiseness" for those students who had repeated the test),

2. secondary school class rank in deciles with first decile indicating one of the highest ranks in class (This index was more frequently reported to the College than the actual GPA on which it was based. In addition, it was considered that actual secondary school GPA's would have had greater error variance than comparative

ranks due to differences in grading standards between schools and between time periods),

3. college total GPA,

4. college graduation year (For a nongraduate, an anticipated year was used),

5. academic major field of student, and

6. GPA in all major courses above the 100 level (Based on the Adaptation-Level Theory, it was considered that there would be greater consistency in the grading standards between departments for introductory (100 level) courses than for 200 level courses and above. This would have been due to the likelihood that similar student performance diversification would be evident across courses on this level since all students, regardless of major, completed their degree core requirements from these courses).

In the few instances where one student pursued two major fields of study simultaneously (both of which satisfies the criteria for inclusion in this study), the student's data were recorded twice - once with the data from the first major and again with the data from the second.

Examination of Institution's SAT Score and Grade Point Average Trends

The student records were divided into three mutually exclusive time periods or consecutive college graduation years referred to as cohorts. The extent to which grade inflation is evident across time for the institution generally was examined by noting the magnitude

and direction of changes in the predictor variable means (i.e. SAT-V, SAT-M, Rank) from one cohort to another as compared to simultaneous changes in the total and major GPA means. Grade inflation within the individual major fields was analyzed in the same manner and compared to the general trends of the institution.

Shifts in Major GPA Grading Standards
between Major Fields of the same
Time Periods

Within each cohort, the multiple regression of major GPA on SAT-V, SAT-M and Rank was calculated for each major (with the exception of the Arts major Field in Cohort I). Prior to applying the resulting equations, the hypothesis of nonparallel major field regression systems within each cohort was tested. Nonparallel systems could produce deceptive results in that a comparison of projected GPA means between major fields could result in over- or underprediction due to differences in slopes rather than mean differences in ability or grading (Goldman, Schmidt, Hewitt and Fisher, 1974). It was for this reason that in his study Goldman grouped the student records into three performance levels according to grade point averages. The method for testing the hypothesis of regression equalities involved testing the significance of the difference between the R^2 of a pooled equation and the R^2 when separate regression coefficients were used for each major field. A set of dummy variables (D) were created by assigning a value of 1 to all persons within a particular major and a zero to all other persons (Kerlinger and Pedhazur, 1973). This required eleven

dummy variables to represent twelve major fields. When the data of the predictor variables were multiplied by any one of the dummy variables, the effect was that the predictor data associated with the corresponding dummy variable was retained and all other predictor data resulted in zeros.

For example, to test the equality of slopes across three groups, the pooled regression and separate coefficient regression equations would be as follows:

$$\begin{aligned} \text{Separate (E1): } GPA' = & b_1(\text{SAT-V}) + b_2(\text{SAT-M}) + b_3(\text{Rank}) + b_4(\text{D1}) + \\ & b_5(\text{D2}) + b_6(\text{D1})(\text{SAT-V}) + b_7(\text{D1})(\text{SAT-M}) + \\ & b_8(\text{D1})(\text{Rank}) + b_9(\text{D2})(\text{SAT-V}) + b_{10}(\text{D2})(\text{SAT-M}) + \\ & b_{11}(\text{D2})(\text{Rank}) + a \end{aligned}$$

$$\begin{aligned} \text{Pooled (E2) : } GPA' = & b_1(\text{SAT-V}) + b_2(\text{SAT-M}) + b_3(\text{Rank}) + b_4(\text{D1}) + \\ & b_5(\text{D2}) + a \end{aligned}$$

The significance of the difference between the multiple correlations of the equation with separate predictor coefficients for each major and the pooled equation was tested by the following F-test (Kerlinger & Pedhazur, 1973) (p. 206):

$$F = \frac{(R^2_{E1} - R^2_{E2}) / (K1 - K2)}{(1 - R^2_{E1}) / (N - K1 - 1)}$$

where K1 = number of variables in equation E1; K2 = number of variables in equation E2; and, N = number of subjects. The degrees of freedom for the above F ratio were K1 - K2 and N - K1 - 1.

For cohorts whose major regression systems were found to be not significantly different, differences between intercepts were tested

for significance. The same F-test, as previously used in slope comparisons was used; but the two comparison prediction equations were changed (Kerlinger & Pedhazur). The first equation included the three predictor variables plus categorical variables to indicate the major fields across which the regressions were compared. The second included only the three predictor variables.

For reasons to be detailed in Chapter 4, comparisons of grading standards between major fields were made within each cohort group without regard to performance level as measured by GPA. The raw regression coefficients of each major GPA equation were standardized in order that the relative contributions of each of the predictor variables to the R^2 of their respective regression equations be compared across major fields within each cohort group.

The SAT-V, SAT-M and Rank scores of the students in each major field were applied to the regression equations that were derived from each of the other fields within the cohort. The resulting projections were the expected GPA's of students in the original field if they had pursued majors in each of the other areas. The magnitude and direction of the shifts in grading standards were derived by the difference between the actual major GPA and each of the projected GPA's. The projections from every major field to every other field were arrayed in a matrix for each cohort group. Each row showed the projected mean major GPA's of students who actually pursued the major fields designated by the column headings if they had pursued the field designated by the row heading. Conversely,

each column showed the projected mean GPA's of students who actually pursued the major field designated by the column heading if they had pursued each of the fields designated by the row headings. Apart from the individual entries of each row and column, it was of interest to compare the summary means of each row to the summary means of each column. The row summary mean was an index of the grading standard of the major field designated by the row heading in that this mean was derived from the application of the row major's regression equation to the predictor variables of all students. Low row summary means indicated stringent grading standards while easier standards were indicated by high row summary means. The column summary mean was a measure of the ability level of the students in the major field designated by the column heading since this mean was derived from the application of all regression equations to the predictor variables of the students in the column designated major field. Low column summary means indicated low ability students whereas high ability was reflected by high summary means. To the extent that Adaptation-Level grading was operative, a negative correlation was expected across the pairs of column summary means of the major fields (Goldman, et al, 1974).

Shifts in College-wide Grading Standards across Time Periods

Within each cohort, the multiple regression of total GPA on SAT-V, SAT-M and Rank was calculated without regard to major field.

The hypothesis of parallel regression systems between the cohorts was tested in the manner described earlier. Separate predictor coefficients were used for each cohort group rather than for each major field as before. Because these tests revealed significantly different slopes, the records of all students (regardless of major field or cohort group) were divided into an approximate trichotomy of performance levels based on the total GPA of each student and separate analyses were made within each level. The SAT-V, SAT-M and Rank scores of the students in each cohort period were then applied to the regression equation from each of the other two periods. The result was that, for any one cohort and performance level, a projected total GPA mean was derived that estimated those student's mean GPA as if they had attended college during either of the other two cohort periods. The projections for each performance level were arrayed in a separate matrix. A given row showed the projected GPA's derived from the application of the regression equation designated by the row heading and applied to the cohort groups designated by the column headings. A particular column displayed the projected GPA's of the students, who actually attended college during the cohort designated by the column heading, if they had attended during each of the cohort periods designated by the row headings. The negative relationship of row and column summary means for any one performance level indicated the influence of Adaptation-Level grading over time for that performance level of students. The extent of

grade inflation was then compared between the three performance levels to determine whether the relation of grade inflation to performance level was similar across performance levels.

Shifts in Grading Standards within
Major Fields across Time Periods

The regression equation for each major field within each cohort period, as previously derived, were utilized for this analysis. Within each major field, the hypothesis of parallel regression systems between cohort periods was tested. For fields in which the hypothesis was not rejected, the equality of intercepts was tested.

For reasons to be explained in Chapter 4, major GPA projections from cohort to cohort were made within each major field regardless of performance level. The standardized regression weights within each major field were compared in order to identify changes in the relative contributions of the predictor variables to the R^2 of their respective regressions across cohort groups. Within each field, the SAT-V, SAT-M and Rank scores of the students in each cohort period were applied to the major GPA regression equation from each of the other two periods. The projections were arrayed in a matrix for each major field in the same manner as previously described. The relationship between row and column means were examined in an analysis of Adaptation-Level grading across cohort groups for each major field.

Chapter 4

ANALYSIS AND RESULTS

This chapter contains the analysis and results of the study on grading standards. The first four sections concern the distribution of students across major fields within each of the cohort periods and a descriptive analysis of the data trends. The final three sections analyze the adaptative grading standards for: (1) major fields within cohort groups; (2) total GPA across cohort groups regardless of major; and (3) each major field across cohort groups.

DISTRIBUTION OF GRADUATION YEARS AND MAJORS

Data was collected from the 2,451 student records that met all of the criteria for inclusion in the Study. Table 1 displays the frequency of records found for each major field by year of anticipated graduation. Since there were only 19 records with a graduation year of 1964, this group was considered atypically small in comparison to the other years and was therefore dropped from further study. This resulted in 2,432 records remaining for the study of total GPA's with three longitudinally distinct cohorts with an equal number of graduation years in each:

1. Cohort I (years 1965 to 1970) containing 674 records;
2. Cohort II (years 1971 to 1976) containing 1,006 records; and
3. Cohort III (years 1977 to 1982) containing 752 records.

Table 1
 Frequency of Majors by Anticipated Year of Graduation

Graduation Year	Art	Fine Arts	Music	English	French	Spanish	German	Philosophy	Religion
1964				2					
Cohort I	1965			3	4	1			
	1966			7	2				
	1967		1		7	1		3	
	1968				2	1	2		2
	1969		1		11	3	1		1
	1970		1		3	6	4		3
					<u>33</u>	<u>25</u>			
Cohort II	1971		5		4	3	3	6	
	1972		11		7	4	6	7	
	1973		13		6	8	4	4	1
	1974		6		10	4	6	1	4
	1975		11		9	4	4	2	7
	1976		3		6	3	6	2	3
			<u>49</u>		<u>42</u>	<u>55</u>			
Cohort III	1977		5		6	3	4	1	3
	1978	1	3		5	2	3	1	1
	1979		3		5	4	1		
	1980	2	2		3	3	3	1	
	1981	6	1		3	3	1		1
	1982	5	2	3	7	7	2		2
			<u>30</u>		<u>29</u>	<u>36</u>			

Table 1 continued

Graduation Year	Business	Econ.	Hist.	Political	Psych.	Sociology	Biol.	Chem.	Math	Physics	
1964		4	2		6	1	1	2	1		
Cohort I	1965		18	5	12	15	5	8	4	2	
	1966		28	5	3	33	5	8	5	2	
	1967	9	14	5	4	25	9	8	4	4	6
	1968	17	16	9	6	32	8	2	4	3	2
	1969	30	9	13	10	51	10	15	13	4	1
	1970	28	5	10	9	27	8	4	4	3	
		174	47	44	183	45	42	38	31		
Cohort II	1971	31	8	19	7	32	12	8	4	6	1
	1972	31	5	19	10	34	18	8	8	6	
	1973	31	1	19	13	24	28	15	5	10	1
	1974	40	7	11	12	30	20	26	8	3	2
	1975	31	4	6	10	27	14	17	7	2	3
	1976	31	9	9	4	23	8	23	10	6	
		229	83	56	170	100	97	42	40		
Cohort III	1977	34	9	7	6	7	5	14	3	2	
	1978	34	15	6	4	19	5	14	10	2	
	1979	38	9	2	5	18	7	12	4	4	
	1980	48	3	3	5	15	12	11	4	3	2
	1981	51	5	4	10	18	9	16	7	2	
	1982	49	6	6	9	15	16	15	2	3	
		301	28	39	92	54	82	30	18		

For the analysis of major GPA's, the following majors were excluded due to the small number of students; German, Music, Philosophy and Religion. Other majors were combined due to the academic discipline similarities which resulted in more appropriate sample sizes in some major areas:

1. Fine Arts and Art (Arts);
2. French and Spanish (Languages);
3. Business Administration and Economics; and
4. Mathematics and Physics.

