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A Study of High School and College Grades

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A STUDY OF HIGH SCHOOL AND COLLEGE GRADES

by

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THESIS

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IN
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INTRODUCTION

The task I have set myself is one to which my interest has been led by a varied experience in high school teaching followed by several years teaching in college where our high school product is largely disposed of.

In all that experience the giving of grades was a bugbear, a necessary evil apparently, and it occurred to me that if those grades had or could be made to have some value beyond the moment, some directive or prognostic value, they might lose their ill-reputation in the minds of both pupil and teacher.

With this thought in mind I interviewed the Registrar of the College of the Pacific and received his hearty approval and free access to the student records of the College. Using this privilege I have made a careful study of the high school and college grades of the graduates with the A.B. degree since 1921. The high school credentials of many of these graduates, however, gave simply the information "Recommended" in the various subjects, hence I could not consider those, so my first group for study, of whom I have complete records, consists of one hundred and nineteen graduates. In addition I have the high school and freshman records of one hundred and four students now

in college, of sophomore standing or higher, who are candidates for the A.B. degree, and the high school and freshman record of one hundred former students, since 1920, who stopped college and did not transfer to other institutions of learning so far as I could determine. These were chosen by taking from the "former student" files, the first one hundred who did not transfer of whom the high school record was complete.

In these I have studied first, the relation of the groups to each other; second the relation of each group to other parts of the same group; and third the relation between grades in the different subjects in the same and in different groups.

In all tables and charts I shall hereafter refer to the group of one hundred and nineteen graduates as Group I, to the group of one hundred and four now in college as Group II, and to the group of one hundred who dropped out, as Group III.

The work will be largely tables, graphs, and summaries. Grades when given as A, B, C, D, and E are used as 1, 2, 3, 4, and 5. In the Grade Point Averages which are included in the first table a grade of 1 receives three grade points, a grade of 2, two grade points, a grade of 3 one grade point and a grade of 4 no grade points.

Relation of Groups to Each Other

Table of Average Grades and Grade Points:

	High School:		Freshman:		College:	
	Ave. Grade	Ave. Grade Points	Ave. Grade	Ave. Grade Points	Ave. Grade	Ave. Grade Points
Group I.	1.77	2.33	2.07	1.93	2.08	1.92
Group II.	1.87	2.13	2.45	1.55		
Group III.	1.89	2.11	2.74	1.26		

I have worked out the same information and the evidence from which it was drawn in a series of graphs of various kind which I shall now describe.

Fig. I, is a histogram of the high school grades of the three groups. The X axis representing grades, is divided so that each half inch (5 spaces) has a range of .15. The Y axis shows the number of cases in each range, one-half inch, (5 spaces) counting as one case.

Fig. 2 is a histogram showing the freshman grades of the same three groups, drawn in the same way and to the same scale.

Both histograms show a decided tendency to fit in with the probability curve, though in a somewhat ragged manner, due probably to the small and selected number of cases.

Fig. 3 is a graph showing the comparative rating of the three groups in their high school averages. Two spaces along the horizontal represents one case and three spaces

on the vertical represent .1 of a grade. All three begin at the same vertical line for their highest grade, but owing to the differing number of cases do not end at the same line.

I have cut the number of cases in group I to one hundred and eleven so this difference will not be misleading.

Fig. 4 is a graph showing the comparative rating of the three groups in their college averages. The scale and the plan is the same as Fig. 3.

The variation in the average high school grades of the three groups is not sufficient to have much significance. Group III was consistently lower than Group I and poorer preparation may have been an element in their leaving, but the difference was not great. Group II was between the other two as a rule and this too might be expected, as in this group there are many that may yet drop out.

The greater variation in the Freshman averages of the three groups, however, gives more material for speculation and a challenge to investigation.

The group of graduates had a decidedly higher average as freshmen than the students now in college had as freshmen. I would suggest two possible explanations, both tending in the same direction. First, from the graduated group were eliminated all those who because of excessively low marks, did not continue to the end; second, the standard

of marking in the college has been raised, in the last eight years and that has tended to lower the grades of more of the present than of former students. There may be a third reason, viz., that with the increase in numbers and the consequent increase in extra-curricular activities, there has been an actual decrease in scholarship. The first two, however, are sufficient to explain the differences and the third may have no lowering influence. (We have no data at present concerning the effect of extra-curricular activities.)

The group of those who dropped out had a still lower rating in their freshman year than either of the other groups. This leads us to think that at least part of the loss was due to poor scholarship. They were earlier in time, as a whole, than the students now in college, and this would have tended to work in the opposite direction, for higher grades, so the evidence seems strong that poor work in the freshman year, even when not "failure" has its effect in thinning the ranks, i.e., that grades in themselves act as a selective agency in determining which students shall continue in college.

(I included no cases who "flunked out" in the first half of the freshman year, and very few whose later scholarship was too low for them to return.)

Relations Within the Groups

Using Spearman's "Foot-rule" as applied to the rank method of working out coefficients of correlation, I worked out the coefficient of correlation between the student's grades in the different periods considered, high school, freshman, and college averages being studied. Tables 2 to 5 inclusive show this work, with the following results;

Coefficients of Correlation

Group I.

H.S. and Freshman averages	.54
H.S. and College averages	.63
Freshman and College averages	.80

Group II.

H.S. and Freshman averages	.73

Group III.

H.S. and Freshman averages	.62

It is gratifying to us as college teachers to note that the highest correlation is between the Freshman and College averages. This would indicate not only that our grades are in reality to a certain extent grades of ability, but also that our grades are consistent and stand for something.

The correlation between High School and Freshman averages was highest in Group II, students now in College. This also is gratifying for it indicates that our present method of choosing students is bearing fruit; that a somewhat more uniform product than formerly is resulting.

I also made charts showing the relation graphically between the three averages of Group I and the two averages of Group II and Group III. I made the first of these in two ways, first arranging the cases in order of rank in the three averages studied, Fig. 5, and second arranging the cases in order of high school rank and keeping that order of cases for both freshman and college averages, Fig. 6. For Group II and Group III, I arranged the high school averages in order of rank and the freshman averages both in order of rank and in the same case order as in the high school graph, Fig. 7 and Fig. 8.

The same results are shown graphically by histograms similar to Figures I and II. Fig. 9 shows the relative numbers of cases in the different ranges in the high school, freshman and college for Group I. Fig. 10 shows the number of cases in the different ranges in high school and freshman for Group II and Fig. 11 shows the cases in the different ranges in high school and freshman for Group III.

Having studied these tables and graphs carefully, I

find they all show the same relations and tendencies. The most noticeable of these is that high school grades are regularly higher than freshman or college grades. This is true in all three groups; the freshman grades being around .4 or 15% lower in the middle portion of the graph, more than that in the lower portion and much less in the higher portion of the cases. This latter variation might well indicate that our grades are really to some extent a standard of ability - poor ability in high school showing still less ability in college and unusual ability in high school indicating still greater ability in college. There are many exceptions, of course, but it would seem that our standard of high grade for college entrance is not entirely without reason as a basis for selection.

Though at first sight it seems anomalous that college grades should be lower than high school grades when we have picked our group according to grade, that very fact will, on consideration, be seen to be one of the factors in explaining the lower grades in college. All of the college group were among the upper 40% in high school, but they are now scattered over the whole range of the probability curve and in consequence their grades are lower, for grades are comparative. The lower grades do not indicate actual decrease in ability but comparative decrease in ability. There

are a number of other factors however, which no doubt have a place in this lowering of grades, which it might be well to consider. The average high school student has definite daily assignments to which he is rigidly held, and periods of supervised study, in fact a schedule of study as well as of recitation or lecture. In college this is changed. The student is thrown upon his own responsibility in the matter of study. Checking up comes only occasionally and he is often deep in difficulty before he is really aware of it. The high school may help in this matter by training in self reliance and individual responsibility. The college may help by increased personal interest and anticipation of difficulties, to bridge the chasm which is at present very wide and deep.

New environment, new interests, social and material, all play their part and, in the period of adjustment, at least, a slump on this account is to be expected. That it is overcome, at least partially, and an adjustment made is shown by the fact that the average college grades are higher than the average freshman grades. We have some encouragement, therefore, to think that if we can give the students a friendly tow the first year, they may be able to travel on their own power thereafter.

Relation Between Grades in Different Subjects

In making this study I classified the subjects as English, Mathematics, Science, Foreign Languages and History. In the latter I included Economics and Political Science. All others I classified as other subjects and though they have their part in the averages previously considered, they will not be considered in the examination of subject matter.

In Table 7 will be found the high school and college averages in the five subjects for Group I and in Table 8 the high school and freshman averages for Group II.

In Table 9 will be found the Coefficients of Correlation between the four subjects, English, Sciences, History and Foreign Languages, in high school and college for Group I and the same four subjects in high school and freshman for Group II.

(I made no attempt at correlation in Mathematics as there were but 41 cases of college mathematics.)

As in the other study, I made graphs for Group I as follows: Fig. 12, a graph showing average in English in high school according to rank, average in English in college according to rank and average in English in college in same order of cases as the high school averages.

Fig. 13, a graph of the same kind for high school and

college sciences.

Fig. 14, a graph of the same kind for high school and college history.

Fig. 15, a graph of the same kind for high school and college Languages.

Fig. 15, a graph showing college averages according to rank in English, Sciences, History and Languages.

(I reduced the number of cases considered in English and Languages to 106 by eliminating a few of the medium grades so as to make the number of cases the same in the four subjects.)

Fig. 17, a graph showing relation between College English and College Science in the same order of cases and also the College Sciences in order of rank.

Fig. 18, a histogram, showing the number of cases in the different ranges in College English, History, Languages and Sciences.

From the evidence here produced, what deductions can be made, what conclusions should be drawn, what changes may be suggested?

I will first say that Mathematics will be eliminated from further discussion as there are so few cases recorded in college. Those few showed a higher average in Group I and a lower average in Group II than any of the other four

subjects.

The variation in high school averages for the four subjects was less than four percent and for the college averages less than ten percent in Group I; and around three percent and twelve percent in Group II. This alone would disabuse us of the old idea that certain subjects are in general easier than others; that it is easier to get high marks in certain subjects than in others and would indicate that the standard of marking in the different departments both in high school and college is somewhat uniform and is nearly commensurate with the ability of the students taking courses in the different departments. Fig. 18 shows this graphically in a very striking manner.

A study of the Coefficients of Correlation in the different subjects tends to break down another of our traditional ideas, namely that students have special ability in one subject and continually do well in that subject as compared with other subjects. Referring to Table 9, we note that the highest correlation coefficient in individual subjects is .54 and the lowest .29 whereas the correlation coefficient for the high school and college averages was .63. The graphs, Figures 12, 13, 14, and 15 show this same condition even more strikingly; the irregularity of subject grades in the same case order being much more noticeable than the general tendency, which does prevail, of high

subject marks in high school being followed by high marks in the same subject in college.

The extremely low correlation coefficient for sciences (.29) for Group I caused considerable reflection, but when I found that in Group II, the coefficient was .60, I concluded that the low coefficient probably had little significance. Grades were but little lower than in Foreign Languages where the correlation was high. It may be that there is a greater difference in the method of presenting sciences in high school and in college than there is in presenting other subjects and that as a consequence the students who succeed in college science are not the ones that succeeded in high school sciences in as large a degree as in the other subjects.

It would therefore appear that the prognostic value of grades as we have them recorded is of a general nature, indicating the ability of the student to do advanced work, but not indicating in any noticeable degree the subjects in which he will be most successful in that advanced work. This is to be deplored and should lead us to further experiments with different methods of grading, such research tending to find some method which would have a greater prognostic value.

TABLE OF COEFFICIENTS OF CORRELATION

Group I. Table 2, page 1.

H.S. Ave.	Fresh Ave.	H. S. rank	Fresh rank	+Diff.	-Diff.
1.0	1.1	3	4		1
1.0	1.15	3	6		3
1.0	1.6	3	16		13
1.0	2.0	3	42½		39½
1.0	2.23	3	72		69
1.06	1.43	6	11		5
1.1	1.13	7	5	2	
1.13	2.03	8½	47½		39
1.13	1.59	8½	15		6½
1.16	2.03	10	47½		37½
1.18	1.85	11	33		22
1.19	1.77	12	28		16
1.20	1.80	13½	29½		16
1.20	2.20	13½	66½		53
1.22	2.90	15	114½		99½
1.27	2.15	16	57		41
1.28	1.24	17	7	10	
1.30	2.43	18	87		69
1.31	1.07	19½	2	17½	
1.31	2.5	19½	93		73½
1.32	1.66	21	22		1
1.33	2.00	23	42½		19½
1.33	1.96	23	38		15
1.33	2.32	23	81½		58½
1.35	2.25	25	73½		48½
1.37	1.61	27	17	10	
1.37	2.30	27	78		51
1.37	2.16	27	59		32
1.38	2.28	29	76½		47½
1.40	1.80	30½	29½	1	
1.40	1.41	30½	10	20½	
1.41	3.42	33	119		86
1.41	1.72	33	26	7	
1.41	1.74	33	27	6	
1.42	1.65	35½	21	14½	
1.42	2.21	35½	70		34½
1.45	1.40	37	8½	28½	
1.50	1.50	39	12	27	
1.50	2.22	39	71		32
1.50	1.51	39	13	26	
1.53	1.00	41½	1	40½	

Group I. Table 2, page 2.

H.S. Ave.	Fresh Ave.	H. S. rank	Fresh rank	+Diff.	-Diff.
1.53	2.17	41½	61½		20
1.54	1.58	43	14	29	
1.56	2.20	44	66½		22½
1.59	2.50	45	93		48
1.60	1.90	46½	36	10½	
1.60	1.70	46½	25	21½	
1.61	2.28	48½	76½		28
1.61	2.0	48½	42½	6	
1.63	1.83	50	32	18	
1.64	2.10	51½	53		1½
1.64	2.10	51½	53		1½
1.65	1.67	53	23½	29½	
1.67	2.2	54	66½		12½
1.70	2.38	55½	84		28½
1.70	1.09	55½	3	52½	
1.71	2.48	57	91		34
1.75	2.06	58	49	9	
1.80	2.20	61	66½		5½
1.80	2.13	61	56	5	
1.80	2.10	61	53	8	
1.80	1.90	61	36	25	
1.80	1.67	61	23½	37½	
1.83	1.62	64	18	46	
1.86	2.57	65	98½		33½
1.87	2.90	66	114½		48½
1.88	2.0	68	42½	25½	
1.88	1.63	68	19	49	
1.88	2.0	68	42½	25½	
1.90	2.0	70½	42;	28	
1.90	2.1	70½	53	17½	
1.93	2.17	72	61½	10½	
1.94	2.77	73½	110½		37
1.94	2.77	73½	110½		37
2.0	1.40	81½	8½	73	
2.0	2.18	81½	63	18½	
2.0	2.16	81½	59	22½	
2.0	2.16	81½	59	22½	
2.0	2.20	81½	66½	15	
2.0	2.52	81½	95½		14
2.0	1.88	81½	34	47½	
2.0	1.90	81½	36	45½	
2.0	2.31	81½	79½	2	
2.0	2.33	81½	83		1½
2.0	2.61	81½	102½		21

Group I. Table 2, page 3.

