

## Comparison of the College Aptitude Test and Rank in High-School Graduating Class as Factors for Predicting Freshman Scholarship

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This study is limited to a consideration of the manner in which the Minnesota college aptitude test and rank in high-school graduating class predict freshman scholarship, first quarter, at the University of Minnesota. It is based upon data derived from the records of 1,950 freshmen who entered the various colleges of the University during the academic year 1932-33 and who completed a minimum of one quarter of college work.

In compiling the data the following methods were used. The student's percentile rank on the college aptitude test was obtained. The percentile rank was determined by comparing the student's raw score on the test with raw scores and corresponding percentile ranks of freshmen who entered the College of Science, Literature and the Arts in the fall of 1929. The freshman class of 1929 has been established as a norm from which to compute the percentile ranks to make test results comparable from year to year.

The high schools in Minnesota report the student's scholarship rank in graduating class on the credentials submitted for students applying for admission. If the student had the highest scholarship average, the high school would report him as being first in his class, also indicating the size of the graduating class. The reports are in the form: **first in a class** of 160, tenth in a class of 75, etc. From this data percentile ranks in graduating class were determined. Students who were first in their class were assigned a percentile rank of 100 and those who were lowest were ranked 1 regardless of the class size. Other percentiles were determined in the usual manner from tables prepared for various class sizes. A previous study<sup>1</sup> indicated that size of graduating class appears to have no significant effect on the reliability of the percentile rank in high-school graduating class for prediction of freshman scholarship.

<sup>1</sup>Pettengill, True, "Size of High School and Predictive Value of Class Rank and Aptitude Test Rank," *Bulletin of the American Association of Collegiate Registrars* (April, 1934), pp. 190-93.

97 The first quarter scholarship average in college, designated in this study as freshman scholarship, was used as the criterion of college success. Freshman scholarship was computed by assigning weights to each grade and dividing by the total credits for which the student was registered according to the following formula, disregarding grades of I (incomplete) and E (condition)

$$\text{Scholarship} = \frac{4A+3B+2C+ID+OF}{\text{Total credits of registration, (A+B+C+D+F)}}$$

Total credits of registration, (A+B+C+D+F) In the General College, for which the marking system was H (honors), P (pass), and F (fail), freshman scholarship was computed by considering a mark of P equivalent to D and H equivalent to B. The scholarship average for the first quarter was figured at the end of the year so that most of the I and E grades had been removed by those students who had continued in residence.

Using these data, zero-order and multiple correlation coefficients and regression coefficients were calculated for 1,950 students from all colleges for whom complete data were available. Coefficients were also calculated for those colleges in which the number of entering students was large enough to insure reliable results. These colleges, and the number of entering students were as follows:

Science, Literature and the Arts .....	1,015
General College.....	307
Engineering and Architecture.....	167
Agriculture, Forestry and Home Economics .....	<u>134</u>

Total 1,623 The students from the other five colleges admitting freshmen were added to this total in computations for freshmen in all colleges. In Table I are summarized the correlations between the variables. The correlations between freshman scholarship and the college aptitude test ranged from .23 for the College of Engineering and Architecture to .34 for the College of Science, Literature and the Arts. For all colleges combined. the coefficient increased to .42.

ating class was higher than the correlation of freshman scholarship with rank on the college aptitude test. To determine whether the differences between these correlations were statistically significant, they were divided by their probable error (Table II). In each inTABLE I  
RELATION OF FRESHMAN SCHOLARSHIP TO PERCENTILE RANK ON COLLEGE APTITUDE TEST AND PERCENTILE RANK IN HIGH-SCHOOL GRADUATING CLASS