Even after combining Fine Arts and Art into one general major, only three records were in Cohort I. In order that there be at least three majors in the Humanities for comparisons, the general area of Arts was retained for Cohorts II and III only.

As a result of the majors excluded due to limited sample sizes, 2364 student records were included in the analyses of major GPA's.

DESCRIPTIVE CHARACTERISTICS OF COHORTS

The total number of students in each cohort is given in Table 2 as well as the mean and standard deviation within each cohort for the variables: SAT-V, SAT-M, rank, total GPA and major GPA. Contrary to the national trend of declining SAT scores in the sixties and early seventies, the mean SAT-V score at this college remained stable from Cohort I to Cohort II while the mean SAT-M score showed an increase of 10 points. From Cohort II to Cohort III, however, there was a drop of over 25 points on both aptitude tests.

Table 2

Descriptive Characteristics by Cohort Groups

Cohort (Graduation Years)	N	Statistic	SAT-V	SAT-M	RANK	Total GPA	Major GPA
I (1965 - 1970)	674	\bar{X}	494.101	511.062	4.212	2.394	2.645
		SD	79.541	75.138	2.581	.415	.522
II (1971 - 1976)	1006	\bar{X}	494.960	521.340	3.945	2.596	2.857
		SD	85.812	83.212	2.285	.534	.593
III (1977 - 1982)	752	\bar{X}	464.048	495.061	3.750	2.675	2.819
		SD	83.784	83.873	2.401	.614	.675

Between the two earlier cohorts, there was an increase in the secondary school class rank means as well as an increase in both the college total and major GPA means. This increasing trend continued into the last cohort for the rank and total GPA means; but the major GPA mean showed a slight drop from Cohort II to III.

The phenomenon of nationally declining SAT scores was therefore not experienced by the College until Cohort III and even then the College's mean secondary school class rank and college total GPA's continued to show increases. These increases were not observed in the major GPA mean, however, in that there was little difference from Cohort II to Cohort III.

DESCRIPTIVE CHARACTERISTICS OF MAJOR FIELDS BY COHORT GROUPS

The descriptive data for the major fields within the individual cohorts are displayed in Table 3. As previously noted, there were fewer student records involved in the review of individual majors than for the general review of cohort groups.

The stability of the College's SAT-V mean from Cohort I to II was evident in that highest and second highest SAT-V means within most major fields were in these two cohorts. Eight of the eleven majors had their lowest mean SAT-V score in Cohort III. For History majors, the highest SAT-V mean was in Cohort II while Cohort I contained the highest mean scores for Political Science and Chemistry.

Table 3

Descriptive Characteristics of Major Fields by Cohort Groups

Major	Cohort	N	Statistic	SAT-V	SAT-M	RANK	Total GPA	Major GPA
Arts:	I	3	N/A N/A					
	II	49	\bar{X} SD	492.898 96.117	497.286 68.353	4.755 2.463	2.412 .458	2.966 .605
	III	30	\bar{X} SD	454.000 86.925	460.000 92.996	4.300 2.307	2.558 .531	3.130 .597
English	I	33	\bar{X} SD	564.030 72.774	523.818 69.397	2.788 2.043	2.481 .050	2.476 .539
	II	42	\bar{X} SD	563.405 87.355	532.286 86.596	3.452 2.461	2.722 .548	2.718 .602
	III	29	\bar{X} SD	532.379 84.701	498.448 75.156	3.793 2.541	2.707 .511	2.608 .522

Table 3 continued

Major	Cohort	N	Statistic	SAT-V	SAT-M	RANK	Total GPA	Major GPA
Languages:	I	25	\bar{X} SD	517.160 83.185	483.080 68.669	2.880 2.147	2.571 .558	3.071 .602
	II	55	\bar{X} SD	502.127 72.354	513.855 79.951	2.964 2.081	2.872 .508	3.237 .471
	III	36	\bar{X} SD	481.972 77.004	483.833 75.023	3.333 2.217	2.841 .624	3.205 .651
Business/ Economics:	I	174	\bar{X} SD	461.741 67.058	519.454 70.665	5.195 2.584	2.272 .327	2.563 .481
	II	229	\bar{X} SD	469.869 74.829	528.480 73.633	4.280 2.279	2.508 .545	2.898 .569
	III	301	\bar{X} SD	448.143 73.627	502.362 77.501	4.153 2.434	2.537 .599	2.677 .653

Table 3 continued

Major	Cohort	N	Statistic	SAT-V	SAT-M	RANK	Total GPA	Major GPA
History:	I	47	\bar{X}	524.489	429.255	4.085	2.468	2.476
			SD	83.797	86.434	2.439	.431	.522
	II	83	\bar{X}	496.458	494.398	4.699	2.422	2.652
			SD	70.057	73.216	2.140	.825	.551
	III	28	\bar{X}	508.929	490.714	3.071	2.966	3.270
			SD	86.339	82.054	2.418	.638	.543
Political Science:	I	44	\bar{X}	493.227	493.523	4.545	2.316	2.622
			SD	77.677	65.760	2.416	.368	.452
	II	56	\bar{X}	504.179	504.518	3.696	2.618	2.986
			SD	87.383	83.014	1.963	.430	.493
	III	39	\bar{X}	499.744	498.205	3.923	2.792	2.927
			SD	98.498	85.498	2.569	.766	.894

Table 3 continued

Major	Cohort	N	Statistic	SAT-V	SAT-M	RANK	Total GPA	Major GPA
Psychology:	I	183	\bar{X} SD	487.098 75.200	497.705 70.157	4.514 2.489	2.340 .372	2.719 .477
	II	170	\bar{X} SD	499.488 88.232	516.265 79.372	4.341 2.316	2.570 .490	2.776 .555
	III	92	\bar{X} SD	445.652 73.414	469.783 76.374	3.467 2.088	2.680 .593	2.834 .663
Sociology:	I	45	\bar{X} SD	494.356 77.750	480.400 72.631	3.733 2.199	2.323 .360	2.737 .431
	II	100	\bar{X} SD	484.090 82.838	480.610 73.360	3.930 1.966	2.498 .465	2.827 .519
	III	54	\bar{X} SD	426.722 89.044	446.093 85.142	4.907 2.467	2.412 .512	2.805 .585

Table 3 continued

Major	Cohort	N	Statistic	SAT-V	SAT-M	RANK	Total GPA	Major GPA
Biology:	I	42	\bar{X}	509.000	510.857	3.500	2.461	2.544
			SD	89.205	66.452	2.255	.447	.602
	II	97	\bar{X}	486.907	522.959	3.268	2.637	2.698
			SD	83.188	82.241	1.945	.508	.661
	III	82	\bar{X}	474.878	505.488	2.963	2.876	2.772
			SD	80.450	83.816	2.191	.524	.640
Chemistry:	I	38	\bar{X}	485.842	548.684	2.763	2.662	2.525
			SD	72.347	60.729	2.399	.476	.602
	II	42	\bar{X}	523.762	604.952	2.619	3.005	2.955
			SD	97.797	70.644	1.962	.600	.728
	III	30	\bar{X}	516.900	564.367	2.400	3.059	3.014
			SD	88.028	87.306	1.793	.558	.714

Table 3 continued

Major	Cohort	N	Statistic	SAT-V	SAT-M	RANK	Total GPA	Major GPA
Math/ Physics:	I	31	\bar{X}	556.581	607.000	2.129	2.812	2.868
			SD	58.832	56.423	1.746	.395	.574
	II	40	\bar{X}	527.025	611.975	1.950	2.993	2.954
			SD	93.570	81.967	1.320	.528	.685
	III	18	\bar{X}	516.667	578.333	1.500	3.259	3.011
			SD	80.440	68.535	1.200	.545	.698
Others:	I	9	N/A N/A					
	II	43	N/A N/A					
	III	13	N/A N/A					

The College's general trend of positive SAT-M score differences from Cohort I to II was evident within each major. All major fields showed positive differences in mean scores between these cohort periods with the exception of Sociology which retained almost identical means. The college-wide pattern of declining SAT-M scores after Cohort II was found in all majors while seven of the eleven majors had their lowest SAT-M mean in Cohort III. Just as with the SAT-V, the majors of History, Political Science and Chemistry deviated from this pattern in that their lowest SAT-M means were in Cohort I. The SAT-M means in Cohorts I and III for Languages were almost identical; but less than that in Cohort II.

With the exception of History, all majors showed consistent increases in secondary school class rank means from Cohort I to Cohort III - the College trend. The lowest mean rank for History was found in Cohort II; but the highest rank was in Cohort III.

Generally, the individual major fields followed the College pattern of increasing college total GPA means from earliest to latest cohorts. The majors of English, Languages and Sociology had their highest total GPA means in Cohort II while the History means followed the same relative pattern as found with their mean secondary school rank pattern.

In all major fields, the lowest major GPA mean was in Cohort I. From Cohorts II to III, however, the majors were evenly split as to which of these cohorts had the highest major GPA mean within the individual majors.

An analysis of the relationship between the cumulative and major GPA means for each cohort's major fields indicated that, with the exception of English, the Humanities and Social Science majors exhibited consistent increases from the total to their respective major GPA's. On the contrary, the majors of English and Chemistry showed consistent decreases from total to major GPA's while inconsistent trends were found in Biology and Math/Physics.

Generally, the predictor variable means as well as the total and major GPA means for each cohort within the individual majors followed the College pattern. If the College pattern was pronounced, the similarity between the majors increased as exemplified by the rank patterns. Weak college-wide patterns resulted in little consistency between the majors. This was certainly shown in Cohorts I and II of the major's SAT-V data. Of all the majors, History deviated most often from the College's patterns between cohorts. Even for the variable of greatest consistency between majors (class rank) History had the only pattern deviation.

Of the three broad academic areas (Humanities, Social Sciences and Sciences), the change in predictor variable means and in both GPA means between cohorts was most consistent in the science major fields which closely followed the College's trends. The only exceptions were the Cohort II and III SAT-V and SAT-M means for Chemistry.