H.S. Ave.	Fresh Ave.	H. S. rank	Fresh rank	+Diff.	-Diff.
2.0	2.60	81½	100½		19
2.0	2.68	81½	106		24½
2.0	2.70	81½	107½		25
2.03	2.25	89	73½	15½	
2.06	2.57	90½	98½		8
2.06	2.88	90½	113		22½
2.11	2.03	92	42½	49½	
2.13	3.05	93	117		24
2.15	2.55	94	97		3
2.18	2.07	95	50	45	
2.20	2.1	98½	53	45½	
2.20	2.61	98½	102½		4
2.20	2.45	98½	88½	10	
2.20	2.47	98½	90	8½	
2.20	2.60	98½	100½		2½
2.20	2.70	98½	107½		9
2.27	1.81	102	31	71	
2.30	2.00	103	42½	60½	
2.33	2.52	104½	95½	9	
2.33	2.31	104½	79½	25	
2.34	2.45	106	88½	17½	
2.36	2.40	107	85½	21½	
2.40	2.20	108	66½	41½	
2.43	2.73	110	109	1	
2.43	2.32	110	81½	28½	
2.43	3.03	110	116		6
2.46	2.64	112	104	8	
2.50	2.84	113½	112	1½	
2.50	3.30	113½	118		4½
2.59	2.67	115	105½	10	
2.67	2.50	116	93	23	
2.73	2.27	117	75	42	
2.8	1.64	118½	20	98½	
2.8	2.40	118½	85½	33	
				1576	1576

$$R = 1 - \frac{6(1576)}{(119)^2-1} = .34$$

$r = .54$

$$R = 1 - \frac{6\ g}{N^2 - 1}$$ Formula 7 Spearman's "Footrule"

g = sum of grains or losses (they are -)

N = number of cases.

From this value of R, we find the coefficients of correlation r = .54, by substituting in table 3, Otis' "Statistical Method in Educational Measurement."[1] This table is based on the formula

$$r = 2 \cos \frac{\pi}{3}(1-R) - 1 \quad \text{in which}$$

$$R = 1 - \frac{6\Sigma g}{n^2-1} \quad \text{and} \quad \frac{\pi}{3} = .60$$

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1. "Statistical Method in Educational Measurement", Arthur S. Otis. World Book Co., Chicago.

TABLE OF COEFFICIENTS OF CORRELATION

Group I. Table 3, page 1.

H.S. Ave.	College	H. S. rank	College rank	+Diff.	-Diff.
1	1.11	3	1	2	
1	1.24	3	4		1
1	1.5	3	13		10
1	1.63	3	56½		53½
1.06	1.5	6	13		7
1.1	1.27	7	5	2	
1.13	1.7	8½	21½		13
1.13	1.63	8½	18		9½
1.16	1.92	10	45½		35½
1.18	1.8	11	32		21
1.19	1.74	12	27		15
1.2	1.8	13½	32		18½
1.2	1.9	13½	41½		28
1.22	2.47	15	96½		81½
1.27	2.04	16	56½		40½
1.28	1.34	17	7	10	
1.3	2.47	18	96½		78½
1.31	1.39	19½	9	10½	
1.31	2.33	19½	85½		66
1.32	1.56	21	15	6	
1.33	1.83	23	35		12
1.33	2.50	23	100½		77½
1.33	1.66	23	20	3	
1.35	2.23	25	74		49
1.37	1.72	27	25	2	
1.37	1.78	27	29½		2½
1.37	2.19	27	68½		41½
1.38	1.9	29	41½		12½
1.4	1.91	30½	44		13½
1.4	1.71	30½	24	6½	
1.41	1.74	33	27	6	
1.41	2.61	33	105		72
1.41	1.9	33	41½		8½
1.42	1.5	35½	13	22½	
1.42	1.87	35½	38		2½
1.45	1.46	37	10	27	
1.5	1.32	39	6	33	
1.5	1.7	39	23	16	
1.5	1.47	39	11	28	
1.53	1.38	41½	8	33½	
1.53	2.44	41½	95		53½
1.54	1.98	43	51		8

Group I. Table 3, page 2.

H.S. Ave.	College	H. S. rank	College rank	+Diff.	-Diff.
1.56	2.43	44	94		50
1.57	2.32	45	81½		36½
1.6	1.65	46½	19	27½	
1.6	1.82	46½	34	12½	
1.61	2.84	48½	113		64½
1.61	1.22	48½	3	45½	
1.63	1.8	50	32	18	
1.64	2.33	51½	85½		34
1.64	2.33	51½	85½		34
1.65	2.32	53	73		20
1.67	1.92	54	45½	8½	
1.7	1.16	55½	2	53½	
1.7	1.96	55½	49	6½	
1.71	2.41	57	93		36
1.75	2.24	58	75		17
1.8	2.02	61	54	7	
1.8	2.29	61	76		15
1.8	2.17	61	65½		4½
1.8	2.0	61	52	9	
1.8	1.59	61	16	45	
1.83	2.07	64	58	6	
1.86	2.66	65	107		42
1.87	2.4	66	91½		25½
1.88	1.7	68	21½	46½	
1.88	1.9	68	41	26½	
1.88	1.86	68	37	31	
1.9	2.1	70½	62	8½	
1.9	1.74	70½	27	43½	
1.93	2.2	72	71	1	
1.94	2.33	73½	85½		12
1.94	2.36	73½	88½		15
2.0	1.78	81½	29½	52	
2.0	2.03	81½	55	26½	
2.0	2.1	81½	62	19½	
2.0	2.17	81½	65½	16	
2.0	2.36	81½	88½		7
2.0	2.54	81½	102		20½
2.0	2.83	81½	112		30½
2.0	2.20	81½	71	10½	
2.0	2.32	81½	81½	0	
2.0	2.01	81½	53	28½	
2.0	2.32	81½	81½	0	
2.0	2.09	81½	60	21½	
2.0	2.3	81½	77½	4	

Group I. Table 3, page 3.

H.S. Ave	College	H. S. rank	College rank	+Diff.	-Diff.
2.0	1.93	81½	47	34½	
2.03	2.18	89	67	22	
2.06	3.5	90½	100½		10
2.06	3.22	90½	119		28½
2.11	2.08	92	59	33	
2.13	2.65	93	106		13
2.15	2.11	94	64	30	
2.18	1.88	95	39	56	
2.20	2.9	98½	114		15½
2.20	2.49	98½	99		½
2.20	2.56	98½	103		4½
2.20	2.1	98½	62	36½	
2.20	2.3	98½	77½	21	
2.20	2.7	98½	108		9½
2.27	2.19	102	68½	33½	
2.3	1.85	103	36	67	
2.33	1.97	104½	50	54½	
2.33	2.48	104½	98	6½	
2.34	2.37	106	90	16	
2.36	2.4	107	91½	15½	
2.4	2.75	108	110		2
2.43	3.0	110	117		7
2.43	2.32	110	81½	28½	
2.43	2.97	110	115		5
2.46	2.58	112	104	8	
2.5	2.2	113½	71	42½	
2.5	2.76	113½	111	2½	
2.59	3.00	115	117		2
2.67	2.31	116	79	37	
2.73	2.72	117	109	8	
2.8	1.94	118½	48	70½	
2.8	3.0	118½	117	1½	
				1407	1407

$$R = 1 - \frac{6(1407}{(119)^2-1} = .41$$

$$\therefore r = .63$$

TABLE OF COEFFICIENTS OF CORRELATION

Group I. Table 4, page 1.

Ave. College	Ave Fresh	College rank	Fresh rank	+Diff.	-Diff.
1.11	1.11	1	4		3
1.16	1.09	2	3		1
1.22	2.00	3	42½		39½
1.24	1.15	4	6		2
1.27	1.13	5	5	0	
1.32	1.50	6	12		6
1.34	1.24	7	7	0	
1.38	1.00	8	1	7	
1.39	1.07	9	2	7	
1.46	1.40	10	8½	1½	
1.47	1.51	11	13		2
1.50	1.43	13	11	2	
1.50	1.60	13	16		3
1.50	1.65	13	21		8
1.56	1.66	15	22		7
1.59	1.67	16	23½		7½
1.62	2.00	17	42½		25½
1.63	1.59	18	15	3	
1.65	1.90	19	36		17
1.66	2.50	20	42½		22½
1.70	2.03	22	47½		25½
1.70	2.22	22	70		48
1.70	2.00	22	42½		20½
1.71	1.41	24	10	14	
1.72	1.61	25	17	8	
1.74	1.72	27	26	1	
1.74	1.77	27	28		1
1.74	2.10	27	52		25
1.78	1.4	29½	8½	21	
1.78	2.3	29½	77		47½
1.8	1.8	32	29½	2½	
1.8	1.85	32	33		1
1.8	1.83	32	32	0	
1.82	1.70	34	25	9	
1.83	1.96	35	38		3
1.85	2.0	36	42½		6½
1.86	2.	37	42½		5½
1.87	2.21	38	69		31
1.88	2.07	39	49		10
1.90	1.74	42	27	15	
1.90	1.63	42	19	23	
1.90	2.28	42	75½		33½
1.90	2.20	42	65½		23½

Group I. Table 4, page 2.

Ave. College	Ave Fresh	College rank	Fresh rank	+Diff.	-Diff.
1.90	1.80	42	29½	12½	
1.92	2.03	45½	47½		2
1.92	2.20	45½	65½		20
1.93	2.16	47	58		11
1.94	1.64	48	20	28	
1.96	2.38	49	82		33
1.97	2.51	50	93		43
1.98	1.58	51	14	37	
2.0	1.90	52	36	16	
2.01	1.90	53	36	17	
2.02	2.20	54	65½		11½
2.03	2.18	55	62		7
2.04	2.23	56½	71		14½
2.04	2.15	56½	56	½	
2.07	1.62	58	18	40	
2.08	2.0	59	42½	16½	
2.09	2.16	60	58	2	
2.1	2.47	62	88		26
2.1	2.0	62	42½	19½	
2.1	2.60	62	99		37
2.11	2.54	64	95		31
2.17	2.52	65½	94		28½
2.17	2.10	65½	52	13½	
2.18	2.25	67	72½		5½
2.19	2.16	68½	58	10½	
2.19	1.81	68½	31	37½	
2.20	2.17	71	60½	10½	
2.20	2.84	71	111		40
2.20	2.31	71	78½		7½
2.22	1.67	73	23½	49½	
2.23	2.25	74	72½	1½	
2.24	2.60	75	99		24
2.27	2.13	76	55	21	
2.30	2.2	77½	65½	12	
2.30	2.6	77½	99		21½
2.31	2.5	79	91		12
2.32	2.5	81½	91		9½
2.32	2.68	81½	105		23½
2.32	2.33	81½	81	½	
2.32	3.0	81½	115		33½
2.33	3.50	85½	91		5½
2.33	2.1	85½	52	33½	
2.33	2.1	85½	52	33½	

Group I. Table 4, page 3.

Ave. College	Ave. Fresh	College rank	Fresh rank	+Diff.	-Diff.
2.33	2.77	85½	109½		24
2.36	2.7	88½	106½		18
2.36	2.77	88½	109½		21
2.37	2.45	90	86½	3½	
2.40	2.90	91½	113½		22
2.40	2.40	91½	83½	8	
2.41	2.48	93	89	4	
2.43	2.2	94	65½	28½	
2.44	2.17	95	60½	34½	
2.47	2.43	96½	85	11½	
2.47	2.9	96½	113½		17
2.48	2.31	98	78½	19½	
2.49	2.61	99	101½		2½
2.50	2.32	100½	80	20½	
2.50	2.57	100½	96½	4	
2.54	1.18	102	34	68	
2.56	2.45	103	86½	16½	
2.58	2.64	104	103	1	
2.61	3.42	105	119		14
2.65	3.05	106	117		11
2.66	2.57	107	96½	10½	
2.70	2.70	108	106½	1½	
2.72	2.27	109	74	35	
2.75	2.2	110	65½	44½	
2.75	3.3	111	118		7
2.83	2.61	112	101½	10½	
2.84	2.28	113	75½	37½	
2.9	2.1	114	52	62	
2.97	3.03	115	116		1
3.0	2.73	117	108	99	
3.0	2.40	117	83½	33½	
3.0	2.67	117	104	13	
3.22	2.88	119	112	07	
				1010	1010

$$R = 1 - \frac{6(1010)}{(119)^2-1} = .57$$

$$\therefore r = .80$$

TABLE OF COEFFICIENTS OF CORRELATION

Group II. Table 5, page 1.

H.S. Ave.	Fresh Ave.	H. S. rank	Fresh rank	+Diff.	-Diff.
1.00	1.13	2½	2	½	
1.00	1.44	2½	7		4½
1.00	1.70	2½	13		10½
1.00	1.93	2½	25		22½
1.06	1.09	5½	1	4½	
1.06	1.91	5½	24		18½
1.11	1.34	7½	5	2½	
1.11	2.65	7½	60		52½
1.14	1.55	9	10		1
1.16	2.10	10	32		22
1.17	1.85	11	17½		6½
1.19	1.17	12	3	9	
1.20	1.87	13	21		8
1.23	1.29	14	4	10	
1.26	2.20	15	39½		24½
1.33	1.94	16	26		10
1.37	1.47	17	9	8	
1.40	1.87	18½	21		2½
1.40	1.46	18½	8	10½	
1.44	1.67	21	11	10	
1.44	1.90	21	23		2
1.44	2.70	21	65½		44½
1.53	2.79	23½	75		51½
1.53	2.43	23½	48		24½
1.56	2.50	25	51		26
1.57	2.15	26	35½		9½
1.60	2.0	28½	27	1½	
1.60	1.73	28½	14	14½	
1.60	2.37	28½	46½		18
1.60	2.15	28½	35½		7
1.64	2.18	31	38		7
1.66	2.69	32	63½		31½
1.67	1.43	33	6	27	
1.68	1.87	34½	21	13½	
1.68	2.20	34½	39½		5
1.70	2.15	37	35½	1½	
1.70	2.14	37	33	4	
1.70	2.85	37	78		41
1.75	1.78	39	15	24	
1.76	2.37	40	46½		6½
1.80	2.03	44	28	16	
1.80	2.05	44	30	14	

Group II.

Table 5, page 2.

H.S. Ave.	Fresh Ave.	H. S. rank	Fresh rank	+Diff	-Diff.
1.80	2.54	44	53½		9½
1.80	2.25	44	42½	1½	
1.80	2.68	44	61½		17½
1.80	1.69	44	12	32	
1.80	2.06	44	31	13	
1.82	1.82	49	16	33	
1.82	2.68	49	61½		12½
1.82	3.58	49	102		53
1.85	2.74	51½	72		20½
1.85	2.82	51½	77		25½
1.86	2.15	53½	35½	18	
1.86	2.28	53½	44	9½	
1.87	2.44	55½	49	6½	
1.87	2.73	55½	68½		13
1.88	2.64	57½	59		1½
1.88	2.80	57½	76		18½
1.90	2.48	59	50	9	
1.92	2.61	60½	57½	3	
1.92	1.85	60½	17½	43	
1.94	2.23	62½	41	21½	
1.94	3.03	62½	90½		28
1.97	3.0	64	88½		24½
2.0	2.54	67	53½	13½	
2.0	2.86	67	80		13
2.0	2.93	67	85½		18½
2.0	2.74	67	72		5
2.0	2.54	67	45	22	
2.05	2.87	70½	82		11½
2.05	3.53	70½	100		29½
2.06	3.50	72½	99		26½
2.06	3.28	72½	94		21½
2.07	3.03	74½	90½		16
2.07	2.74	74½	72	2½	
2.10	3.83	76	104		28
2.12	3.39	77½	98		20½
2.12	2.90	77½	83½		6
2.13	3.0	79½	88½		9
2.13	1.86	79½	19	60½	
2.16	2.25	81	42½	38½	
2.18	2.98	82½	87		4½
2.18	2.51	82½	52	30½	
2.19	2.58	84	55½	28½	
2.20	2.86	85½	80	5½	
2.20	2.90	85½	83½	2	
2.25	2.04	87½	29	58½	

Group II. Table 5, page 3.