COLLEGE	CAM	MEAN	STANDARD	ZERO-ORDXR	
All Colleges					
(1) Freshman Scholarship	1,950	1.83	0.84	rig = .42 ±	
(2) Percentile Rank, College					
Aptitude Test	1,950	42.88	28.70	ria = .58 ±	
(3) Percentile Rank, High					
School Graduating Class	1,950	62.49	27.65	r2a	
= .37 ±, of Science, Literature and the Arts					
(1) Freshman Scholarship	1,015	1.93	0.80	rig = .34	
(2) Percentile Rank, College					
Aptitude Test	1,015	49.03	27.65	r <sub>ia</sub> = .53	
(3) Percentile Rank, High					
School Graduating Class	1,015	70.84	23.69	r2a	
= .22 ±, General College					
(1) Freshman Scholarship	307	1.27	0.67	rig = .30 ±	
(2) Percentile Rank, College					
Aptitude Test	307	28.40	20.94	r <sub>ia</sub> = .50 ±	
(3) Percentile Rank, High					
School Graduating Class	307	34.36	23.74	r <sub>aa</sub> = .17 ±	0.04
Engineering and Architecture					
(1) Freshman Scholarship	167	1.79	0.91	rig = .23 ±	0.05
(2) Percentile Rank, College					
Aptitude Test	167	41.34	25.30	r <sub>ia</sub> = .49	
(3) Percentile Rank, High					
School Graduating Class	167	67.65	23.24	r2a = .21 ±	0.05
Agriculture, Forestry and Home Economics					
(1) Freshman Scholarship	134	1.91	0.69	r <sub>ig</sub> = .28	
(2) Percentile Rank, College					
Aptitude Test	134	42.60	27.20	r <sub>ia</sub>	
(3) Percentile Rank, High					
School Graduating Class	134	63.80	25.50	r2a = .21 ±	0.06

stance the difference appeared to be statistically significant. Percentile rank in high-school graduating class appeared to be a

199 The multiple coefficients of correlation of freshman scholarship with the college aptitude test and rank in high-school graduating class were next computed to determine whether a better prediction TABLE II

# DIFFERENCES BETWEEN THE CORRELATIONS OF FRESHMAN SCHOLARSHIP WITH THE COLLEGE APTITUDE TEST AND FRESHMAN SCHOLARSHIP WITH PERCENTILE RANK IN HIGH-SCHOOL GRADUATING CLASS AND STATISTICAL SIGNIFICANCE OF THE DIFFERENCES

COLLEGE	$r_{n'}$	$r' ='$	$D_{nrrasExce}$	$P.E._{Ea}$	$P.E. D.a$
All Colleges	$.58 \pm .01$	$.42 \pm .01$	.16	.017	
9.41 Science, Literature					
and Arts	$.53 \pm .02$	$.34 \pm .02$	.19	.023	8.26
General	$.50 \pm .03$	$.30 \pm .04$	.20	.045	4.44
Engineering and Architecture	$.49 \pm .04$	$.23 \pm .05$	.26	.063	4.13
Agriculture, Forestry and Home					
Economics	$.58 \pm .04$	$.28 \pm .05$	.30	.066	4.54

\*1. Freshman Scholarship. 2. Percentile Rank on College Aptitude Test. 3. Percentile Rank in High-School Graduating Class.

could be obtained from these variables combined than from either separately. The coefficients (Table III) varied from .51 in the College of Engineering to .63 for all colleges. The regression coefficients indicate that the weight that should be given to percentile rank in high-school graduating class ranges from 2 to 4 times the weight that should be assigned to percentile rank on the college aptitude test.

The multiple coefficients of correlation of freshman scholarship with these variables combined were only slightly higher than the coefficients of correlation of freshman scholarship with percentile rank in high-school graduating class alone (Table IV).

## THE TABLE

## III

MULTIPLE CORRELATION COEFFICIENTS OF FRESHMAN SCHOLARSHIP WITH THE COLLEGE APTITUDE TEST AND PERCENTILE RANK IN HIGH-SCHOOL GRADUATING CLASS AND THE REGRESSION COEFFICIENTS FOR EACH VARIABLE.

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			CoamcnaNT y en	RANK
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		CommaE Arm	Sc Hom GRADD-	DATING Crrest
		TDDD_TnsT	ATixa CLASS	
All Colleges	.63 ±.01	.0069	.0147	
	2.13 Science, Literature			
and Arts	.59 ±.01	.0068	.0162	2.38
General	.54 ±.03	.0040	.0129	3.23
Engineering and Architecture	.51 ±.04	.0045	.0184	
	4.09 Agriculture, Fores			
tryand Home Eco				
nomics	.59 ±.04-	.0043	.0151	3.51

\*1. Freshman Scholarship. 2. Percentile Rank on College Aptitude Test. 3. Percentile Rank in High-School Graduating Class.