CORRELATIONS OF CRITERIA AND PREDICTOR VARIABLES
BY MAJOR FIELD WITHIN COHORT GROUPS

The percent of common variance (r^2) between and among predictor and criterion variables are displayed in Tables 4, 5, and 6 for the three cohort groups.

While the amount of common variance was relatively low, the r^2 's across majors tended to show an increase from Cohort I to Cohort III as shown by comparing the common variances across all majors at the bottom of each table. The predictor variables within majors generally correlated more highly with the total GPA than with the major GPA. Of the three predictor variables, rank usually correlated most highly with each of the criteria within the individual majors. While the importance of rank dominated each cohort, SAT-V and SAT-M variables showed increasingly stronger correlations with both criteria in the later cohorts.

Intercorrelations between the predictor variables indicated that the highest correlation was generally between the two aptitude test scores with a range of .02 - .54. Correlations with either of these scores and rank were usually lower (.02 - .24).

Correlational analysis indicated that the rank variable generally accounted for more of either criteria's variance than did the SAT-V or SAT-M scores. In as much as there was no particular pattern within individual majors, overall correlations for all intercorrelations did increase from Cohort I to III. While the predictor variables tended

Table 4

Percent of Common Variance (r^2) between and among Predictor and Criterion Variables
for Cohort I

	Total GPA & SAT-V	Total GPA & SAT-M	Total GPA & Rank	Major GPA & SAT-V	Major GPA & SAT-M	Major GPA & Rank	Total GPA & Major GPA	SAT-V & SAT-M	SAT-V & Rank	SAT-M & Rank
Arts										
English	.20	.27	.34	.20	.11	.16	.81	.23	.00	.09
Languages	.19	.00	.29	.21	.01	.19	.79	.06	.07	.04
Business/Econ.	.00	.00	.21	.00	.00	.16	.54	.09	.00	.00
History	.06	.00	.09	.07	.01	.01	.54	.18	.04	.05
Political Sci.	.03	.00	.36	.01	.00	.29	.64	.14	.04	.08
Psychology	.02	.05	.22	.04	.07	.08	.52	.12	.00	.00
Sociology	.05	.23	.14	.02	.19	.19	.69	.17	.01	.09
Biology	.03	.08	.32	.08	.15	.19	.76	.38	.00	.01
Chemistry	.25	.03	.30	.15	.00	.21	.65	.14	.10	.01
Math/Physics	.16	.03	.23	.24	.11	.16	.54	.02	.07	.05
All students Regardless of Major	.07	.05	.27	.07	.05	.27	.53	.13	.01	.01

Table 5

Percent of Common Variance (r^2) between and among Predictor and Criterion Variables
for Cohort II

	Total GPA & SAT-V	Total GPA & SAT-M	Total GPA & Rank	Major GPA & SAT-V	Major GPA & SAT-M	Major GPA & Rank	Total GPA & Major GPA	SAT-V & SAT-M	SAT-V & Rank	SAT-M & Rank
Arts	.01	.04	.22	.00	.04	.06	.38	.33	.09	.01
English	.33	.33	.32	.37	.26	.28	.86	.27	.24	.20
Languages	.18	.09	.29	.11	.05	.26	.64	.33	.18	.13
Business/Econ.	.13	.08	.31	.13	.07	.25	.81	.24	.03	.02
History	.08	.07	.11	.07	.04	.06	.76	.06	.01	.00
Political Sci.	.10	.03	.30	.09	.04	.17	.72	.24	.04	.00
Psychology	.10	.03	.22	.09	.01	.15	.79	.14	.09	.00
Sociology	.09	.05	.16	.03	.01	.07	.77	.19	.02	.00
Biology	.09	.11	.27	.08	.07	.18	.80	.36	.01	.02
Chemistry	.04	.08	.22	.01	.07	.13	.86	.29	.08	.00
Math/Physics	.14	.14	.34	.13	.07	.13	.72	.23	.10	.02
All students Regardless of Major	.12	.11	.28	.12	.11	.28	.70	.22	.06	.03

Table 6

Percent of Common Variance (r^2) between and among Predictor and Criterion Variables
for Cohort III

	Total GPA & SAT-V	Total GPA & SAT-M	Total GPA & Rank	Major GPA & SAT-V	Major GPA & SAT-M	Major GPA & Rank	Total GPA & Major GPA	SAT-V & SAT-M	SAT-V & Rank	SAT-M & Rank
Arts	.06	.11	.49	.01	.01	.10	.35	.12	.22	.17
English	.07	.21	.42	.03	.04	.16	.70	.33	.22	.21
Languages	.03	.01	.48	.05	.01	.40	.84	.22	.16	.08
Business/Econ.	.16	.09	.25	.18	.10	.18	.80	.22	.05	.03
History	.07	.13	.43	.11	.17	.21	.77	.25	.02	.01
Political Sci.	.20	.40	.33	.10	.25	.17	.83	.34	.05	.13
Psychology	.12	.03	.26	.11	.01	.13	.84	.29	.04	.02
Sociology	.28	.11	.16	.25	.02	.14	.69	.18	.15	.00
Biology	.19	.18	.08	.16	.11	.01	.78	.23	.01	.01
Chemistry	.22	.30	.24	.19	.19	.18	.76	.32	.10	.17
Math/Physics	.05	.00	.47	.14	.01	.00	.48	.54	.00	.03
All Students Regardless of Major	.18	.13	.30	.18	.13	.30	.72	.25	.08	.06

to correlate more highly with the total GPA than with the major GPA, further analysis within the individual majors by this study involved only the major GPA means and not the total GPA means of the fields.

SHIFTS IN MAJOR GPA GRADING STANDARDS BETWEEN
MAJOR FIELDS OF THE SAME TIME PERIODS

Appendix C displays the intercept and raw regression coefficients of the regression equations on major GPA for each major field by cohort group. The multiple and standardized regression coefficients for the criteria of major GPA is given in Table 7 for each cohort and each major. There was no distinct positive or negative pattern of differences as to which cohort had the highest multiple R's for its regression on major GPA. The standardized beta weights revealed the previously found influence of the rank variable in the equations. The SAT-V (and to a lesser extent the SAT-M) generally contributed more to the Cohort I and Cohort III regressions of major GPA than to those of Cohort II.

Table 8 displays the test results of the hypothesis of nonparallel major field regression systems within each cohort. At the .05 level of significance, the major GPA regressions in only Cohort I were found to be not parallel. Since the longitudinal shift in grading standards is a primary area of analysis in this study, it was decided that grouping the student records into ability levels (as in the Goldman study) would compound the difficulty in making longitudinal comparisons. This decision was also supported in the fact that only one of three cohorts exhibited significantly different regression systems. Finally, some

Table 7

Multiple and Standardized Regression Coefficients when Criteria is Major GPA

	Multiple Regression Coefficient			Standardized Regression Coefficients										
	Cohort I	Cohort II	Cohort III	SAT-Verbal			SAT-Math			Secondary School Rank				
				Cohort I	Cohort II	Cohort III	Cohort I	Cohort II	Cohort III	Cohort I	Cohort II	Cohort III		
Arts		.1305			-.2470			.3132				-.2830		
			.1078			-.0713			-.0506					-.3720
English	.3752			.4636			-.0093					-.4161		
		.4662			.3814			.1961					-.2537	
			.1664			-.0377			.0499					-.4008
Languages	.3294			.4106			-.1318					-.3002		
		.2757			.1524			-.0188					-.4500	
			.4035			-.0086			-.0672					-.6545
Business/ Economics	.1575			.0314			.0263					-.3911		
		.3302			.2356			.0890					-.4467	
			.3016			.2916			.1138					-.3396
History	.0939			.2963			-.0004					-.1570		
		.1376			.1870			.1716					-.2265	
			.3558			.1286			.2998					-.4109

Table 7 continued

	Multiple Regression Coefficient			Standardized Regression Coefficients								
				SAT-Verbal			SAT-Math			Secondary School Rank		
	Cohort I	Cohort II	Cohort III	Cohort I	Cohort II	Cohort III	Cohort I	Cohort II	Cohort III	Cohort I	Cohort II	Cohort III
Political Science	.3243	.2305	.3080	.0684	.1472	.0331	-.2173	.1475	.3807	-.5811	-.3808	-.2650
Psychology	.1670	.1851	.2068	.1333	.1858	.3266	.2202	.0285	-.1184	-.2977	-.3298	-.3118
Sociology	.2870	.0887	.2943	-.0181	.1111	.4554	.3377	.0559	-.0650	-.3324	-.2453	-.1960
Biology	.3235	.2438	.1886	.1251	.1908	.2990	.2699	.0921	.1823	-.4195	-.3956	-.0807
Chemistry	.3036	.2141	.3058	.3332	-.1828	.2391	-.1874	.3493	.1931	-.3719	-.3947	-.2732
Math Physics	.3675	.2090	.2128	.3984	.2063	.6660	.2239	.1289	-.3971	-.2401	-.2772	-.0052

Table 8

Tests of Differences between Major GPA Regression
Slopes of Major Fields by Cohort Group

Cohort Group	N	R ² with Separate Slopes Per Major	R ² with Pooled Slopes	F Ratio
Cohort I	662	.28	.23	1.59*
Cohort II	963	.28	.25	1.20
Cohort III	739	.32	.28	1.37

* .05 significance level

major fields contained so few students that a further breakdown by ability levels could have resulted in misleading projections from one major to another. The implication of the tests for nonparallel major GPA regressions within cohorts, therefore, was to qualify any comparisons of major field grading standards within only Cohort I.

For the major GPA regression systems in both Cohort II and III (each of which were found to have not significantly different regression slopes), Table 9 displays the test results of the hypothesis that the regression intercepts were significantly different for the respective cohorts. Neither cohort was found to have significantly different intercepts for the major GPA regression systems.