H.S. Ave.	Fresh Ave.	H. S. rank	Fresh rank	+ Diff.	-Diff.
2.25	2.69	87½	63½	24	
2.27	2.70	89½	65½	24	
2.27	2.58	89½	55½	34	
2.28	2.72	91	67	24	
2.29	3.54	92	101		9
2.37	2.74	94	72	22	
2.37	2.93	94	85½	8½	
2.37	3.1	94	92	2	
2.40	2.86	97	80	17	
2.40	3.29	97	95	2	
2.40	3.27	97	93	4	
2.47	2.61	99	57½	41½	
2.48	3.30	100	96	4	
2.56	2.74	101	72	29	
2.69	3.34	102	97	5	
2.73	2.13	103	68½	34½	
2.87	3.64	104	103	1	
				899½	899½

$$R = 1 - \frac{6(899\frac{1}{2})}{(104)^2 - 1} = .50$$

$$r = .73$$

TABLE OF COEFFICIENTS OF CORRELATION

Group III. Table 6, page 1.

H.S. Ave.	Fresh Ave.	H. S. rank	Fresh rank	+Diff.	-Diff.
1.0	1.36	1	3		2
1.19	1.35	3	2	1	
1.19	1.86	3	17		14
1.19	2.25	3	33		30
1.20	1.61	5	9		4
1.22	1.37	6	4½	1½	
1.27	1.42	7	6	1	
1.31	2.30	8	35		27
1.38	1.19	9½	1	8½	
1.38	2.41	9½	43½		34
1.41	2.16	11	30		19
1.47	1.67	12½	11	1½	
1.47	2.40	12½	42		29½
1.48	2.67	14	53		39
1.50	1.73	15	12½	2½	
1.54	2.80	16	58		42
1.56	1.76	19	15	4	
1.56	1.93	19	19	0	
1.56	1.93	19	19	0	
1.56	2.17	19	31		12
1.56	2.47	19	47½		28½
1.58	2.80	22	58½		36
1.60	3.45	23	81½		58½
1.67	2.11	24	28		4
1.70	1.63	25½	10	15½	
1.70	2.78	25½	56		30½
1.71	2.85	27	61		34
1.73	2.10	28½	26½	2	
1.73	3.55	28½	86		57½
1.76	3.35	30	80		50
1.78	2.0	31½	21½	10	
1.78	2.83	31½	60		28½
1.80	1.73	35½	12½	23	
1.80	1.74	35½	14	21½	
1.80	2.22	35½	32	3½	
1.80	2.41	35½	43½		8
1.80	3.06	35½	67		31½
1.80	4.20	35½	93		57½
1.81	2.30	39½	35	4½	
1.81	3.07	39½	69		29½
1.82	3.64	41	87		46
1.84	2.36	42	40	2	

Group III

Table 6, page 2.

H.S. Ave.	Fresh Ave.	H. S. rank	Fresh rank	+Diff.	-Diff.
1.85	1.50	43	7	36	
1.87	1.82	44	16	28	
1.88	1.93	47½	19	28½	
1.88	2.30	47½	35	12½	
1.88	2.65	47½	52	4½	
1.88	2.73	47½	55		7½
1.88	2.87	47½	62		14½
1.88	3.07	47½	69		21½
1.89	2.45	51	46	75	
1.94	2.03	53½	23½	30½	
1.94	2.44	53½	45	8½	
1.94	2.62	53½	50½	3	
1.94	2.80	53½	58		4½
2.0	1.37	60	4½	55½	
2.0	2.33	60	37	23	
2.0	2.38	60	41	19	
2.0	2.58	60	49	11	
2.0	2.70	60	54	6	
2.0	3.22	60	74		14
2.0	3.46	60	83		23
2.0	4.37	60	94		34
2.0	4.60	60	98		38
2.06	2.07	67	24½	42½	
2.06	2.10	67	26½	40½	
2.06	2.34	67	38½	28½	
2.06	3.33	67	79		12
2.06	4.42	67	96		29
2.07	3.07	70	69	1	
2.10	2.0	71	21½	49½	
2.13	3.13	72	72	0	
2.13	2.98	74	64	10	
2.13	3.03	74	66	8	
2.13	3.31	74	77½		3½
2.17	2.97	76	63	13	
2.18	2.34	77	38½	38½	
2.19	1.60	79	8	71	
2.19	3.48	79	84		5
2.19	4.40	79	95		16
2.2	4.56	81	97		16
2.23	3.31	82	77½	4½	
2.25	2.62	83	50½	32½	
2.25	3.12	84	71	13	
2.27	2.07	85½	24½	61	
2.27	2.91	85½	92		6½

Group III

Table 6, page 3.

H.S. Ave.	Fresh Ave.	H. S. rank	Fresh rank	+Diff.	-Diff.
2.30	2.13	87	29	58	
2.33	3.0	88½	65	23½	
2.33	3.45	88½	81½	7	
2.36	3.23	90½	75	15½	
2.36	5.0	90½	100		9½
2.40	2.47	92½	47½	45	
2.40	3.51	92½	85	7½	
2.41	3.68	94	88	7	
2.43	3.26	95	76	9	
2.44	3.21	96	73	23	
2.50	3.77	97	90	7	
2.55	3.80	98	91	7	
2.66	3.76	99	89	10	
2.72	4.67	100	99	1	
				1012½	1012½

$$R = 1 - \frac{6(1012\frac{1}{2})}{100^2 - 1} = .40$$

$$r = .62$$

Table 7.

Group I.

Averages

	High School	College
English	1.745	2.16
Mathematics	1.73	2.05
Science	1.81	2.31
History	1.79	2.17
Foreign Language	1.81	2.25
General Ave.	1.77	2.08

Table 8.

Group II.

Averages

	High School	College
English	1.84	2.48
Mathematics	1.80	2.69
Science	1.85	2.46
History	1.82	2.40
Foreign Language	1.87	2.18
General Ave.	1.87	2.45

Table 9.

Coefficients of Correlation

Group I.

High School English and College English	.50
High School Science and College Science	.29
High School History and College History	.54
High School Languages and College Languages	.51
High School Ave. and College Ave.	.63

Group II.

High School English and Freshman English	.59
High School Languages and Freshman Languages	.69
High School History and Freshman History	.58
High School Science and Freshman Science	.60

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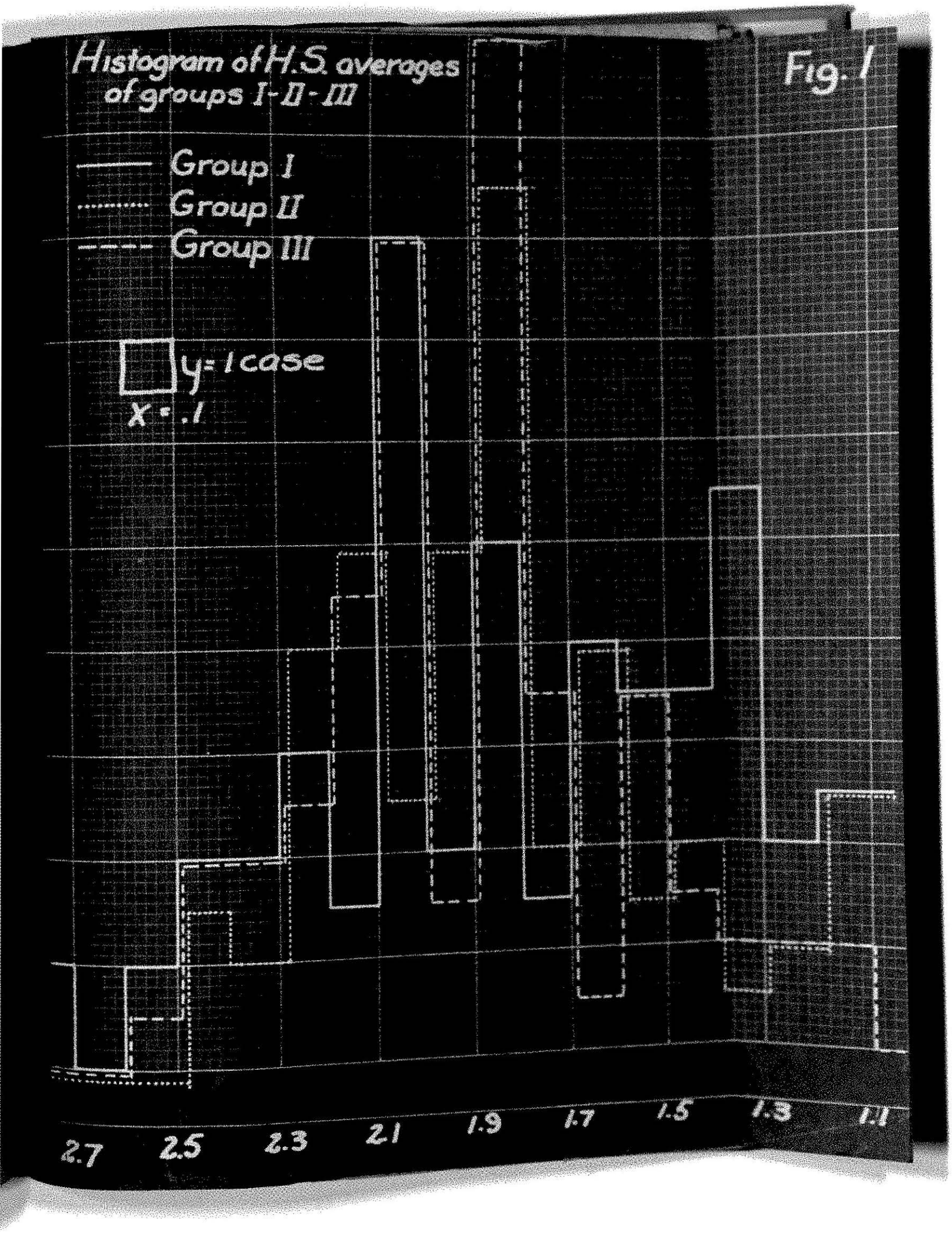
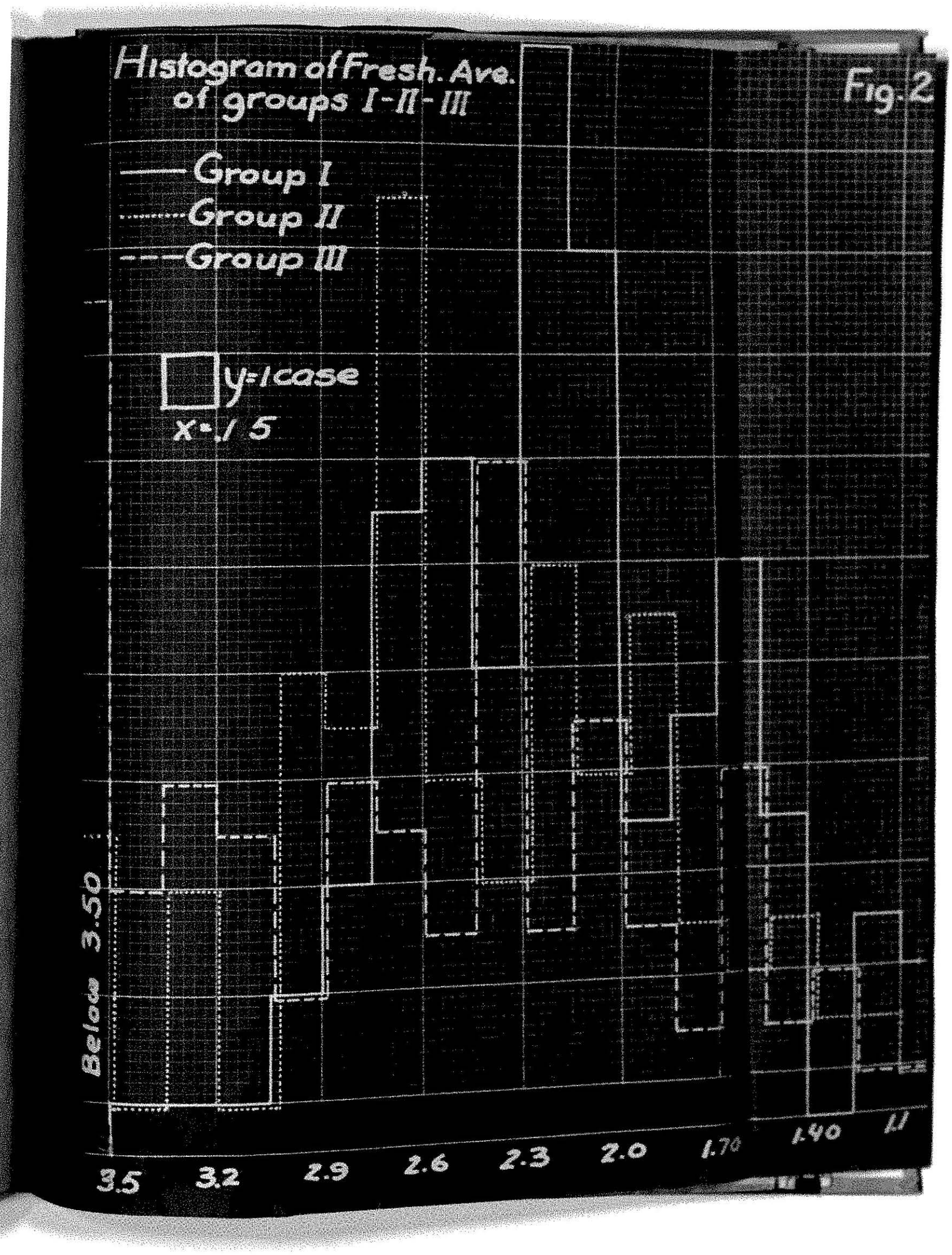
Fig. 1


Histogram of H.S. averages of groups I-II-III
Group I
Group II
Group III
y = 1 case
x = .1
2.7
2.5
2.3
2.1
1.9
1.7
1.5
1.3
1.1


Histogram of Fresh. Ave. of groups I-II-III
Fig. 2
—— Group I
..... Group II
- - - Group III
y=1 case
x=.1 5
Below 3.50
3.5
3.2
2.9
2.6
2.3
2.0
1.70
1.40
1.1