t Considering Coefficient for College Aptitude Test

as 1. TABLE IV  
DIFFERENCES BETWEEN THE MULTIPLE CORRELATION COEFFICIENTS AND THE ZERO-ORDER COEFFICIENTS OF FRESHMAN SCHOLARSHIP WITH PERCENTILE RANK IN HIGH-SCHOOL GRADUATING CLASS AND THE STATISTICAL SIGNIFICANCE OF THE DIFFERENCES

CDLLNGN	R l . . *	r , *	P. E. DirrsRDxcn		P. E. DirrEHENCd
			DirazNHxca	DirpznExeD	
All Colleges	. 63 ±.01	.58 ±.01,	.05	.014	
	3.57 Science, Literature				
and Arts	.59±.01	.53 ±.02	.06	.021	2.86

A chief objective of the measurements for the prediction of freshman scholarship is to determine, if possible, prior to college entrance whether or not students will be able to do college work.

e. The desirability of such measures for use in educational measurement

college scholarship only to the extent of .50 to .60 it is clear that a basis for prediction. Many studies have shown that the correlation between high school and college scholarship is only .50 to .60.

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more or less universally as a measure of college success it seemed to serve as a satisfactory criterion.

The first fact to be noted from these figures is that there is complete overlapping of the curves at every point. Students high in rank on either measure fall below C and students low in rank fre

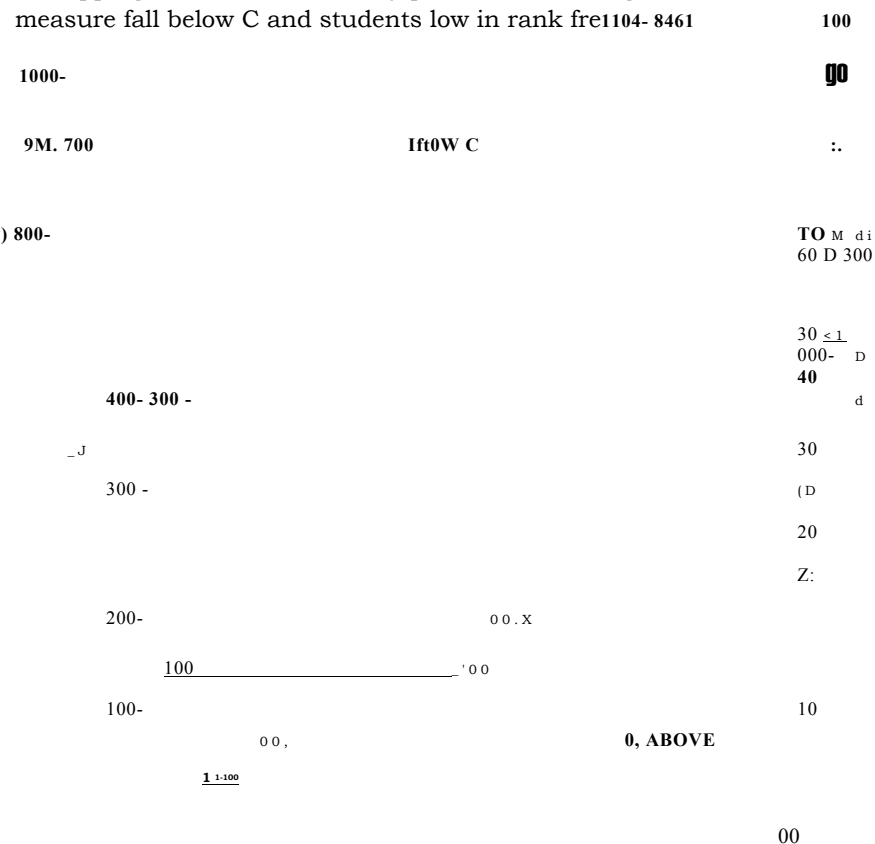


FIG. 2. Comparison of cumulative frequencies of freshmen by scholarship with percentile rank in high-school graduating class.

scholarship below C ranked below 31 in high-school graduating class. From these figures it appears that the college aptitude test at all

levels selects a larger percentage of the students who will do poorly in college, while rank in high-school graduating class selects a larger percentage of those who will achieve satisfactorily.