Tables 10, 11 and 12 display the projected major GPA means within Cohorts I, II and III respectively. In Table 10, for example, the second row indicates the expected major GPA mean of the students in each of the other major fields if they had pursued the English major. This is the result of the major GPA regression for students actually pursuing the English major (row effect) as applied to the predictor data of the students in each of the column major fields. Those students who actually majored in Languages were projected to earn a GPA of 2.31 if they had majored in English. If the English majors in Cohort I had pursued all major fields simultaneously, their expected major GPA mean would have been 2.77 (column summary mean). A comparison of column summary means across major fields indicated the differences in the mean ability levels of students in each of those fields. With a column summary mean of 2.85, the Math/Physics students had the highest

Table 9

Tests of Differences between Major GPA Intercepts
of Major Fields by Cohort Group

Cohort Group	N	R ² with Separate Intercepts for Majors	R ² with Pooled Intercepts	F Ratio
Cohort I		N/A	N/A	
Cohort II	963	.1895	.1886	1.11
Cohort III	739	.2223	.2217	.55

Table 10

Predicted Major GPA Mean if Students in one Major Field were to Pursue Another Field within Cohort I

		Projected to Predictor Data Source											
		Arts	English	Languages	Business/ Economics	History	Political Science	Psychology	Sociology	Biology	Chemistry	Math/ Physics	Row Mean
Projected from Regression Equation Source	Arts												
	English	(2.48)	2.31**	1.86**	2.20**	2.04**	2.02**	2.14**	2.21**	2.21**	2.52**	2.20	
	Languages	3.17**	(3.07)	2.67**	2.98**	2.85**	2.83**	2.94**	2.96**	2.91**	3.11*	2.95	
	Business/ Economics	2.76**	2.74**	(2.56)	2.65*	2.61	2.61**	2.67	2.70	2.75*	2.82	2.71	
	History	2.59	2.50**	2.32**	(2.48)	2.40**	2.39**	2.43**	2.47	2.45	2.60**	2.46	
	Political Science	2.80**	2.83*	2.50	2.69*	(2.62)	2.62**	2.73	2.72	2.73*	2.74	2.70	
	Psychology	2.92**	2.82*	2.69**	2.77**	2.72	(2.72)	2.74	2.82**	2.89**	3.08*	2.82	
	Sociology	2.88**	2.80*	2.72**	2.73**	2.71	2.72	(2.74)	2.81**	2.94**	3.09*	2.81	
	Biology	2.70**	2.55**	2.34**	2.45	2.37**	2.38**	2.43**	(2.54)	2.70	2.97	2.54	
	Chemistry	2.79**	2.72**	2.29**	2.61	2.48*	2.46**	2.59*	2.59	(2.53)	2.67*	2.57	
Math/ Physics	2.66*	2.37**	2.06**	2.33	2.17**	2.16**	2.21**	2.36*	2.41	(2.87)	2.36		
Column Mean	2.77	2.67	2.42	2.59	2.50	2.49	2.56	2.62	2.65	2.85			

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference between projection and actual GPA in column of projection

Table 11

Predicted Major GPA Mean if Students in one Major Field were to Pursue Another Field within Cohort II

		Projected to Predictor Data Source											
		Arts	English	Languages	Business/ Economics	History	Political Science	Psychology	Sociology	Biology	Chemistry	Math/ Physics	Row Mean
Projected from Regression Equation Source	Arts	(2.97)	3.04**	3.12	3.12**	2.96**	3.04	3.04**	2.99**	3.15**	3.37**	3.43**	3.11
	English	2.40**	(2.72)	2.56**	2.42**	2.41**	2.51**	2.47**	2.41**	2.52**	2.76	2.82	2.55
	Languages	3.05	3.25**	(3.24)	3.07**	3.06**	3.17**	3.09**	3.12**	3.19**	3.28**	3.35**	3.17
	Business/ Economics	2.86	3.16**	3.09*	(2.90)	2.88**	3.01	2.94**	2.93	3.04**	3.23*	3.32**	3.03
	History	2.65**	2.87*	2.79**	2.68**	(2.65)	2.73**	2.71	2.66**	2.76	2.96	3.01	2.77
	Political Science	2.87	3.08**	3.06**	2.92	2.87**	(2.99)	2.93**	2.93	3.03**	3.19*	3.27**	3.01
	Psychology	2.73**	2.92**	2.89**	2.75**	2.74	2.83**	(2.78)	2.78	2.85*	2.96	3.02	2.84
	Sociology	2.79*	2.93**	2.92**	2.81**	2.79*	2.87*	2.83	(2.83)	2.89**	2.99	3.04	2.88
	Biology	2.49**	2.80	2.76**	2.54**	2.50*	2.65**	2.57**	2.57**	(2.70)	2.90	3.00	2.68
	Chemistry	2.30**	2.52*	2.61**	2.51**	2.29**	2.46**	2.42**	2.37**	2.62	(2.96)	3.07	2.56
	Math/ Physics	2.38**	2.71	2.66**	2.44**	2.39**	2.55**	2.47**	2.46**	2.61	2.85	(2.95)	2.59
	Column Mean	2.68	2.91	2.88	2.74	2.68	2.80	2.75	2.73	2.85	3.04	3.12	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference between projection and actual GPA in column of projection

Table 12

Predicted Major GPA Mean if Students in one Major Field were to Pursue Another Field within Cohort III

		Projected to Predictor Data Source											
		Arts	English	Languages	Business/ Economics	History	Political Science	Psychology	Sociology	Biology	Chemistry	Math/ Physics	Row Mean
Projected from Regression Equation Source	Arts	(3.13)	3.13**	3.20	3.13**	3.21	3.13	3.21**	3.09**	3.23**	3.25	3.33	3.19
	English	2.57**	(2.61)	2.65**	2.60*	2.67**	2.60*	2.64**	2.52**	2.69	2.75*	2.83	2.65
	Languages	3.04	3.10**	(3.21)	3.04**	3.25	3.08	3.19**	2.93	3.26**	3.34*	3.50*	3.18
	Business/ Economics	2.64**	2.92**	2.82**	(2.68)	2.92**	2.83	2.70*	2.50**	2.86	3.07	3.17	2.83
	History	3.05	3.24**	3.21	3.14**	(3.27)	3.20*	3.14**	2.95	3.28**	3.48**	3.59**	3.23
	Political Science	2.73**	2.95**	2.92**	2.91**	2.98**	(2.93)	2.84	2.61*	3.04**	3.34**	3.47*	2.97
	Psychology	2.79**	3.03**	2.94**	2.74	3.04*	2.92	(2.83)	2.66*	2.93*	3.05	3.13	2.91
	Sociology	2.91	3.15**	3.03	2.88**	3.12	3.05	2.92	(2.81)	3.01**	3.14	3.17	3.02
	Biology	2.63**	2.88**	2.75**	2.68	2.83**	2.80	2.64**	2.53**	(2.77)	2.97	3.01	2.77
	Chemistry	2.52**	2.79*	2.72**	2.59**	2.81**	2.71	2.61**	2.38**	2.78	(3.01)	3.13	2.73
	Math/ Physics	3.12	3.42**	3.19	2.91**	3.32	3.23	3.03**	3.02**	3.06**	3.07	(3.01)	3.12
	Column Mean	2.83	3.02	2.97	2.85	3.04	2.95	2.89	2.73	2.99	3.13	3.21	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference between projection and actual GPA in column of projection

mean ability level of any major field of students in Cohort I. If all students in Cohort I had pursued the English major, their expected mean GPA would have been 2.52 (row summary mean). A comparison of row summary means across major fields indicated the differences in the grading standards between major fields. With the lowest row summary mean of 2.20, the English major was considered to have the most stringent grading standards of all the Cohort I major fields. Due to the limited size of the Cohort I Arts major field, as noted earlier, the first row and first column cell entries in Table 10 were omitted.

Goldman measured the extent of Adaptation-Level grading by the direction and strength of the correlation between the row and column summary GPA means of the projection matrix. A negative correlation indicated such grading. The correlation between the row and column summary means in this study were $-.62$ and $-.61$ for Cohorts I and II respectively. While the correlations were essentially equal, only the $r = -.61$ was significant at the $.05$ level due to one more degree of freedom ($N - 2 = 9$) than that of the $r = -.62$. Contrary to the first two cohorts, Cohort III showed no evidence of Adaptation-Level grading with $r = -.09$.

The measure of Adaptation-Level grading is based on the inter-relationship of the paired row and column summary means for each major field. The radical departure of Cohort III from the consistent grading trends of both Cohorts I and II could have been due to Cohort III changes in either the grading standards (row summary means) or ability levels (column summary means) or a simultaneous change in both. In an

effort to understand the row and column summary mean correlation drop from Cohorts I and II to Cohort III, it was suspected that such an outcome could have been attributed to a reduced variance in either the row or column means. The summary row/summary column variances for Cohorts I, II and III were .05/.02, .04/.02 and .04/.02 respectively. Clearly the drop in correlation for Cohort III was not due to a change in variance.

Considering Tables 10, 11 and 12 again, one method of analyzing grading standards for a given major field (relative to all other fields) is to note the number of projected GPA means in a given row that are less than the earned GPA means of students who actually majored in the fields designated by the column headings. For example, Table 10 shows a projected GPA of 2.80 if the regression equation based on Sociology majors were applied to the predictor data scores of those students who actually pursued the Languages major. When this projected value of 2.80 is compared to the 3.07 GPA actually earned by those who majored in the Languages, it is clear that the grading standards of Sociology were more stringent than those of the Languages. A comparison of each remaining projected GPA mean (based upon the Sociology regression equation) with the actual GPA mean for each corresponding major field, indicates that no other major field had grading standards less stringent than those of Sociology since all remaining actual GPA means are less than or equal to the projected GPA means of the Sociology row. If such a comparison were made for each row of projections, the number of actual GPA means that exceed the corresponding projected means would provide an

index by which the grading standards between major fields could be compared. Table 13 displays such indices of grading standards. In Cohort I, only one projected major GPA mean based on the regression equation for Sociology majors was less than its corresponding actual earned GPA mean (index = 1) while all nine projected major GPA means based on the English major equation (index = 9) were less than the actual column means.

Within each of the three cohorts, generally both the lowest and highest grading standards occurred in the Humanities. Arts and Languages had extremely low indices (i.e. 0, 1, 2) while English had the highest possible indices (i.e. 9, 10). The Social Science majors had indices that dominated the mid-range with occasional low extremes. With the exception of Math/Physics in Cohort III, the Sciences had high indices in comparison to the other two academic areas.

The stability of relative grading standards across cohort groups was measured by the squared correlation of the above indices between the major fields of two adjacent cohorts. While the squared correlations were low, there did appear to be slightly more stable grading between Cohorts I and II with $r^2 = .49$ than between Cohorts II and III with $r^2 = .25$.

The measure of Adaptation-Level grading indicated that grades assigned during either of the two earlier cohort periods were generally influenced by the performance levels of other students. While the row and column correlations were almost identical for these two

Table 13

Relative Index of Major Field Grading Standards by Cohort Group

Predictor Data	Cohort I	Cohort II without Arts	Cohort II with Arts	Cohort III
Arts	N/A	N/A	1	2
English	9	9	10	10
Languages	0	0	0	2
Business/Economics	5	1	2	6
History	8	5	6	1
Political Science	5	1	2	4
Psychology	1	4	5	5
Sociology	1	3	4	3
Biology	6	7	8	9
Chemistry	6	8	9	7
Math/Physich	8	9	10	2

Stringent grading standards are indicated by high indices.

groups, there was no indication of Adaptation-Level grading in Cohort III. With the exception of English, there was a pattern of grading standards between the broad academic areas in that the Humanities majors generally exhibited the least stringent grading standards and the Science majors generally showed the more stringent. This finding of greater grading stringency in the Sciences was consistent with Goldman's studies. The major of English was the exception in that this field consistently had the most stringent grading standards of all the majors. The relative grading standards between time periods appeared to have changed in that these standards were more highly correlated between Cohorts I and II than between Cohorts II and III.

SHIFTS IN TOTAL GPA GRADING STANDARDS BETWEEN TIME PERIODS

Appendix C displays the intercept and raw regression coefficients of the regression equations on total GPA for each cohort group. The results of the test of the hypothesis for parallel total GPA regression slopes between cohorts indicated that the slopes were significantly different at the .01 level. (With an N of 2,432 records, the R^2 's for the equation with separate cohort predictors and the equation with pooled predictors were .39 and .38 respectively. The resulting F Ratio between R^2 's was 6.65). A comparison of multiple and standardized regression coefficients between cohort equations, therefore, was not considered appropriate; but this data is reported in Appendix D.