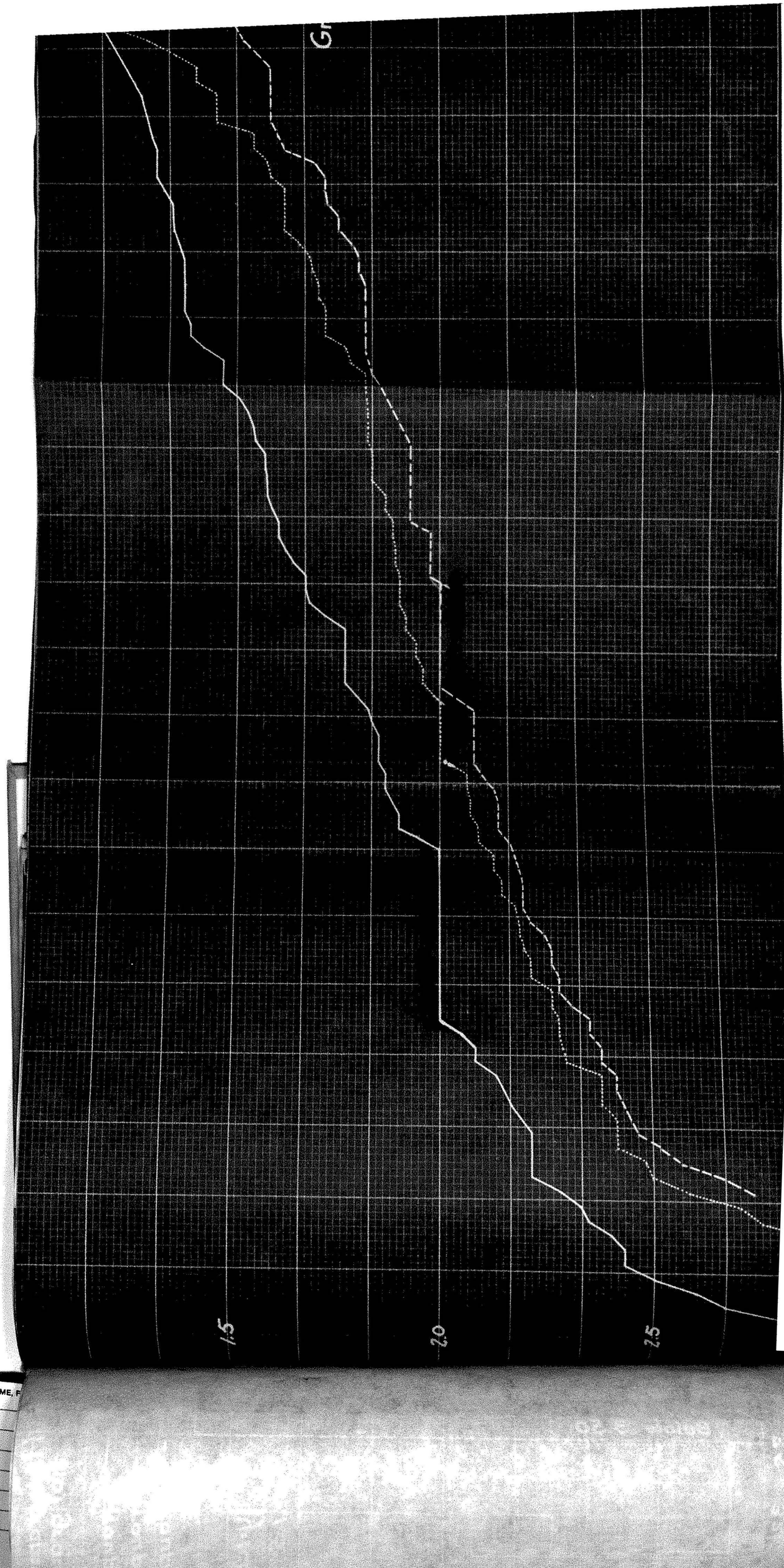
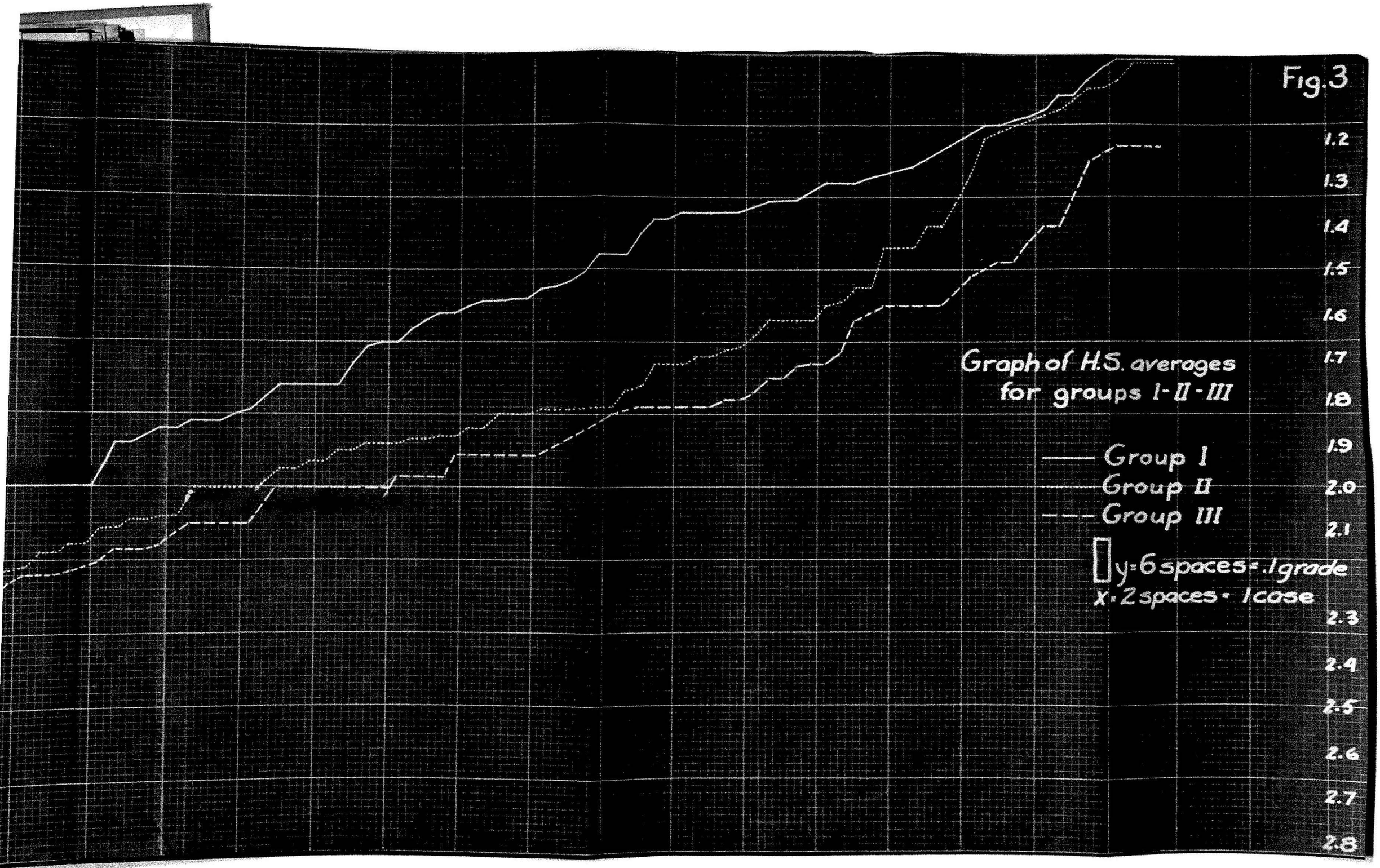


Fig. 3


1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2.0
2.1
2.3
2.4
2.5
2.6
2.7
2.8
Graph of H.S. averages for groups I - II - III
Group I
Group II
Group III
y = 6 spaces = .1 grade
x = 2 spaces = 1 case