It is significant to note the effect when some crucial point is selected below which students might be denied admission to college. Let us assume that it is desired to deny admission to 50 per cent, admittedly an extreme case, of the below C students. By using the college aptitude test, admission would have to be refused to all with a rank of 25 or below (Figure 1). This would deny admission to approximately 23 per cent of the students who would achieve a scholarship average of C or better. On the other hand, if rank in high-school graduating class were used, a rank of 51 would be the crucial point at which to refuse admission to below C freshmen. This point would deny admission to only 12 per cent of students capable of scholarship average of C or better, or about one half of the number of better students who would be eliminated by using the college aptitude test as the basis for selection. Both criteria in this respect are subject to the law of diminishing returns. The high-school rank has the advantage over the aptitude test in that, no matter where the crucial point is set, relatively fewer students of promise would be eliminated for the same percentage of students denied admission who would have low freshman scholarship.

In order to show the effect upon selection when rank in high-school graduating class and rank on the college aptitude test were combined, Figure 3 was constructed. In this figure the regression coefficients obtained (Table III) were used as the best weights in combining the ranks on both measures. This figure shows that a weighted average rank of about 45 would be the point at which 50 per cent of the poorer students would be denied admission, but this rank would also eliminate about 12 per cent of the C or better students. Apparently weighting and combining the two measures does not result in any more satisfactory means of selection than rank in high-school graduating class alone, assuming that the purpose is to admit the largest number of satisfactory students while denying admission to as many poor students as possible.

In summarizing the results of this study, it appears that:

1. The rank in high-school graduating class is statistically a more reliable index than the college aptitude test for the prediction of

2. If the two factors are combined, the ratio of the regression coefficients varies by colleges and indicates that rank in high-school graduating class should receive from 2 to 4 times the weight assigned to the college aptitude test to obtain the best prediction of freshman scholarship.

3. There is no significant difference between the correlation of rank in high-school graduating class with freshman scholarship and FR3MMM  
Bale. C C-6

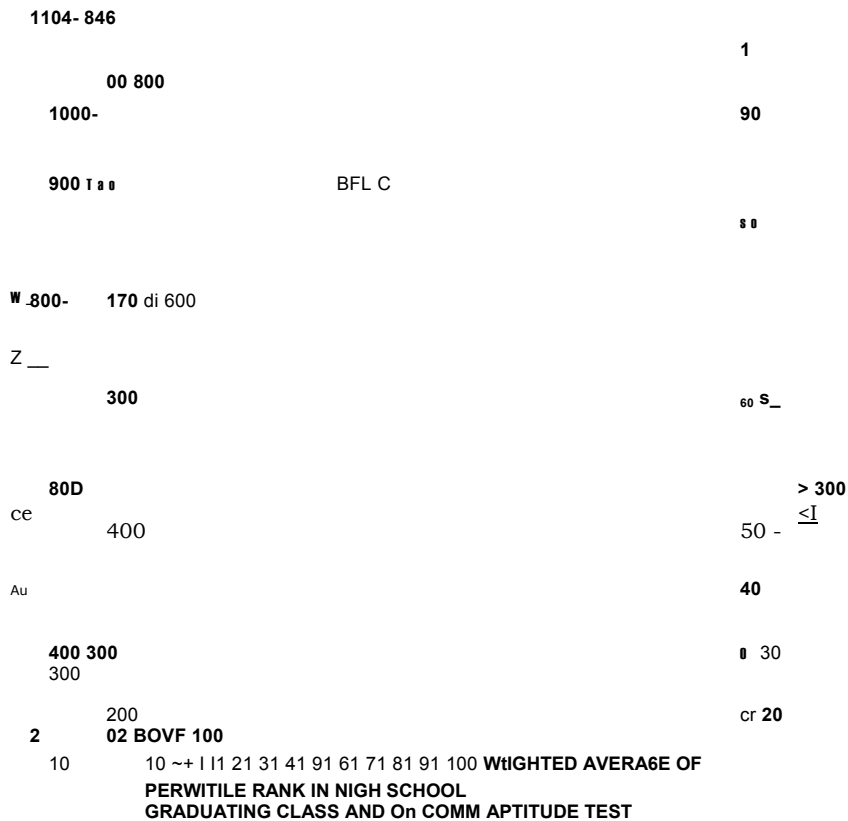


Fig. 3. Comparison of cumulative frequencies of freshmen by scholarship with weighted average of percentile rank in high-school graduating class and on college aptitude test.

a properly weighted combination of rank in high-school graduating class and college aptitude test rank correlated with