Due to the nonparallel regression systems, the student records were grouped into the following trichotomy: total GPA less than 2.33, total GPA from 2.33 to 2.80 and total GPA greater than 2.80. These GPA levels reflect the total GPA mean of all 2,432 cases plus or minus 0.43 standard deviations. Tables 14, 15 and 16 display the projected total GPA means within each of the respective performance levels if students in one cohort period had attended during any of the cohort periods. In Tables 14, 15 and 16 for example, the first rows indicate the expected total GPA means of students in each of three cohort groups if they had attended during the Cohort I period. The first columns represent the expected total GPA means for the students of Cohort I if they had attended during each of the cohort periods. As before, row summary means indicate relative grading standards while column summary means indicate ability levels.

Figure 1 displays the interaction of the row summary means (labeled as Grading Standards) and the column summary means (labeled as Ability Levels) of Tables 14, 15 and 16. For each performance level, the intersecting points of grading standards and ability levels are connected in the order of the cohort number with Cohort I being the lowest point on the "Grading Standards" scale. Figure 1 displays the magnitude of change in grading standards per unit change in ability levels. If drops in ability levels were accompanied by corresponding drops in GPA means (as the result of more stringent grading standards), a positive relationship would exist as displayed by points whose connecting lines would be at

Table 14

Projected Total GPA Mean if Students in one Cohort
Period had Attended During Another Cohort Period
(Total GPA less than 2.33)

		Projected to Predictor Data Source			Row Mean
		Cohort I	Cohort II	Cohort III	
Projected From Regression Equation Source	Cohort I	(2.10)	2.28*	2.21*	2.20
	Cohort II	2.41*	(2.06)	2.32*	2.26
	Cohort III	2.53*	2.52*	(2.00)	2.35
	Column Mean	2.35	2.29	2.18	
	N	366	357	243	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference
between projection and actual GPA in column of projection

Table 15

Projected Total GPA Mean if Students in one Cohort
 Period had Attended During Another Cohort Period
 (Total GPA from 2.33 to 2.80)

		Projected to Predictor Data Source			Row Mean
		Cohort I	Cohort II	Cohort III	
Projected From Regression Equation Source	Cohort I	(2.54)	2.41*	2.37*	2.44
	Cohort II	2.65*	(2.54)	2.52*	2.57
	Cohort III	2.79*	2.71*	(2.56)	2.69
	Column Mean	2.66	2.55	2.48	
	N	205	315	198	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference
 between projection and actual GPA in column of projection

Table 16

Projected Total GPA Mean if Students in one Cohort
Period had Attended During Another Cohort Period
(Total GPA greater than 2.80)

		Projected to Predictor Data Source			Row Mean
		Cohort I	Cohort II	Cohort III	
Projected From Regression Equation Source	Cohort I	(3.15)	2.58*	2.55*	2.76
	Cohort II	2.89*	(3.22)	2.77*	2.96
	Cohort III	3.07*	2.98*	(3.28)	3.11
	Column Mean	3.04	2.93	2.87	
	N	103	334	311	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference between projection and actual GPA in column of projection

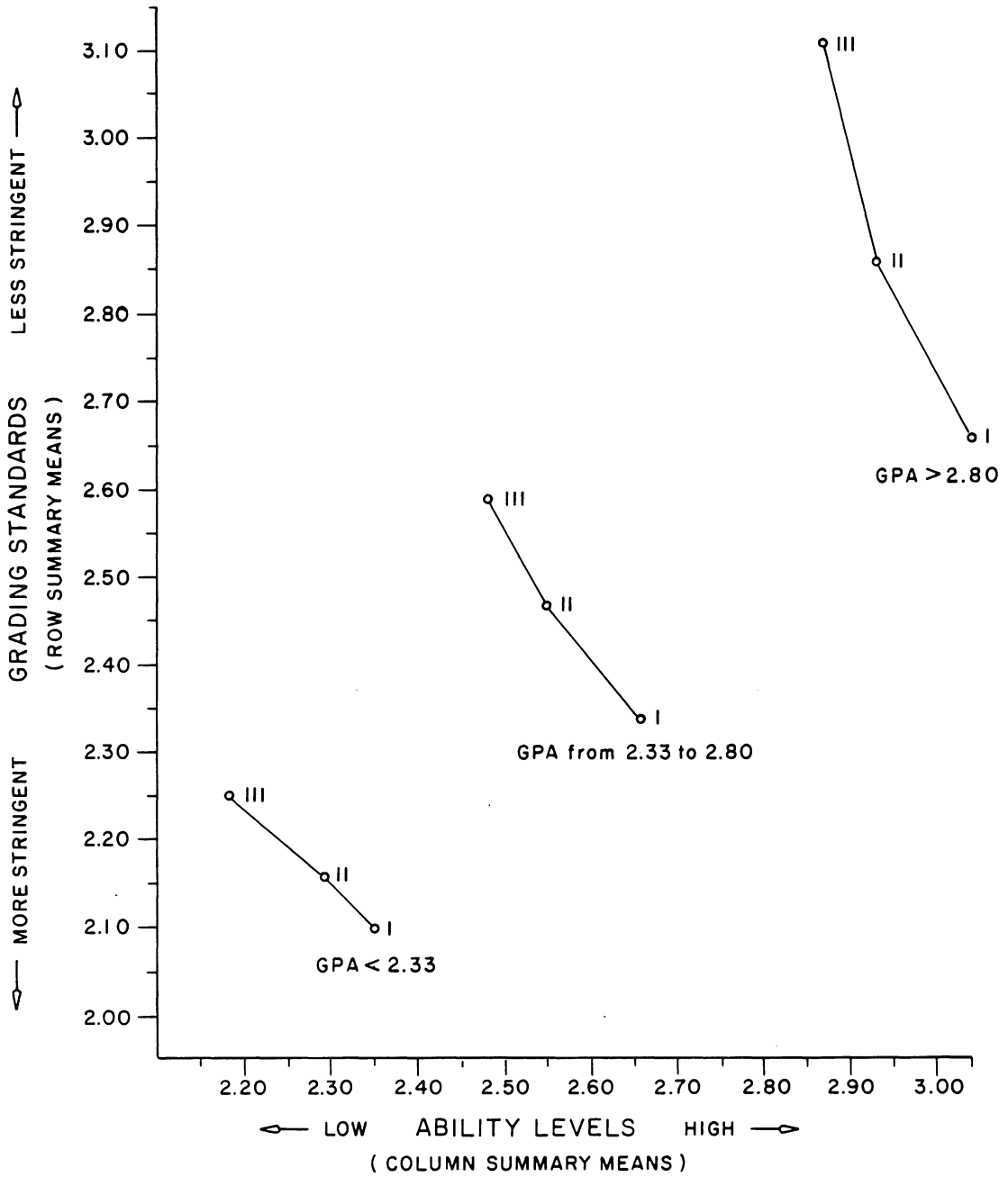


Figure I
 Cohort Interaction of Total GPA Grading Standards
 and Ability Levels by Performance Levels

45 degree angles from both the Grading Standards and Ability Levels axes. On the contrary, a negative relationship was found in Figure 1 which indicates Adaptation-Level grading. It is quite apparent that, not only were there less stringent grading standards applied as ability levels declined; but there were also different trends attributable to the performance levels of the students. Between Cohorts I and II, students with total GPA's less than 2.33 showed the least gain in projected GPA means whereas students with total GPA's greater than 2.80 showed the greatest GPA gains. Between Cohorts II and III, each higher GPA level displayed a greater shift toward less stringent as indicated by a greater vertical difference between the Cohort II and III points for each higher GPA level. At the same time, each higher GPA level exhibited less difference in the ability levels of students from Cohort II to III.

Grading standards, as defined by the summary row means of the projection matrices, have declined since the early 1960's. While SAT scores have decreased from early to later cohorts, total GPA's have increased over the same periods. Positive differences were also found in the mean secondary school ranks from early to later cohorts: but these indices would not reflect changes in secondary school grading standards - only students' performances relative to their classmates. The changes in college-wide grading standards from early to later cohorts was found to be influenced by the students' performance levels. Lower performance students were less affected by changing grading standards or grade inflation than were high performance students.

SHIFTS IN MAJOR GPA GRADING STANDARDS BETWEEN
TIME PERIODS

The major GPA regression equations for each major field by cohort group are displayed in Appendix C. The analysis of multiple and standardized regression coefficients was discussed previously.

Table 17 displays the results of the test of nonparallel major GPA regression systems between cohort groups for each major field. At the .01 level of significance, the cohort major GPA regressions for Business/Economics were found to be not parallel. In order to facilitate the comparison of longitudinal changes in grading standards between major fields, it was decided to not group the records into the three performance levels as done in the analysis of anticipated total GPA means across cohort groups. This decision was based upon the fact that only one major field was found to have nonparallel regression systems at the .05 significance level. In addition, some major fields had so few students per cohort that to further divide the students into performance levels would have produced unstable results. However, due to the significant differences observed for the Business/Economics major, it is important to qualify comparisons for this field. An analysis of this one field by the total GPA performance levels, as used in the previous section, is in Appendices E, F and G. Contrary to Goldman's findings, Adaptation-Level grading was found to a greater extent with each higher performance level for the Business/Economics major.

Table 17

Tests of Differences between Major GPA Regression
Slopes of Cohort Groups by Major Fields

Major Field	N	R^2 with Separate Slopes per Cohort	R^2 with Pooled Slopes	F Ratio
Arts	79	.13748	.10810	.60462
English	104	.38831	.33581	1.12802
Languages	116	.35098	.31444	.83646
Business/Economics	704	.32048	.30102	2.83106**
History	158	.33435	.32120	.41204
Political Science	139	.33587	.27996	1.52736
Psychology	445	.19105	.17048	1.57290
Sociology	199	.19356	.16172	1.05474
Biology	221	.24868	.21518	1.33128
Chemistry	110	.33464	.28006	1.14843
Math/Physics	89	.25795	.21379	.65462

* .05 significance level

** .01 significance level

Intercept differences within each major field were measured by the magnitude of discrepancy in the R^2 of one equation having only the predictor variable regression coefficients and the R^2 of that same equation plus the addition of a predictor variable to indicate cohort identity. Table 18 shows the results of such tests for those major GPA equations whose slopes were found to be not significantly different. Across cohorts, the hypothesis of no intercept differences was rejected for the following majors: History and Chemistry at .01 level of significance; and English, Sociology and Biology at .05 levels.

Tables 19 through 29 display the projected major GPA means within each respective major field across the cohort periods. The second row of any table indicates the anticipated major GPA mean if the actual students in each of the three cohort periods had pursued that respective field during the Cohort II time period. The second column of any table indicates the anticipated major GPA mean if the actual students in Cohort II had pursued that respective major field during each of the three cohort periods. Consistent with previous projection tables, the row summary means can be compared for changes in grading standards while the column summary means can be compared for changes in student ability levels. There are no first row or first column entries for the Arts major due to the inadequate numbers of student records from Cohort I as previously explained.