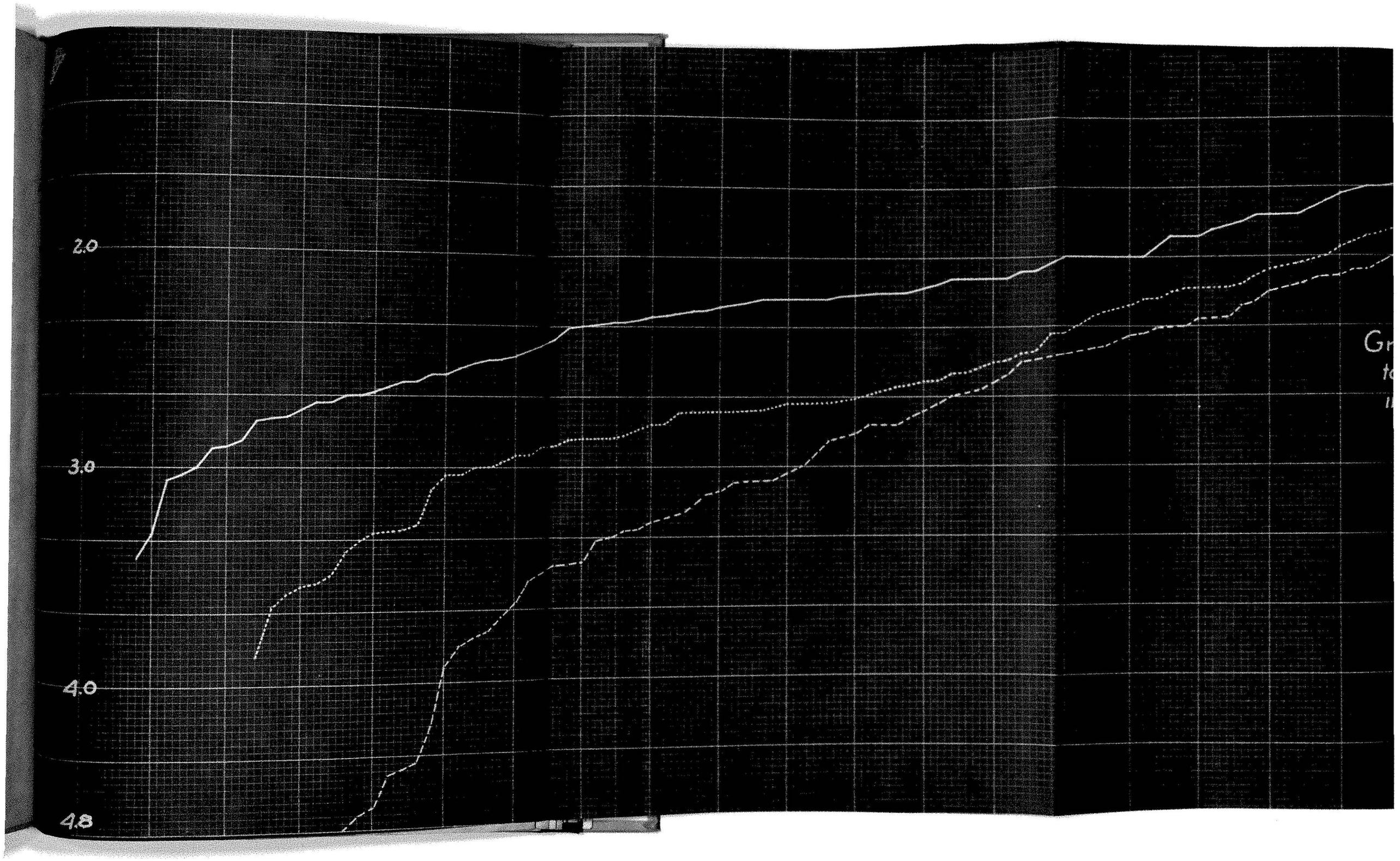

2.0
3.0
4.0
4.8

Fig. 4

Graph of averages according to rank in Freshman year in groups I - II - III

—— Group I

..... Group II

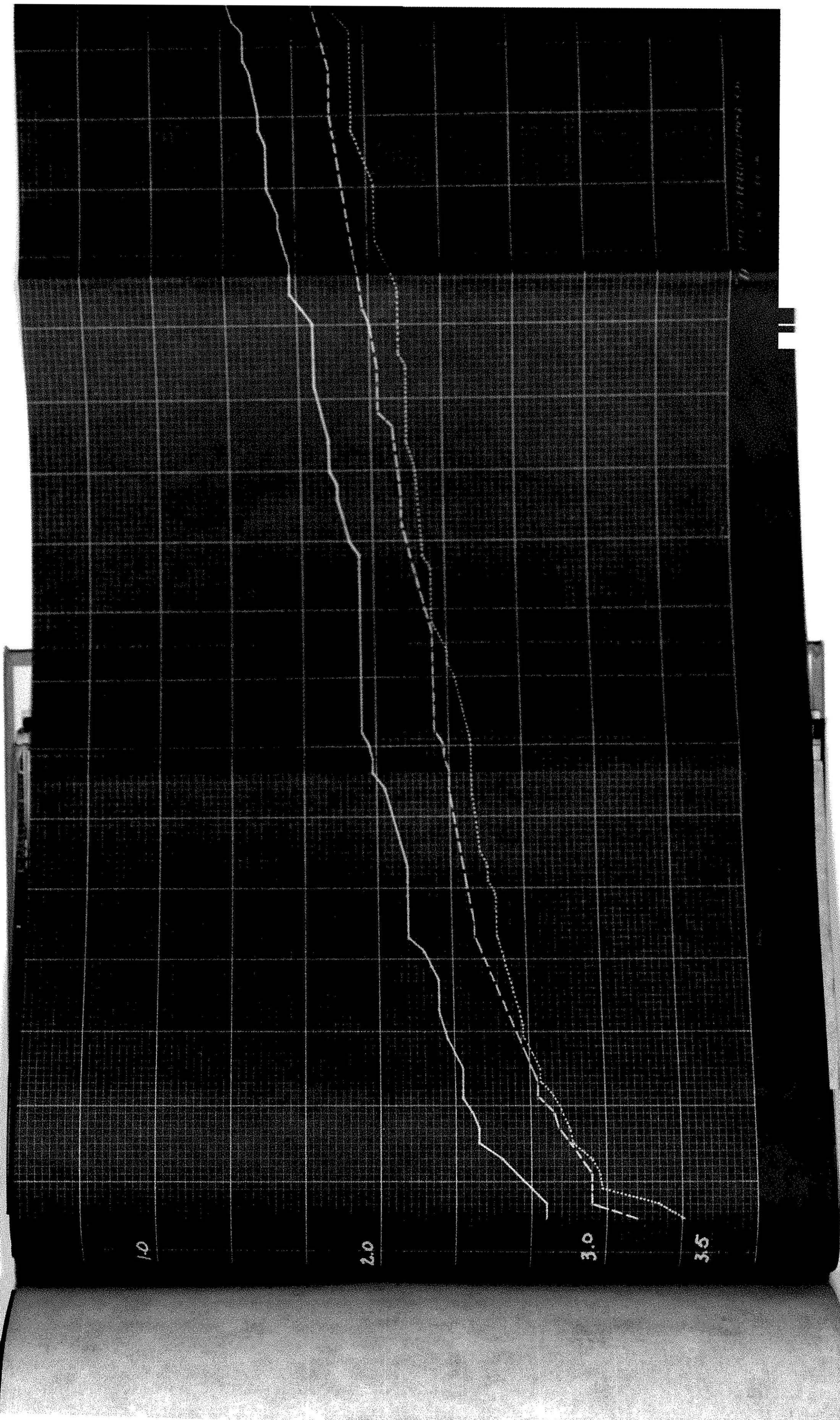
– – – Group III

□ y = .1 grade
x = 1 case

2.0

3.0

4.0


1.0
2.0
3.0
3.5

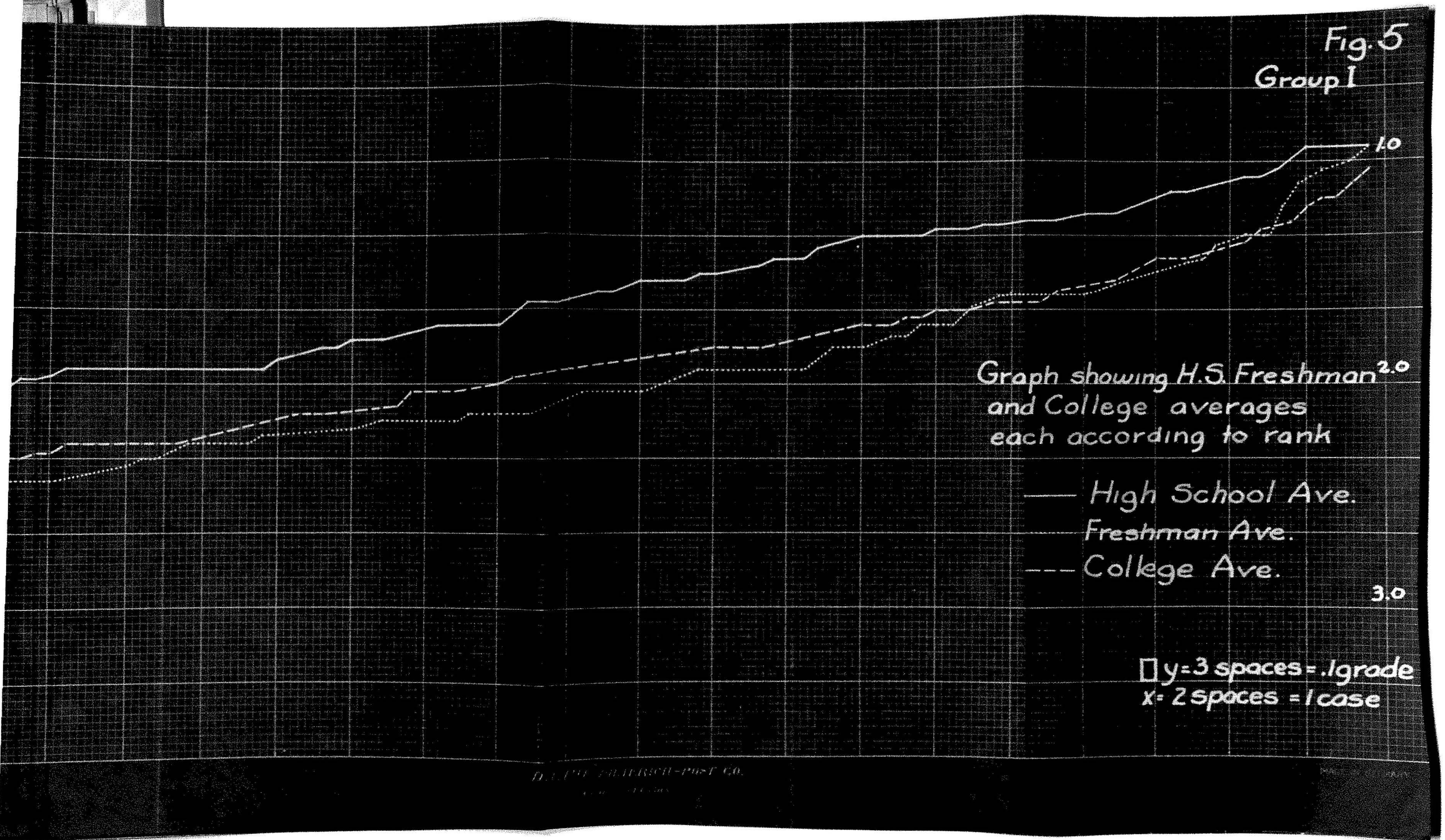


Fig. 5
Group I
1.0
2.0
3.0
Graph showing H.S. Freshman and College averages each according to rank
High School Ave.
Freshman Ave.
College Ave.
y=3 spaces=.1grade
x=2 spaces=1case

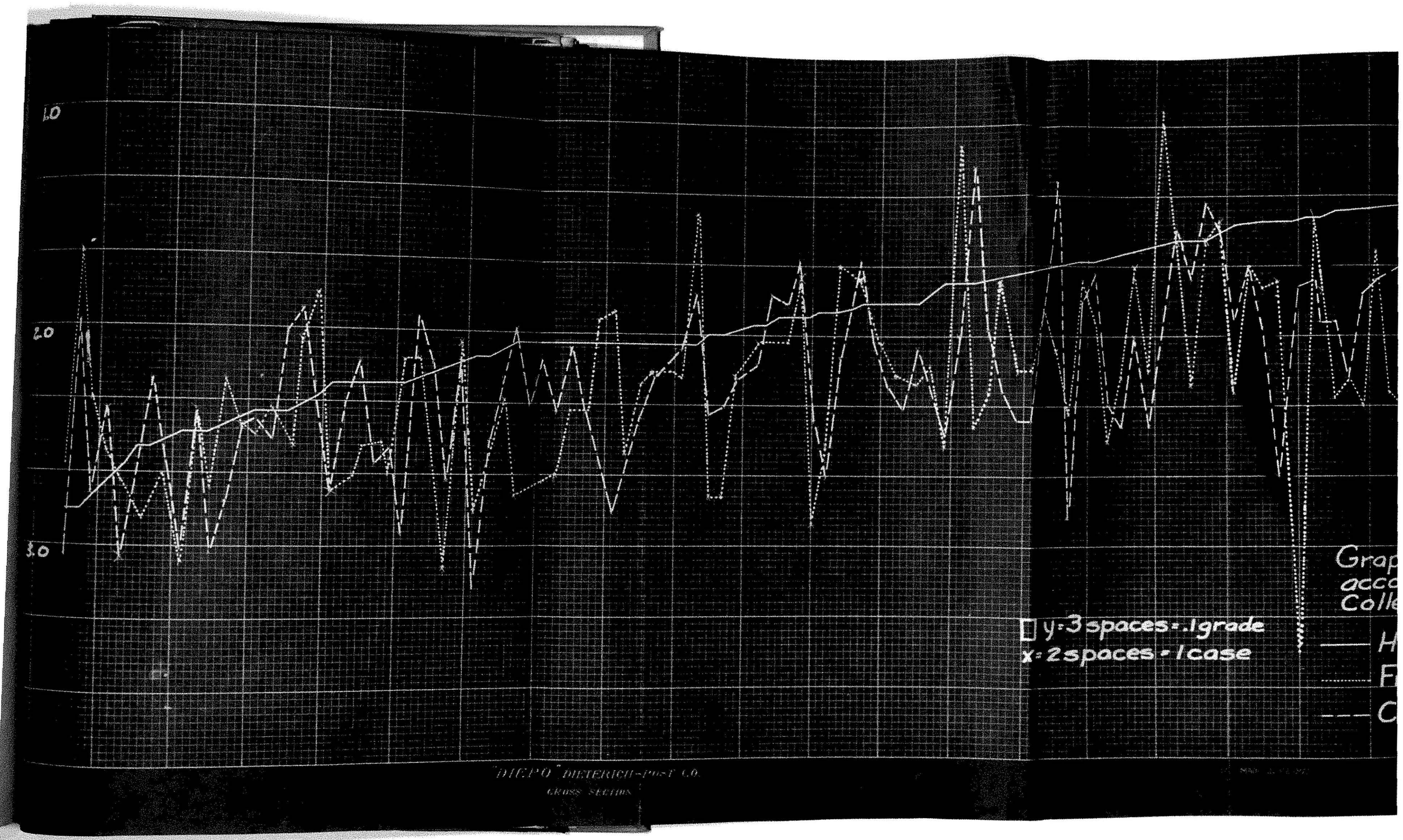
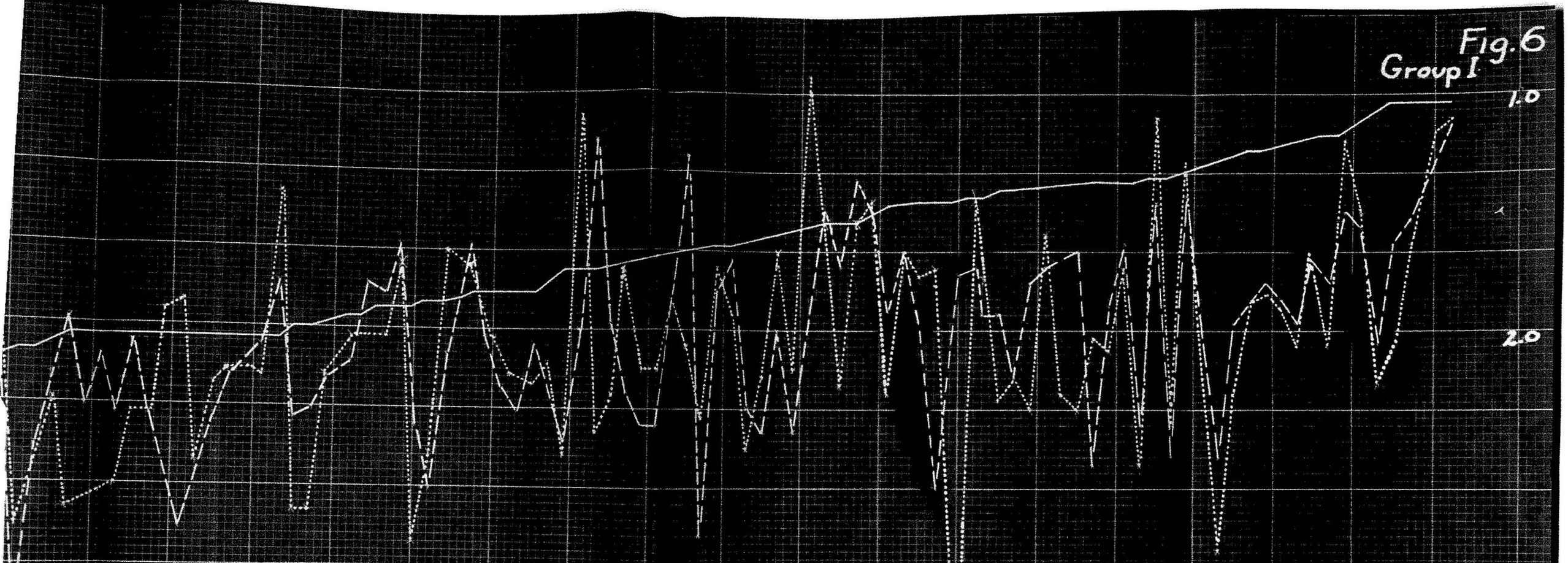

1.0
2.0
3.0
y=3 spaces=.1 grade
x=2 spaces=1 case
Grap
acco
Colle
H
F
C
"DIEPO" DIETERICH-POST CO.
CROSS SECTION

Fig. 6

Group I



Graph showing H.S. averages according to rank + Freshman + College averages in same case order.

□ y = 3 spaces = .1 grade
x = 2 spaces = 1 case

—— High School ave. according to rank.
..... Fresh. ave. in same case order.
– – – College ave. in same case order.