Figure 2 displays the interaction of the row summary means (labeled as Grading Standards) and column summary means (labeled as Ability

Table 18

Tests of Differences between Major GPA Intercepts
of Cohort Groups by Major Fields

Major Field	N	R ² with Separate Predictors for Majors	R ² with no Major Predictor	F Ratio
Arts	79	.10810	.09665	.94999
English	104	.32100	.28142	5.77087*
Languages	116	.30794	.28867	3.09073
Business/Economics		N/A	N/A	
History	158	.31103	.14810	36.18197**
Political Science	139	.26845	.24824	3.70192
Psychology	445	.16953	.16522	2.28353
Sociology	199	.16169	.13686	5.74611*
Biology	221	.21457	.19741	4.71915*
Chemistry	110	.27526	.22558	7.19762**
Math/Physics	89	.21301	.20055	1.32993

* .05 significance level

** .01 significance level

Table 19

Projected Major GPA Mean if Students in one Cohort
Period had Attended During Another Period
(Major Field of Art)

		Projected to Predictor Data Source			Row Mean
		Cohort I	Cohort II	Cohort III	
Projected From Regression Equation Source	Cohort I	N/A	N/A	N/A	
	Cohort II	N/A	(2.97)	2.95	2.96
	Cohort III	N/A	3.05	(3.13)	3.09
	Column Mean		3.01	3.04	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference
between projection and actual GPA in column projection

Table 20

Projected Major GPA Mean if Students in one Cohort
Period had Attended During Another Period
(Major Field of English)

		Projected to Predictor Data Source			Row Mean
		Cohort I	Cohort II	Cohort III	
Projected From Regression Equation Source	Cohort I	(2.47)	2.40**	2.26**	2.38
	Cohort II	2.75**	(2.72)	2.57	2.68
	Cohort III	2.69*	2.64	(2.61)	2.65
	Column Mean	2.64	2.59	2.48	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference between projection and actual GPA in column of projection

Table 21

Projected Major GPA Mean if Students in one Cohort
Period had Attended During Another Period
(Major Field of Languages)

		Projected to Predictor Data Source			Row Mean
		Cohort I	Cohort II	Cohort III	
Projected From Regression Equation Source	Cohort I	(3.07)	2.98**	2.93**	2.99
	Cohort II	3.26	(3.24)	3.18	3.23
	Cohort III	3.29	3.26	(3.21)	3.25
	Column Mean	3.21	3.16	3.11	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference between projection and actual GPA in column of projection

Table 22

Projected Major GPA Mean if Students in one Cohort
 Period had Attended During Another Period
 (Major Field of Business/Economics)

		Projected to Predictor Data Source			Row Mean
		Cohort I	Cohort II	Cohort III	
Projected From Regression Equation Source	Cohort I	(2.56)	2.63**	2.63	2.61
	Cohort II	2.78**	(2.90)	2.86**	2.85
	Cohort III	2.63	2.75**	(2.68)	2.69
	Column Mean	2.66	2.76	2.72	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference between projection and actual GPA in column of projection

Table 23

Projected Major GPA Mean if Students in one Cohort
Period had Attended During Another Period
(Major Field of History)

		Projected to Predictor Data Source			Row Mean
		Cohort I	Cohort II	Cohort III	
Projected From Regression Equation Source	Cohort I	(2.48)	2.40**	2.48**	2.45
	Cohort II	2.73**	(2.65)	2.76**	2.71
	Cohort III	3.19**	3.12**	(3.27)	3.19
	Column Mean	2.80	2.72	2.84	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference between projection and actual GPA in column of projection

Table 24

Projected Major GPA Mean if Students in one Cohort
Period had Attended During Another Period
(Major Field of Political Science)

		Projected to Predictor Data Source			Row Mean
		Cohort I	Cohort II	Cohort III	
Projected From Regression Equation Source	Cohort I	(2.66)	2.70**	2.69	2.68
	Cohort II	2.89**	(2.99)	2.95	2.94
	Cohort III	2.85**	2.97	(2.93)	2.92
	Column Mean	2.80	2.89	2.86	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference between projection and actual GPA in column of projection

Table 25

Projected Major GPA Mean if Students in one Cohort
Period had Attended During Another Period
(Major Field of Psychology)

		Projected to Predictor Data Source			Row Mean
		Cohort I	Cohort II	Cohort III	
Projected From Regression Equation Source	Cohort I	(2.72)	2.77	2.70*	2.73
	Cohort II	2.74	(2.78)	2.77	2.76
	Cohort III	2.82**	2.86**	(2.83)	2.84
	Column Mean	2.76	2.80	2.77	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference between projection and actual GPA in column of projection

Table 26

Projected Major GPA Mean if Students in one Cohort
Period had Attended During Another Period
(Major Field of Sociology)

		Projected to Predictor Data Source			Row Mean
		Cohort I	Cohort II	Cohort III	
Projected From Regression Equation Source	Cohort I	(2.74)	2.73*	2.60*	2.69
	Cohort II	2.85	(2.83)	2.71	2.80
	Cohort III	3.05**	3.01**	(2.81)	2.96
	Column Mean	2.88	2.86	2.71	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference between projection and actual GPA in column of projection

Table 27

Projected Major GPA Mean if Students in one Cohort
Period had Attended During Another Period
(Major Field of Biology)

		Projected to Predictor Data Source			Row Mean
		Cohort I	Cohort II	Cohort III	
Projected From Regression Equation Source	Cohort I	(2.54)	2.58	2.56**	2.56
	Cohort II	2.69	(2.70)	2.71	2.70
	Cohort III	2.85**	2.82	(2.77)	2.81
	Column Mean	2.69	2.70	2.68	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference between projection and actual GPA in column of projection

Table 28

Projected Major GPA Mean if Students in one Cohort
Period had Attended During Another Period
(Major Field of Chemistry)

		Projected to Predictor Data Source			Row Mean
		Cohort I	Cohort II	Cohort III	
Projected From Regression Equation Source	Cohort I	(2.53)	2.54**	2.62**	2.56
	Cohort II	2.78*	(2.96)	2.85	2.86
	Cohort III	2.89**	3.07	(3.01)	2.99
	Column Mean	2.73	2.86	2.83	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference between projection and actual GPA in column of projection

Table 29

Projected Major GPA Mean if Students in one Cohort
Period had Attended During Another Period
(Major Field of Math/Physics)

		Projected to Predictor Data Source			Row Mean
		Cohort I	Cohort II	Cohort III	
Projected From Regression Equation Source	Cohort I	(2.87)	2.78	2.70	2.78
	Cohort II	2.97	(2.95)	2.97	2.96
	Cohort III	3.12*	2.93	(3.01)	3.02
	Column Mean	2.99	2.89	2.89	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference between projection and actual GPA in column of projection

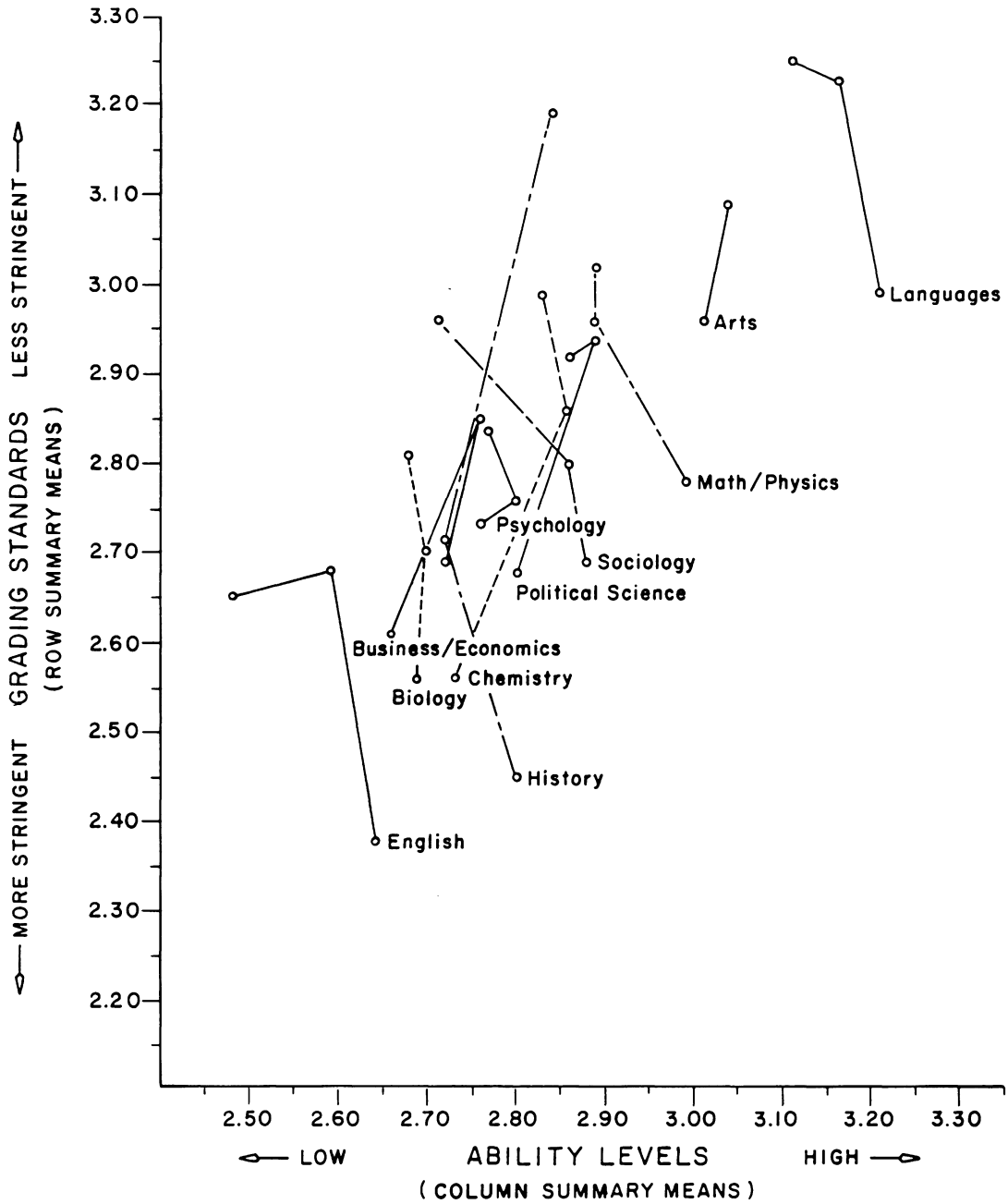


Figure 2
 Cohort Interaction of Major GPA Grading Standards
 and Ability Levels by Major Field

Levels) of Tables 19 through 29. For each major field, the intersecting points of grading standards and ability levels are connected in order of the cohort number with Cohort I being the lowest point on the "Grading Standards" scale. While the differences in grading standards and ability levels between fields preclude a direct comparison of majors, the amount of change between cohort grading standards for each increment change in cohort ability level can be compared between fields. As in Figure 1, if drops in ability levels were accompanied by corresponding drops in GPA means, a positive relationship would exist as displayed by points whose connecting lines for a given major field would be at 45 degree angles from both the Grading Standards and Ability Level axes. Contrary to Figure 1, however, there was no consistent grading standards/ability levels interaction between the major fields.