Fig. 7

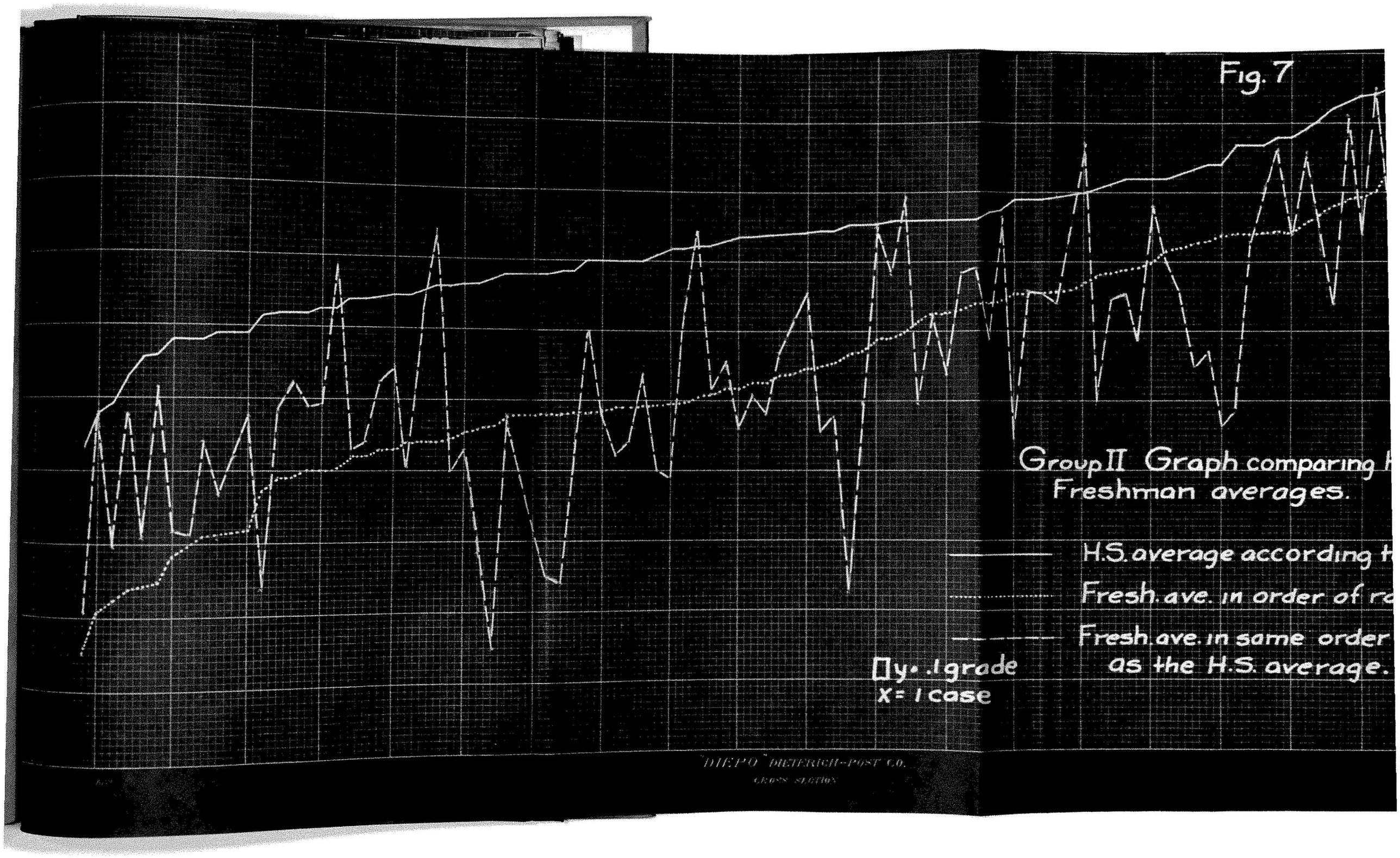
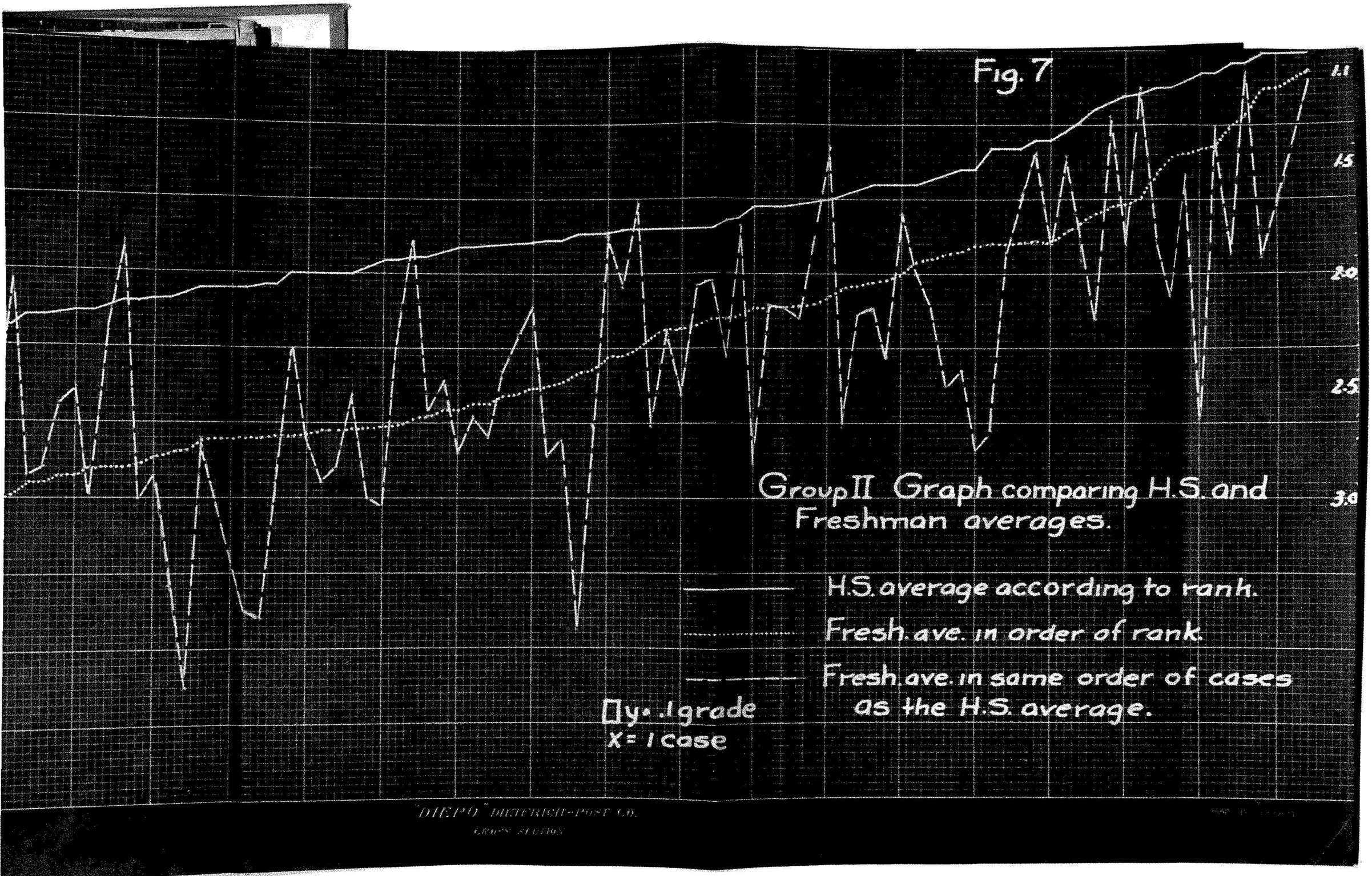
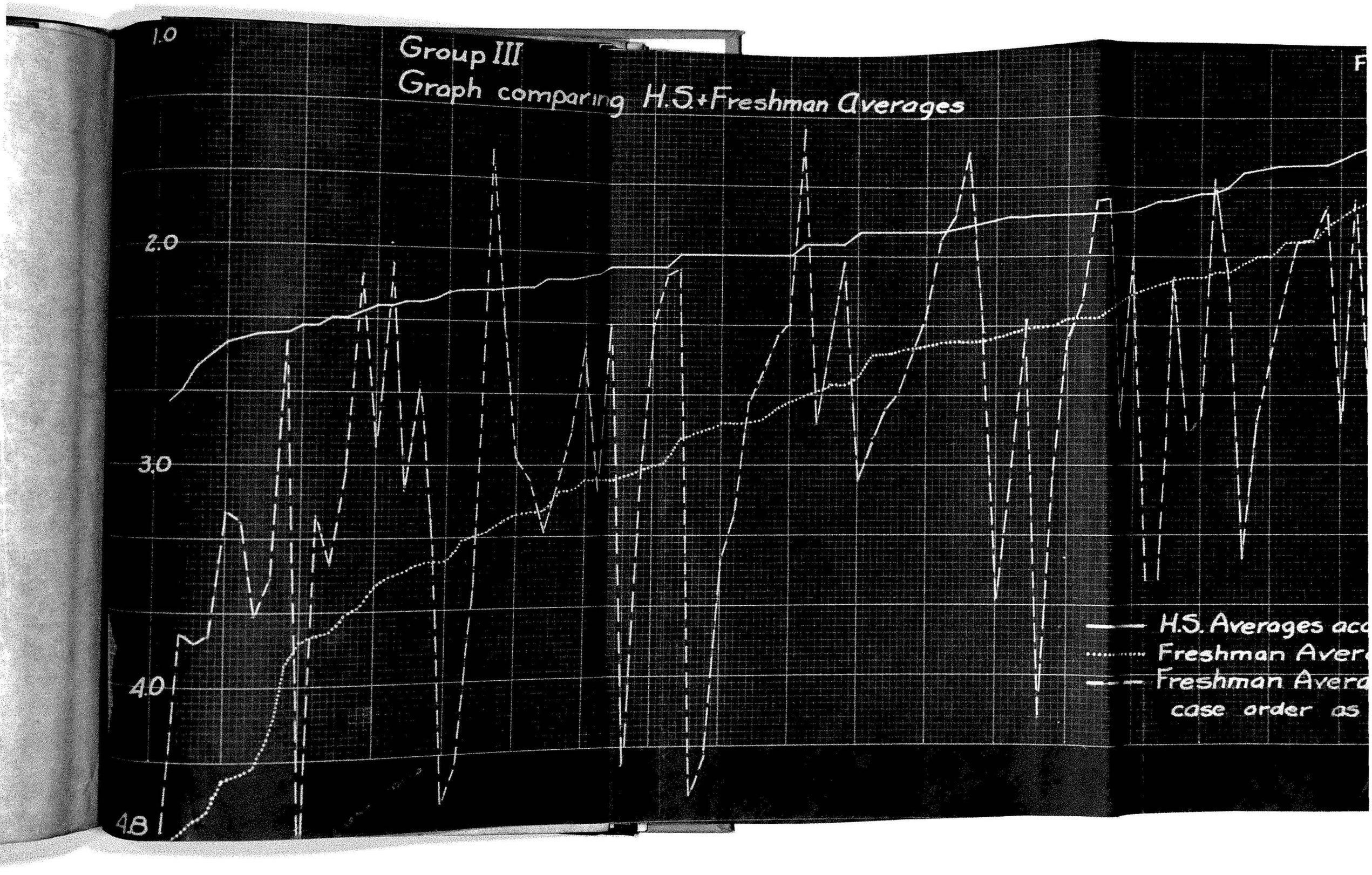

Group II Graph comparing H
Freshman averages.
H.S. average according t
Fresh. ave. in order of ra
Fresh. ave. in same order
as the H.S. average.
□y. .1 grade
X = 1 case
"DIEPO" DIETERICH-POST CO.

Fig. 7



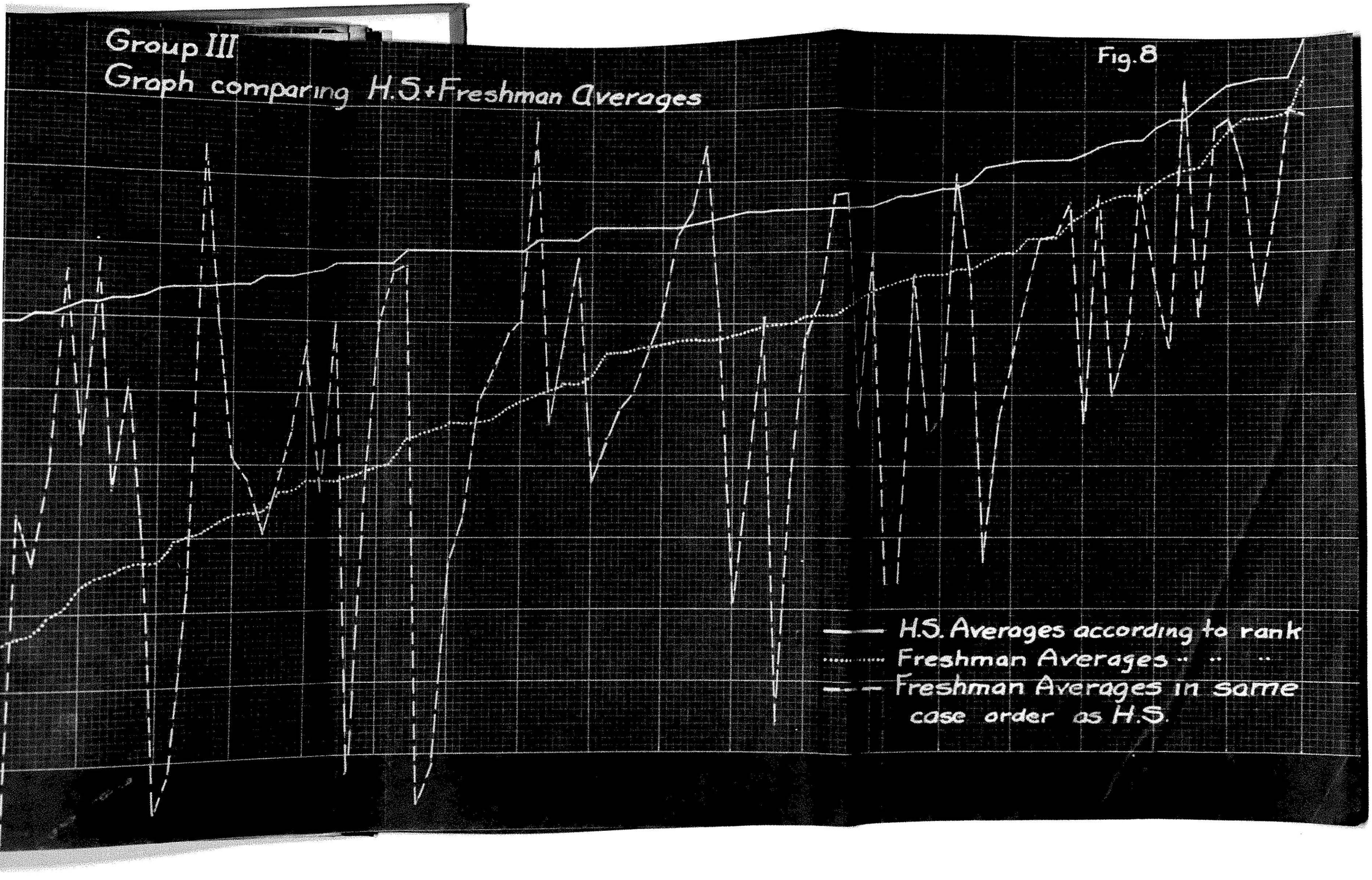
"DIEPO" DIETERICH-POST CO.
CROSS SECTION


Group III
Graph comparing H.S. + Freshman Averages
1.0
2.0
3.0
4.0
4.8
H.S. Averages acc
Freshman Aver
Freshman Avera
case order as

Group III

Graph comparing H.S. + Freshman Averages

Fig. 8



HISTOGRAM SHOWING H.S., FRESHMAN + COLLEGE AVERAGES FOR GROUP I

Fig. 9.

H.S.
FRESH.
COLLEGE

Y = 1 case

X = .15

350 305 245 90 156

HISTOGRAM SHOWING H.S. & FRESHMAN AVERAGES FOR GROUP II

Fig. 10.

FRESHMAN AVE.

H.S. AVE.

Y = 1 case

X = 1.5 grade

3.50 3.45 3.50 3.35 3.20 3.05 2.90 2.75 2.60 2.45 2.30 2.15 2.00 1.85 1.70 1.55 1.40 1.25 1.10

HISTOGRAM SHOWING H.S. + FRESHMAN AVERAGES FOR GROUP II

FIG. II

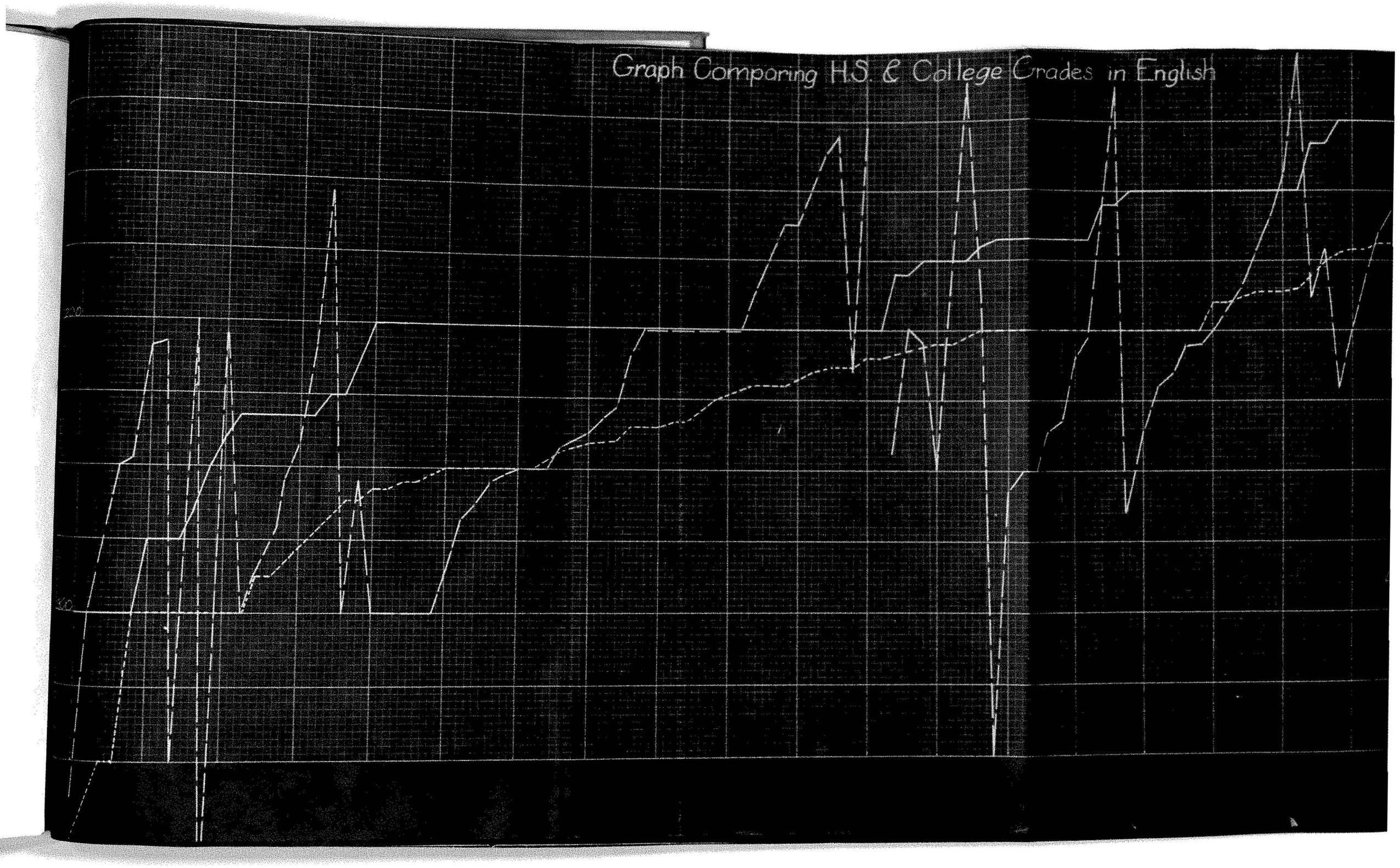
H.S. AVE.

FRESHMAN

Y = 1 case

X = .15 Grade

4.1 3.95 3.65 3.35 3.05 2.95 2.45 2.15 2.0 1.85 1.55 1.25 1.1 1.0


Graph Comparing H.S. & College Grades in English
220

Graph Comparing H.S. & College Grades in English

Fig. 12

Legend

H.S. Average according to rank

College Average according to rank

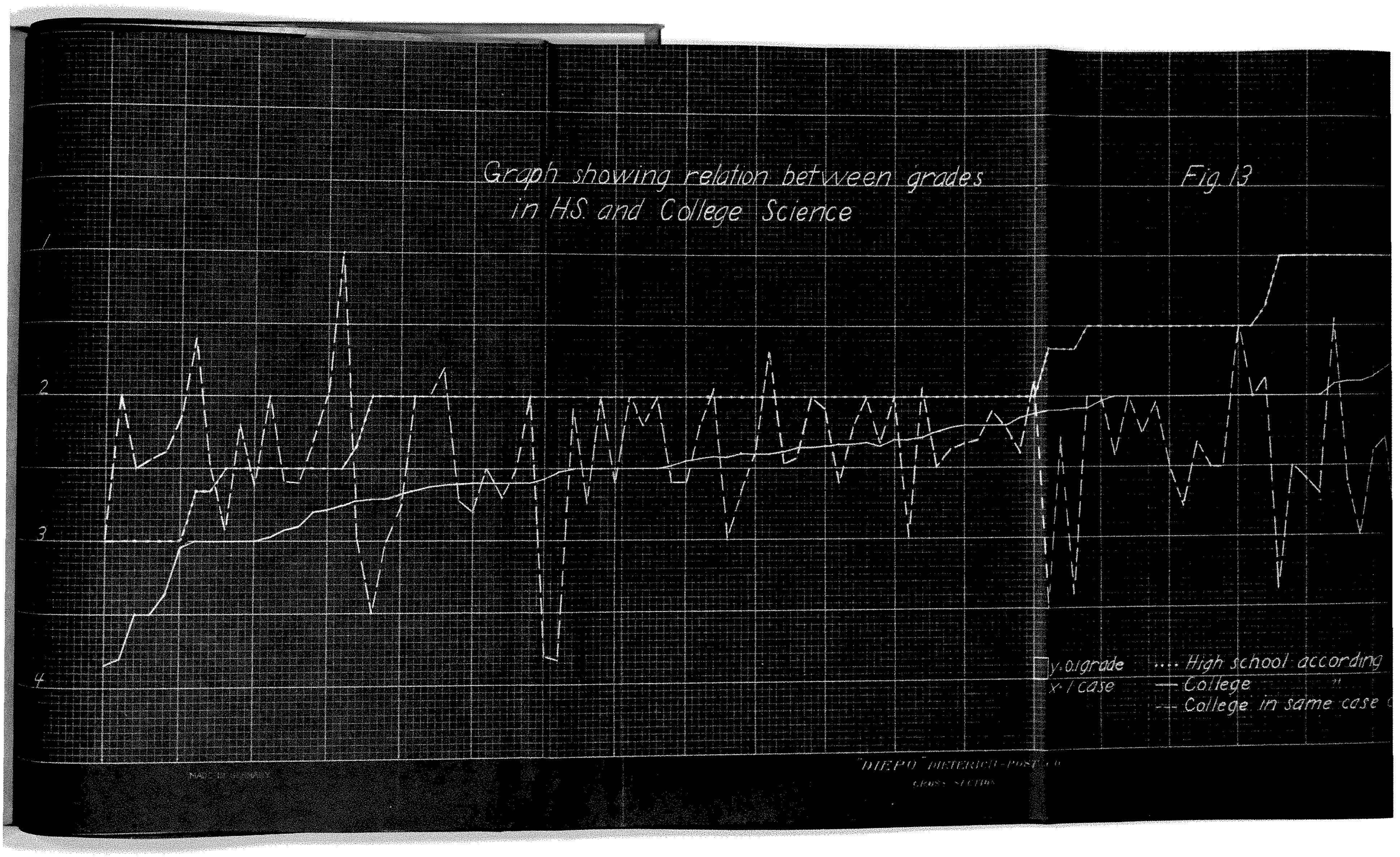
College Average in same case order as H.S.

y= 1 grade

x= 1 case

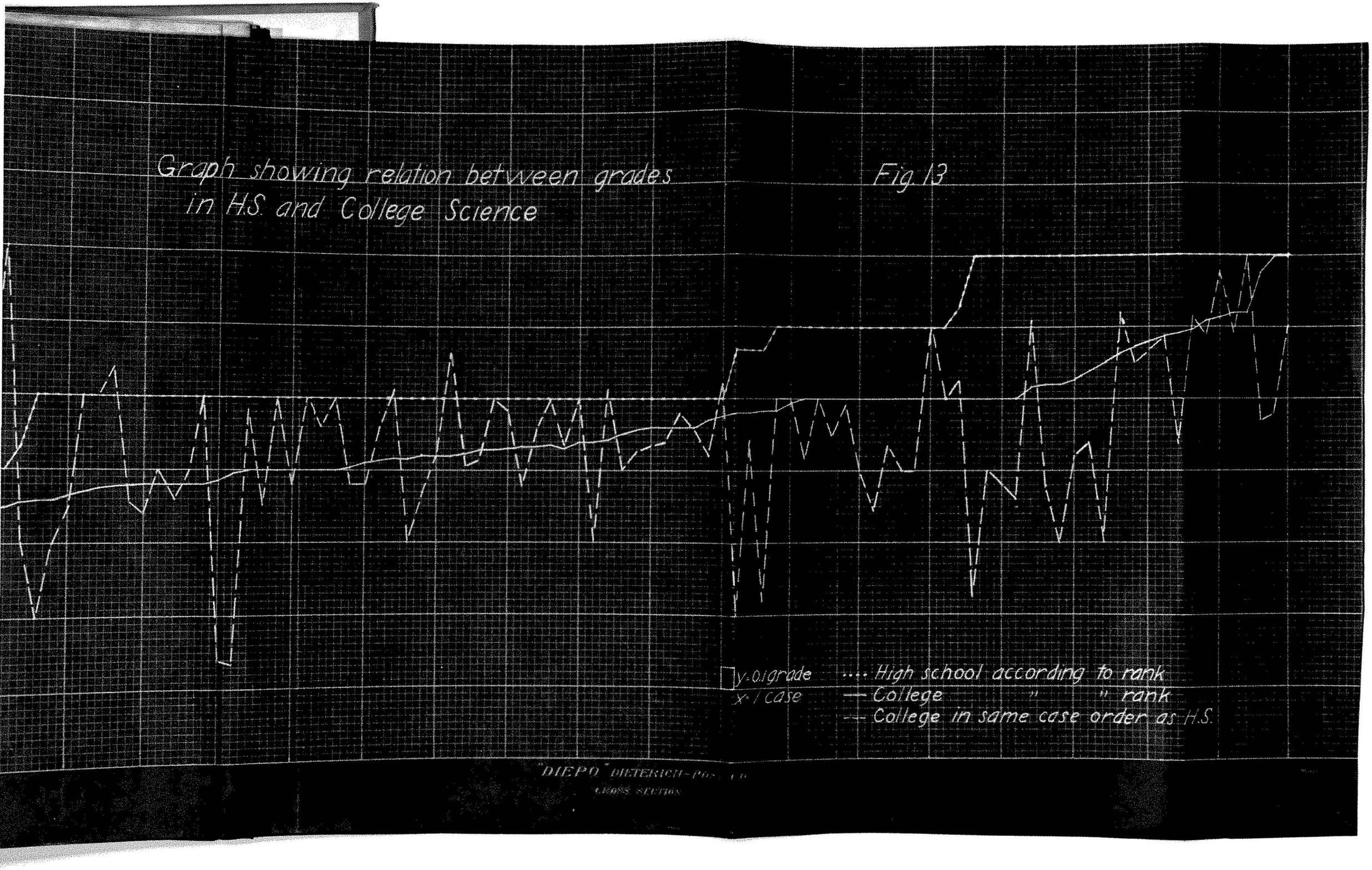
Graph showing relation between grades in H.S. and College Science

Fig 13



Graph showing relation between grades in H.S. and College Science

Fig 13



GRAPH COMPARING HISTORY GRADES IN HIGH SCHOOL AND COLLE

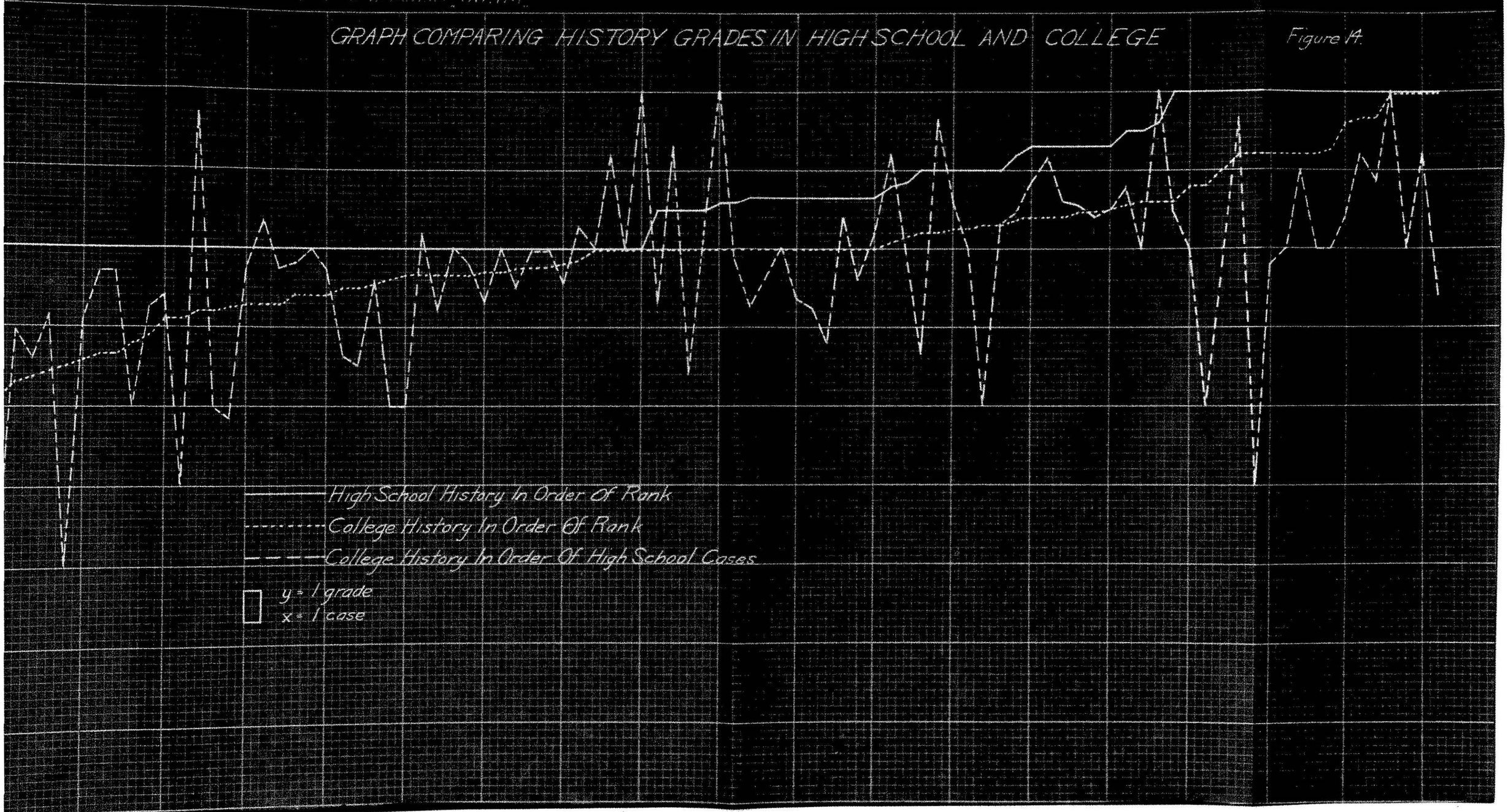
1.0
1.5
2.0
2.5
3.0
3.5
4.0

High School History In Order Of Rank
College History In Order Of Rank
College History In Order Of High School Cases

y = 1 grade
x = 1 case

GRAPH COMPARING HISTORY GRADES IN HIGH SCHOOL AND COLLEGE

Figure 14.



GRAPH COMPARING H.S. & COLLEGE GRADES IN LANGUAGES

1

2

3

4

y = 1 Grade
x = 1 case

H.S AVERA
COLLEGE "
" "

GRAPH COMPARING H.S. + COLLEGE GRADES IN LANGUAGES

FIG 15

1" = 1 Grade
1" = 1 case

H.S AVERAGES ACCORDING TO RANK
COLLEGE " " " "
" " IN SAME COURSE ORDER
AS H.S.

GRAPH COMPARING GRADES IN HISTORY, LANGUAGES, ENGLISH, AND SCIENCES.