The intersecting points for the Arts major consist of only Cohorts II and III for previously explained reasons. Earlier it was reported that the variances for the major GPA row summary means were consistently greater than the variances of the respective column summary means. Figure 2 displays this phenomenon in that for each change in ability level (row summary means) there was a greater change in grading standards (column summary means) for each cohort. Changes in the ability levels across the cohort periods displayed no consistent pattern of fluctuations between the major fields. The grading standards in all fields, however, exhibited a net decline from the earliest to latest cohort. The History major experienced the greatest drop in grading

standards across cohorts with a net decline of .74 point while the ability level only increased .04 point. The Psychology major exhibited the least change in grading standards with a net change of .11 point as compared to a .04 point increase in ability level.

A further examination revealed that all fields experienced declines in grading standards from Cohort I to Cohort II. From Cohorts II to III, several major fields exhibited more stringent grading standards. The Business/Economics major, for example, showed a .16 point drop in the stringency of grading standards as compared to only a .04 point decline in ability levels.

Of all the major GPA regressions within major fields, only the regressions of Business/Economics were found to be significantly different across cohort groups. Unlike the Adaptation-Level grading (as indicated by a negative relationship between row and column summary means) for total GPA's across cohort groups, there was no consistent indication of such grading trends within the individual major fields. Across the cohort periods, there was greater fluctuation in the grading standards of the fields than in the ability levels of the students in those fields. While there was no consistent pattern to the fluctuation of ability levels across cohorts, all major fields experienced declines in their grading standards from Cohort I to Cohort II. On the contrary, this consistency in grading standards decline was not found between Cohorts II and III.

Chapter 5

SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

In Chapter 5, the study is summarized; conclusions are drawn; the implications between the results of this study and previously cited research are discussed; and recommendations are made. The first two sections review the analytical process and the characteristics of the major fields and cohort groups. The next three sections examine the adaptative grading standards for: (1) major fields within cohort groups, (2) total GPA across cohort groups regardless of major, and (3) each major field across cohort groups. In the final section, recommendations are discussed.

THE ANALYTICAL PROCESS

The primary purpose of this study was to: 1) establish the extent to which SAT scores have declined while college GPA have increased; and, 2) examine shifts in grading standards between major fields and between time periods. Goldman et al. theorized that these shifts could be explained by Helson's Adaptation-Level Theory in that grades awarded to individual students are influenced by the performance level of the entire class. Grade inflation could be inferred if higher grades are awarded without a corresponding increase in ability levels.

The extent to which grade inflation is evident in this study was determined by first establishing regression equations within each of three graduation year cohorts (1965 - 1970, 1971 - 1976, 1977 - 1982). Within each cohort, college total GPA and major GPA for each major field were regressed, using separate equations, onto the predictor variables of SAT-V, SAT-M and secondary school class rank. These equations were then applied to the predictor variable scores of students in each of the other cohorts or major fields. The effect was to project a total or major GPA mean for students if they had attended college during another time period or had pursued a different major field. Each set of projections were arrayed in a matrix in which the rows represented the regression equation sources (or grading standards) and the columns represented the predictor data sources (or ability levels). Negative correlations between the row and column means indicated Adaptation-Level grading.

DESCRIPTIVE CHARACTERISTICS OF MAJOR FIELDS AND COHORT GROUPS

The national trend of yearly declining mean SAT scores is not evident by the scores of the students whose records were included in this study until the latest cohort (Cohort III). In spite of the longitudinal fluctuations in the mean SAT scores, the mean secondary school rank for each cohort indicates that there is a slightly higher performing group of students relative to their high school class with each later cohort group. This paradoxical relationship is consistent with the

findings of the Advisory Panel on the Scholastic Aptitude Test Score Decline in that there was an apparent shift in the secondary school curriculums. Relative to other high school graduates, the college involved in this study has continued to attract at least the same caliber of students; but the academic preparation of these students has generally declined over time.

The percent of common variance between and among the predictor and criterion variables display consistent increases from the earliest to latest cohorts. The squared correlations of the predictor variables to either of the predicted GPA's (both major and total) are relatively low ($r^2 = .05 - .30$); but these low correlations are consistent with Humphreys' conclusion that the predictor indices decrease in their ability to predict GPA's as students progress to their senior years. All GPA's in this study are derived from a minimum of three years of courses. Of the three predictor variables, the secondary school rank generally correlate more highly with both criterion GPA's than did either of the SAT scores. This is not unexpected since the secondary school rank and both criterion are scholastic performance related measures involving motivational and persistence factors. Aptitude performance measures like the SAT's are derived from one single test.

Across the major fields of each cohort group, each predictor variable correlates more highly with the total GPA's than with the major GPA's. Initially, this would seem appropriate if the upper level major courses produce a limited range of grades with fewer "D" and "F" grades. On the contrary, Table 3 indicates that for each pair

of total and major GPA means within each major field, the standard deviations for the major GPA's are generally greater than those for the total GPA's. One possible explanation for the higher correlation of predictor variables with the total GPA's, therefore, is that the total GPA's include those courses taken early in the students' college careers whereas the major GPA's include few such early courses. Again the Humphreys research indicate that the earlier GPA's correlate more highly with the predictor variables than with later GPA's.

In those instances where there is a great difference in the mean score of a particular predictor variable between cohort groups for the College in general, there is increased consistency in the direction of the cohort differences for that variable among the individual major fields. This trend is found in that SAT scores between Cohorts I and II. The almost identical college means for the SAT-V between the two cohorts result in no pattern of differences between the individual major fields. The wide difference in mean college SAT-M scores between the same cohorts, however, result in a consistent increase of mean SAT-M scores from Cohort I to Cohort II for the individual major fields.

A review of the mean predictor and criterion scores between cohort periods for each major field indicate that the students who actually pursue science major fields generally have higher mean SAT scores, ranks and GPA's than non-science oriented students. This is particularly true for Math/Physics and Chemistry students whose mean

SAT-M, rank and college total GPA scores are not exceeded by any other major field regardless of cohort group. Contrary to the Sciences, there does not appear to be any group distinction between the major fields in the Humanities and those of the Social Sciences. It should be noted, however, that the students who pursued the English major have the highest mean SAT-V scores of all fields for the three cohort groups including the Math and Science majors.

SHIFTS IN MAJOR GPA GRADING STANDARDS BETWEEN
MAJOR FIELDS OF THE SAME TIME PERIODS

The major fields of the two earliest cohorts exhibit Adaptation-Level grading to approximately the same extent. Contrary to the first two cohorts, the last cohort shows no evidence of Adaptation-Level grading. Since the index of Adaptation-Level grading is based upon the paired correlation between measures of ability levels and grading standards for each major field, a change in this relationship could partially explain the lack of consistency between the grading patterns in Cohorts I and II and those of Cohort III. Figure 2 indicates that all fields adopted less stringent grading standards from Cohort I to Cohort II regardless of the directional changes in the ability levels. This consistent grading standard is not found between Cohorts II and III. The major fields of English, Business/Economics and to a lesser extent, Political Science exhibit more stringent grading standards from Cohort II to Cohort III while all other fields show less stringent standards over the same time period.

The results of this study are consistent with Goldman's findings that Science majors would have generally earned higher GPA's if they had pursued one of the Humanities or Social Science fields. The present study shows that if the grading standards (major GPA regression equations) of any one of the Science major fields are applied to the predictor variable scores of the students in non-science fields, the projected major GPA mean would generally be less than the actual GPA mean of the non-science majors (as shown in Table 13). The consistent exception to this trend in grading stringency is the major field of English. Regardless of the cohort group, the students in any other major would have lowered their mean major GPA if they had pursued English. By the exclusion of English with its unique grading stringency, a clearer pattern emerges between the major fields of the Humanities and those of the Social Sciences. Students in any one of the Social Science major fields would have generally earned higher mean major GPA's if they had pursued either the Arts or the Languages major.

Previously reported research by Hewitt and Jacobs indicate that students are aware of the differences in grading stringency between major fields while Holem and Newhouse found that students have a very accurate perception of their own grade potential in the different fields. The accuracy of their perceptions may be partially due to the different study strategies developed by students which are unique to the general areas as concluded by the research of Biggs and Goldman et al. The present study provides evidence that between the general

expands Goldman's work in that it shows that at this institution this grading phenomenon has been present for the past twenty years which includes the time period just prior to the national decline in mean SAT scores.

SHIFTS IN MAJOR GPA GRADING STANDARDS BETWEEN TIME PERIODS

Unlike the definite Adaptation-Level grading pattern that is present with total GPA's across time, there appears to be no pattern for the major GPA's. The courses from which the major GPA is derived are also a part of the courses from which the total GPA is derived. The lack of a grading pattern in the former and the presence of a definite pattern in the latter can only indicate that there is a group of remaining courses included in the calculation of the total GPA whose grading pattern is that of Adaptation-Level grading. Since the major level courses usually dominate the last two years of a four year undergraduate program, the Adaptation-Level grading courses must, therefore, primarily occur in the first two years of study. Humphreys concludes that the predictor variables correlate most highly with the early semester GPA's and that this correlation decreases with each successive semester GPA. It is quite possible that the phenomenon that Humphreys observes is the Adaptation-Level grading observed by Goldman et al.

academic areas, the relative grading standards have remained rather stable over the past twenty years. This stability could also contribute to the accuracy of perceptions between the general academic areas. Longitudinal grading standard fluctuations for the major fields, however, would probably result in less stable grading perceptions for the specific fields within the general areas.

SHIFTS IN TOTAL GPA GRADING STANDARDS BETWEEN TIME PERIODS

Adaptation-Level grading is evident in the total GPA's over the three time periods in that the mean GPA's increase from Cohorts I to III while mean ability levels decline over the same periods. Longitudinal changes in total GPA grading standards, however, are affected by the performance levels of the students themselves. Each of the three total GPA levels display approximately the same declines in ability levels from Cohort I to Cohort III. In contrast, the lowest total GPA group shows the least drop in grading standards while the highest total GPA group shows the greatest drop in standards over the same periods. This great decline in grading standards for the highest GPA group may be partially attributable to professors' fears that lower grades will deprive their students of good jobs or graduate study as noted in Chapter 1.

The presence of Adaptation-Level grading for total GPA's in each cohort group is consistent with the Goldman results which analyze total GPA's in each major field for only one period of time. This study

RECOMMENDATIONS

As a result of this study and the conclusions derived, three recommendations are made. Every several years, a similar analysis of departmental grading standards should be conducted as part of the college's commitment to institutional self study. The results of this study and future studies should be made available to the academic departments as reference points in the definition of student performance quality. This "benchmark" is certainly needed as the ability levels of new students become more diverse. As a result of this feedback, those departments whose grading standards are considerably lower than the mid-range of standards should become more demanding in their expectations of students and more discriminating in their grading. Such an increase in standards may require that the College offer remedial courses (i.e. math, writing) on a regular basis to prepare lower ability students in the skills required in those major fields whose standards have been increased.