FIG

5

2.0

.5

3.0

3.5

4.0

Y = 2 spaces = 0.1 grade

X = 2 spaces = 1 case

LEGEND

Solid line — History in order of rank

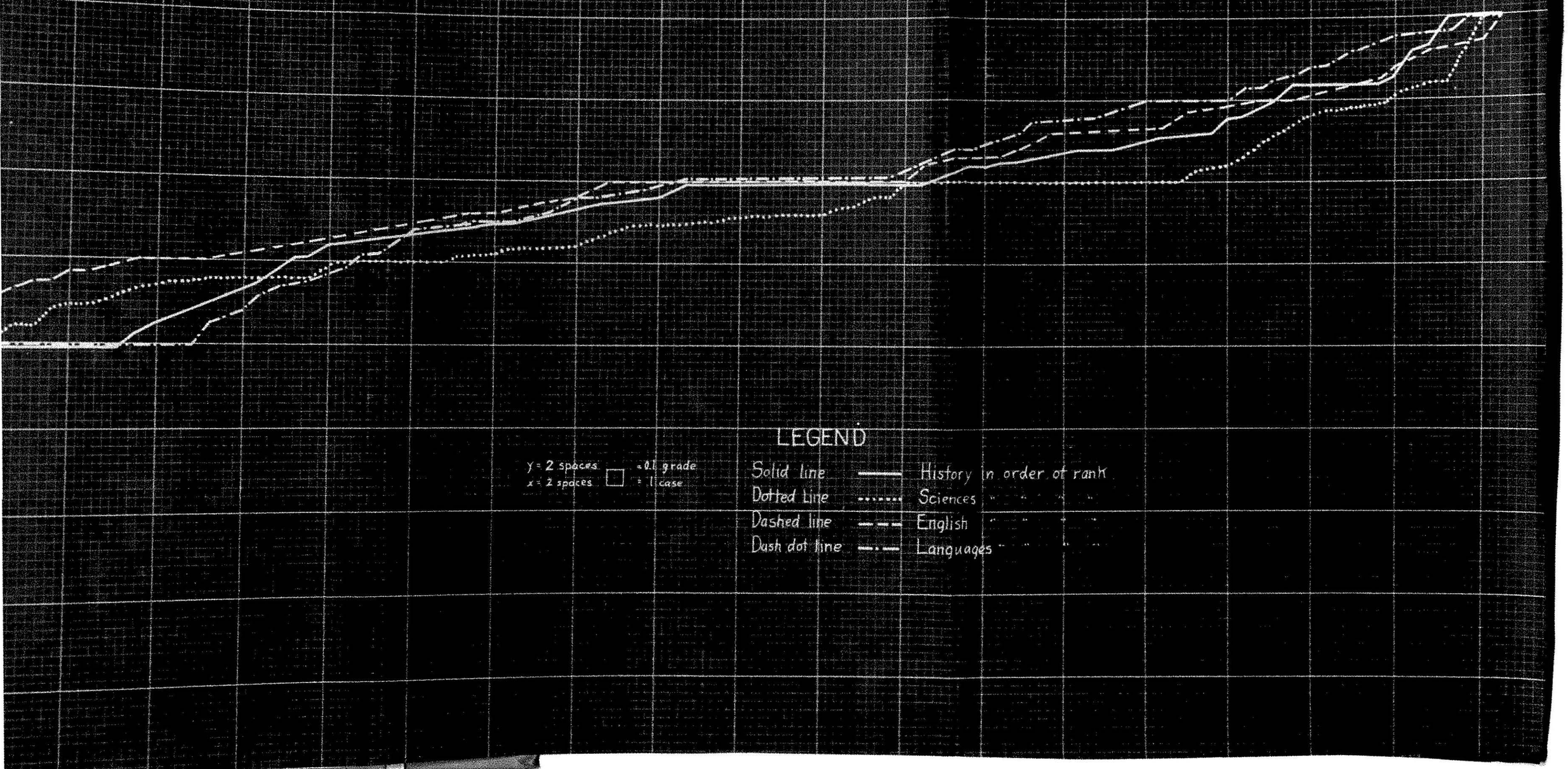
Dotted Line ..... Sciences " " " "

Dashed line — — — English " " " "

Dash dot line — · — Languages " " " "

PH COMPARING GRADES IN HISTORY, LANGUAGES, ENGLISH, AND SCIENCES.

FIG. 16



y = 2 spaces = 0.1 grade
x = 2 spaces = 1 case

LEGEND

Solid line ——— History in order of rank
Dotted Line ..... Sciences " " " "
Dashed line – – – English " " " "
Dash dot line —·— Languages " " " "

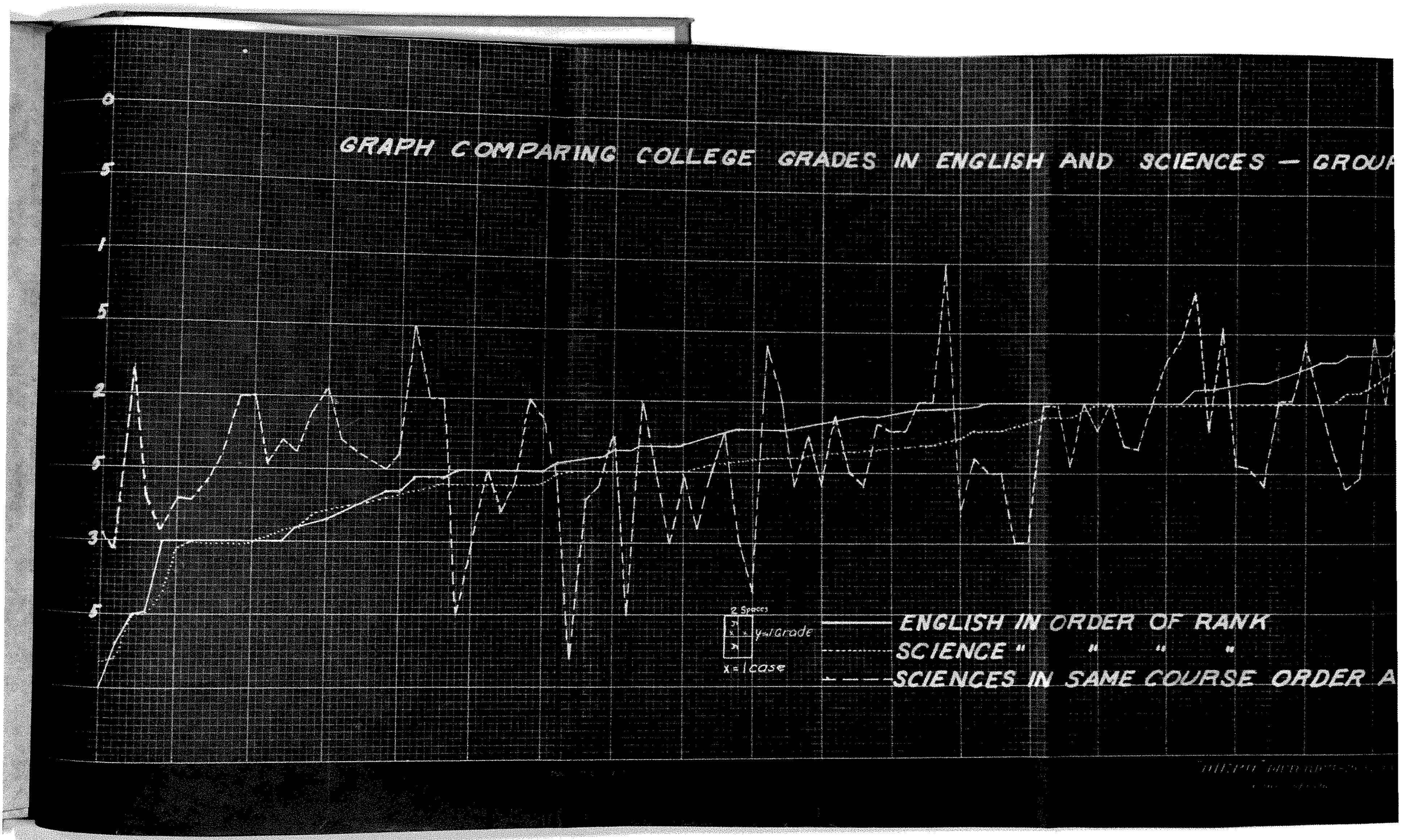

GRAPH COMPARING COLLEGE GRADES IN ENGLISH AND SCIENCES — GROUP
0
5
1
5
2
5
3
5
2 Spaces
y=1 grade
x=1 case
ENGLISH IN ORDER OF RANK
SCIENCE " " " "
SCIENCES IN SAME COURSE ORDER A

FIG. 17.

...APH COMPARING COLLEGE GRADES IN ENGLISH AND SCIENCES — GROUP I

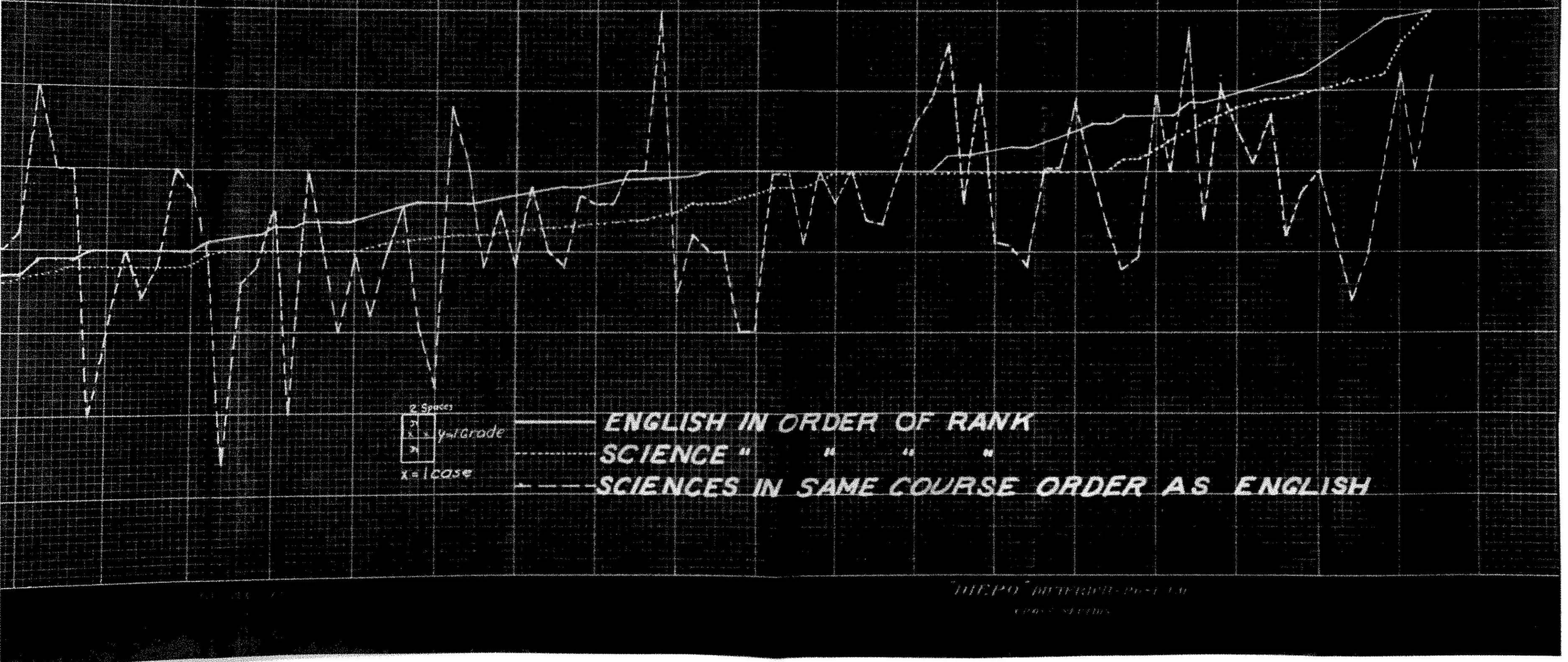
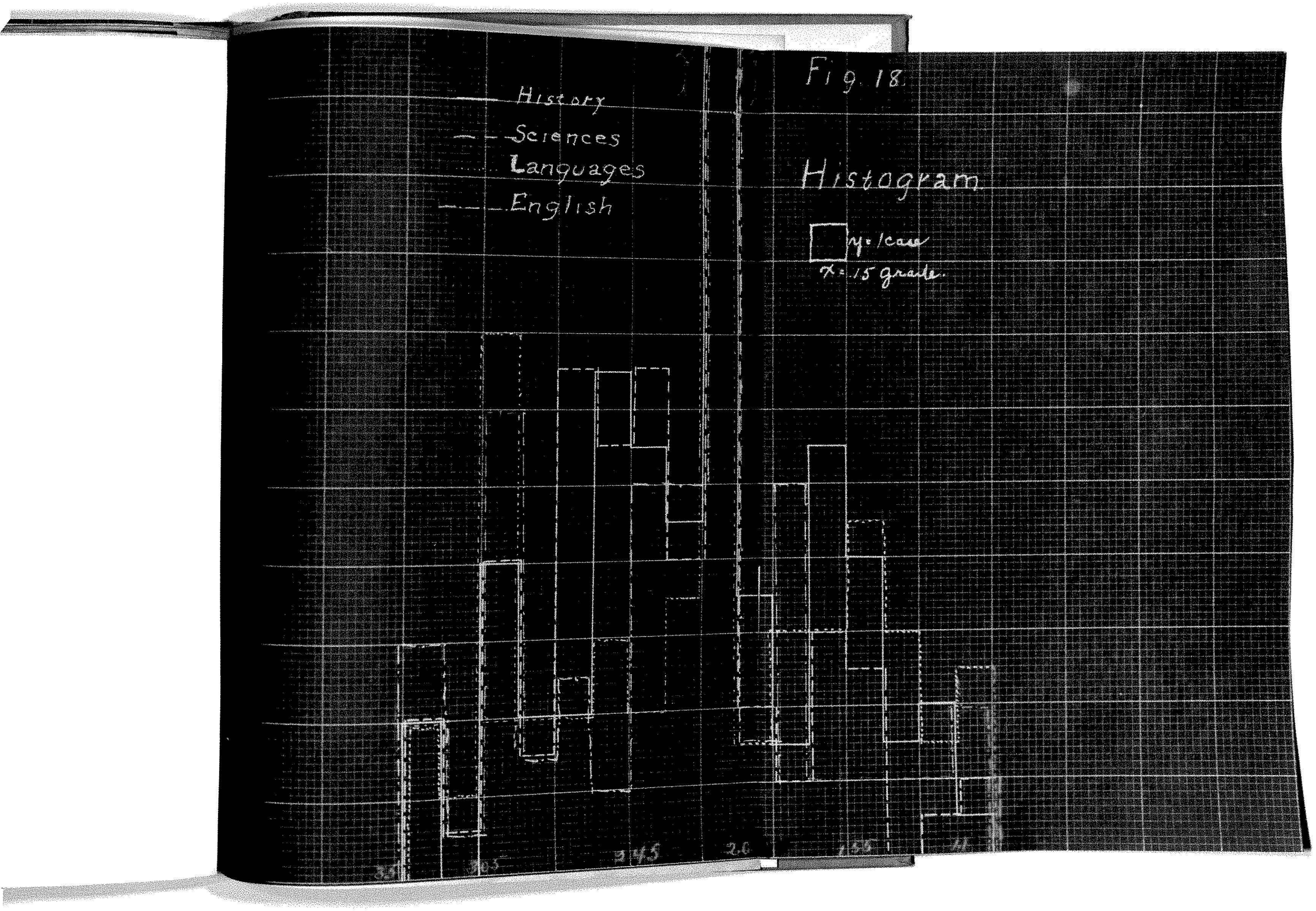


Fig. 18.


History
Sciences
Languages
English
Histogram
1y = 1 case
x = .15 grade.
3.5
3.3
4.5
2.0
1.55
11