Secondly, it is recommended that future research be devoted to the longitudinal analysis of Adaptation-Level grading in service-level (100 level) courses. This study shows that such grading is evident when the GPA is derived from all course grades; yet this trend diminishes when only the major course grades are considered. An analysis of service-level course grades would test the hypothesis that Adaptation-Level grading is more evident in these courses than in any other level of courses.

Third, the implications of this study on admission decisions are not as pertinent to a small liberal arts college as they would be for a large university where students are admitted directly into individual colleges of specialized concentrations. This study does, however, involve prediction techniques that would be useful in counseling with students who are deciding upon a major field in a liberal arts college. It is recommended that the prediction benefit of major GPA regressions on secondary school indices be used as a counseling tool. While its accuracy in predicting success in specific major fields is limited, it would be more applicable to the general academic areas whose longitudinal grading standards have been shown to be more stable.

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APPENDIX A

NATIONAL MEAN SAT SCORES 1951-52 TO 1979-80

Appendix A

National Mean SAT Scores 1951-52 to 1979-80

Academic Year	SAT - Verbal		SAT - Mathematics	
	All Candidates	High School Seniors	All Candidates	High School Seniors
1951-52	476		494	
1952-53	476		495	
1953-54	472		490	
1954-44	475		496	
1955-56	479		501	
1956-57	473		496	
1957-58	472		496	
1958-59	475		498	
1959-60	477		498	
1960-61	474		495	
1961-62	473		498	
1962-63	478		502	
1963-64	475		598	
1964-65	473		496	
1965-66	471		496	
1966-67	467	466	495	492
1967-68	466	466	494	492
1968-69	462	463	491	493
1969-70	460	460	488	488
1970-71	454	455	487	488
1971-72	450	453	482	484
1972-73	443	445	481	481
1973-74	440	444	478	480
1974-75	437	434	473	472
1975-76	429	431	470	472
1976-77	429	429	471	470
1977-78		429		468
1978-79		427		467
1979-80		424		466

Appendix A continued

Sources:**Academic Years**

1951-52 to 1976-77: CEEB, 1977

1977-78 to 1978-79: CEEB, 1979

1979-80 : CEEB, 1980

APPENDIX B

PERCENTAGE OF CANDIDATES IN GIVEN SCORE RANGES
OF THE SAT FROM 1966-67 TO 1975-76

Appendix B

Percentage of Candidates in Given Score Ranges
of the SAT from 1966-67 to 1975-76

Test Year	Total N*	SAT - Verbal			SAT - Mathematics		
		200-399	400-599	600-800	200-399	400-599	600-800
1966-67	1422.5	28.2	59.3	12.5	20.3	61.8	17.9
1967-68	1543.8	29.9	58.0	12.1	22.1	59.6	18.2
1968-69	1585.6	29.8	58.5	11.7	22.5	59.8	17.6
1969-70	1605.9	31.6	56.7	11.8	23.0	59.5	17.5
1970-71	1537.2	31.5	57.3	11.1	22.6	59.3	18.1
1971-72	1459.9	33.1	56.6	10.4	23.8	59.2	16.9
1972-73	1398.4	35.7	55.1	9.1	24.2	59.5	16.4
1973-74	1354.0	36.2	54.8	8.9	26.1	57.5	16.4
1974-75	1371.2	36.6	55.3	8.1	28.0	56.4	15.6
1975-76	1415.0	39.6	52.8	7.6	28.6	56.3	15.1

* N in thousands

Source: Jackson, 1977

APPENDIX C
INTERCEPTS AND RAW REGRESSION COEFFICIENTS

Appendix C

Intercepts and Raw Regression Coefficients

	Intercept	SAT-V	SAT-M	RANK
<u>Cumulative GPA</u>				
Cohort I	1.93131	.00084	.00073	-.07819
Cohort II	1.96528	.00092	.00115	-.10877
Cohort III	1.82747	.00171	.00096	-.11463
<u>Major GPA - Cohort I</u>				
Arts	N/A	N/A	N/A	N/A
English	.88228	.00343	-.00007	-.10988
Languages	2.33499	.00297	-.00115	-.08414
Business/Econ	2.74428	.00022	.00017	-.07274
History	1.64585	.00184	-.00000	-.03361
Political Sci.	3.65883	.00039	-.00149	-.10886
Psychology	1.82007	.00084	.00149	-.05703
Sociology	2.06716	-.00010	.00200	-.06510
Biology	1.25665	.00084	.00244	-.11201
Chemistry	2.45549	.00277	-.00185	-.09341
Math/Physics	-.50757	.00388	.00227	-.07888
<u>Major GPA - Cohort II</u>				
Arts	2.68418	-.00155	.00277	-.06956
English	.72475	.00262	.00136	-.06207
Languages	3.09700	.00099	-.00011	-.10182
Business/Econ	2.17032	.00179	.00068	-.11155
History	1.55725	.00147	.00129	-.05830
Political Sci.	2.47893	.00083	.00087	-.09568
Psychology	2.43267	.00116	.00019	-.07910
Sociology	2.55453	.00069	.00039	-.06480
Biology	2.01185	.00151	.00074	-.13454
Chemistry	1.87483	-.00135	.00359	-.14630
Math/Physics	1.77910	.00151	.00107	-.14401

Appendix C continued

	Intercept	SAT-V	SAT-M	RANK
<u>Major GPA - Cohort III</u>				
Arts	3.91546	-.00048	-.00032	-.09629
English	2.87105	-.00023	.00034	-.08236
Languages	4.16277	-.00007	-.00058	-.19207
Business/Econ	1.41534	.00258	.00095	-.09105
History	2.16835	.00080	.00198	-.09225
Political Sci.	1.15626	.00029	.00398	-.09222
Psychology	2.34555	.00294	-.00102	-.09895
Sociology	1.95471	.00299	-.00044	-.04652
Biology	1.00730	.00238	.00139	-.02359
Chemistry	1.38110	.00194	.00158	-.10884
Math/Physics	2.36873	.00577	-.00404	-.00300

APPENDIX D

MULTIPLE CORRELATIONS AND STANDARDIZED REGRESSION
COEFFICIENTS FOR TOTAL GPA REGRESSION EQUATIONS

Appendix D

Multiple Correlations and Standardized Regression
Coefficients for Total GPA Regression Equations

	Multiple Correlation	Standardized Regression Coefficients		
		SAT-V	SAT-M	RANK
Cohort I	.33	.1621	.1323	-.4860
Cohort II	.36	.1488	.1796	-.4650
Cohort III	.39	.2346	.1324	-.4484

APPENDIX E

PROJECTED MAJOR GPA MEAN IF STUDENTS IN ONE COHORT
PERIOD HAD ATTENDED DURING ANOTHER PERIOD
(MAJOR FIELD OF BUSINESS/ECONOMICS)
(TOTAL GPA LESS THAN 2.33)

Appendix E

Projected Major GPA Mean if Students in one Cohort
Period had Attended During Another Period
(Major Field of Business/Economics)

(total GPA less than 2.33)

		Projected to Predictor Data Source			Row Mean
		Cohort I	Cohort II	Cohort III	
Projected From Regression Equation Source	Cohort I	(2.36)	2.55**	2.53**	2.56
	Cohort II	2.70**	(2.43)	2.64**	2.59
	Cohort III	2.57**	2.59**	(2.14)	2.43
	Column Mean	2.54	2.52	2.44	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference
between projection and actual GPA in column of projection

APPENDIX F

PROJECTED MAJOR GPA MEAN IF STUDENTS IN ONE COHORT
PERIOD HAD ATTENDED DURING ANOTHER PERIOD
(MAJOR FIELD OF BUSINESS/ECONOMICS)
(TOTAL GPA FROM 2.33 TO 2.80)

Appendix F

Projected Major GPA Mean if Students in one Cohort
Period had Attended During Another Period
(Major Field of Business/Economics)

(total GPA from 2.33 to 2.80)

		Projected to Predictor Data Source			Row Mean
		Cohort I	Cohort II	Cohort III	
Projected From Regression Equation Source	Cohort I	(2.91)	2.64**	2.66	2.74
	Cohort II	2.90	(2.97)	2.89**	2.92
	Cohort III	2.75**	2.74**	(2.65)	2.71
	Column Mean	2.85	2.78	2.73	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference between projection and actual GPA in column of projection

APPENDIX G

PROJECTED MAJOR GPA MEAN IF STUDENTS IN ONE COHORT
PERIOD HAD ATTENDED DURING ANOTHER PERIOD
(MAJOR FIELD OF BUSINESS/ECONOMICS)
(TOTAL GPA GREATER THAN 2.80)

Appendix G

Projected Major GPA Mean if Students in one Cohort
Period had Attended During Another Period
(Major Field of Business/Economics)

(total GPA greater than 2.80)

		Projected to Predictor Data Source			Row Mean
		Cohort I	Cohort II	Cohort III	
Projected From Regression Equation Source	Cohort I	(3.46)	2.77**	2.75**	2.99
	Cohort II	3.15*	(3.59)	3.10**	3.28
	Cohort III	2.95**	3.02**	(3.40)	3.12
	Column Mean	3.19	3.13	3.08	

() indicates actual major GPA mean

* (.05 level) or ** (.01 level) indicate a significant mean difference between projection and actual GPA in column of projection

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A LONGITUDINAL ANALYSIS OF COLLEGE-WIDE
AND MAJOR FIELD GRADING STANDARDS

by

Dolphus E. Henry

(ABSTRACT)

This study investigates whether national trends of declining SAT scores and grade inflation were evident at a small liberal arts college. Specifically, the changes in grading standards between major fields and across time periods were examined against the model of Adaptation-Level grading. (The Adaptation-Level grading theory hypothesizes a positive relationship between ability levels and grading standards.) Actual total and major GPA's were regressed separately on the SAT-verbal scores, SAT-math scores, and secondary school class ranks. The resulting regression equations were used to project a hypothetical GPA when applied to the predictor data of other major fields or longitudinal cohort groups.

Evidence of Adaptation-Level grading was found between major GPA's of the major fields in the first two of three cohort groups. However, only the grading of the second cohort was significant at the .05 level. Between each cohort, the relative grading standards of the general academic areas (humanities, social sciences and sciences) remained relatively stable. The standards between the individual major fields in each area were less so. Adaptation-Level grading was also found for each of three total GPA performance levels across time periods with the highest

GPA level exhibiting the greatest drop in grading standards over time. No consistent major GPA grading pattern was found between the individual major fields across time periods.

Since Adaptation-Level grading was found between cohort groups for the total GPA's and not for the major GPA's, it was concluded that the grading pattern of total GPA's was primarily due to the grading patterns of lower level or service courses.