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THE LIMITS SET TO EDUCATIONAL ACHIEVEMENT BY LIMITED INTELLIGENCE¹

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I. PREVIOUS ESTIMATES OF THE LIMITS OF SCHOOL PROGRESS

Very few figures are available which show definitely the maximum school progress that is possible for children of any given level of intelligence, either in terms of rate of learning, or in terms of the upper academic limit of their achievement. Dr. Terman (1), in connection with the description of the Stanford-Binet Scale, gives general statements the substance of which is that children below 75 IQ should be kept out of regular classes, and will rarely be equal to the work of the fifth grade, however long they attend school; that for children below 80 IQ, special classes are advisable and work should be concrete; that children 80 to 89 IQ will usually be able to reach Grade VIII after from one to four failures; that those from 90 to 109 may enter high school, but marks will be below average there and excessively poor in college; that those from 110 to 119 should complete eight grades in 7 years and are "good" scholars in the grades, average in high school. Children who stand better than 120 IQ, he says, are so intelligent as to be seriously hampered in an ordinary classroom. Later, in "The Intelligence of School Children," (2) he says, "Throughout Proctor's study it appears that the standards of work which are maintained in the first year of average California high schools can not be satisfactorily met by pupils with a Stanford-Binet mental age below 13 years, and that below the mental age of 14 years the chances of success are not

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good . . . Entrance to this high school is pretty well barred to children who test much below 90 . . . In this high school, at least, the pupil with IQ below 90 is practically certain to fail in such studies as algebra and Latin . . . Below 90 IQ graduation is by no means likely."

Proctor (3), in connection with his study of the usefulness of intelligence tests in giving guidance to high school pupils, found on examination of the high school success of 107 freshman, that 70 per cent of those who tested below 95 in intelligence quotient on the Stanford-Binet Scale (19 pupils) failed in more than half of their subjects. All of this 70 per cent (13 pupils) either dropped out of school or repeated.

The annual report of the Providence Public Schools for the year 1917-1918 (4) contains similar information. In summary of the work in mental measurements of children, it gives in tables and in general statements the following information concerning the grammar schools:

The most usual mark of children whose intelligence quotients (Stanford-Binet Scale) are between 70 and 79 is *D* (conditioned), with more children failing (*E*) than passing (*C*). Only one child, among the 220 included in the table whose intelligence quotients were below 80, made a better mark than *C*. Among those whose intelligence quotients range from 80 to 89, the most usual mark is *C*, with more conditioned or failing than there are who do better than *C*. Among the group whose intelligence quotients range from 90 to 99, the most

TABLE I.—CORRELATION OF INTELLIGENCE AND SCHOOL WORK

IQ	Failed, <i>E</i>	Conditioned, <i>D</i>	Passing, <i>C</i>	Good, <i>B</i>	Excellent, <i>A</i>	Total	Distribution of intelligence
Below 70	27	36	4	...	..	67	0.055
70-80	36	92	24	1	..	153	0.15
80-90	8	71	125	21	2	227	0.223
90-100	1	22	133	40	3	199	0.195
100-110	1	10	67	77	15	170	0.167
110-120	..	4	23	66	23	116	0.114
120 and above	..	...	12	32	40	84	0.082
Total distribution, number.....	73	235	388	237	83	1016	
Marks, per cent.....	0.071	0.231	0.381	0.232	0.081		

frequent mark is still *C* but with rather more exceeding this than there are below it. Among the group from 100 to 109 there are more children making *A* and *B* than there are making grades below *B*. Above 109, no children fail and only $3\frac{1}{2}$ per cent are conditioned, while most of them make *A* and *B*. (In connection with Table I it should be explained that it does not represent the Providence schools, since more of the backward than of the normal children were included.)

A second table in this same report includes an estimate as to the probable limit of successful school progress of children having different intelligence quotients. For comparison, Terman's estimates, from "The Measurement of Intelligence" (1), have been added to the table. (See Table II.)

TABLE II

IV	Mental age at 14	Probable limit of school progress	
		Providence estimate	Terman estimate
60-70	9-8	VA	IV A
70-80	11-2	VI B	VI A
80-90	12-6	VIII B	VIII B
90-100	14	VIII A	
100-110	15-4	VIII A	High school
110-120	16-8	VIII A	High school (aver-
120-150	18-2 { (130) }	{ First year high or more	age success)
	19-6 { (140) }		
	21 { (150) }		

When the Providence figures are compared with the estimate given by Terman in "The Measurement of Intelligence" (1), it will be seen that the discrepancies are not very great, the estimates being identical at some points and never more than a year apart. The Providence table would seem to indicate that in order to do successful work in the first year of high school, an intelligence quotient of 120 is necessary. Terman would predict average high school success where the intelligence quotient is 110.

A third estimate is that of Supt. Carroll, who considers that an intelligence quotient of 110-115 is necessary for high school work.

These data obtainable this year have been chiefly in terms of the

Army Alpha Examination. In the following sections our figures will be expressed, so far as possible, both as Alpha scores, and in terms of the Stanford-Binet Scale. The following table, made up after a study of the Army (5), Kohs-Proctor (3), Kansas State Normal School (6), and Doll (7) norms, is the one which we have used, though naturally it is far from being considered final.

TABLE III

Median MA	Median Alpha score	Median MA	Median Alpha score
20-6	175	14-6	85
19-6	160	13-6	70
18-6	145	12-6	55
17-6	130	11-6	40
16-6	115	10-6	25
15-6	100	9-6	10

II. THE INTELLIGENCE OF HIGH SCHOOL PUPILS

The Army Alpha examination has been rather extensively used in high schools. In Kansas, the Bureau of Educational Measurements and Standards of the Kansas State Normal School at Emporia has collected data from a number of high schools (6). The medians from this survey are included in our tables and the distributions themselves (given by them in terms of letter grades) are similar to those here presented. Madsen and Sylvester (8) presented in "School and Society" in 1919 distributions obtained in three high schools in Illinois, Iowa and Wisconsin. The Bureau of Educational Reference and Research of the University of Michigan (9) issued in 1921 medians for some schools in that state; these schools¹ have cooperated by supplying their records for this study, and the distributions (see Tables IV-VII and Figure 1) are here given separately as well as in combination with Madsen's published figures.

Michigan may apparently be taken as fairly representative of the intelligence of the country as a whole. Reference to Section V will show that recruits from Michigan, and medical officers from Michigan, made scores on Examination Alpha which were very slightly above

¹ Alma, Milan, Mt. Clemens, Mt. Pleasant and Detroit.

those of the country as a whole. While therefore it should be borne in mind that the group here reported is a local group, one will not go far amiss in generalizing its results.

Most striking is the wide variety of intelligence to be found in any one high school year. A freshman may score anything from 35, corresponding approximately to a mental age of 11 years, to 185, which is a very superior adult score. Few scores however (7 or 8 per cent) fall below 65 (MA about 13 years), and some of these are probably scores which are low through some accident. The median score of recruits to the National Army was 63 (MA about 13 years).

Whether the army was typical in intelligence of the total population of the United States is a question still under discussion. At both ends of the scale are groups in the general population which did not get into the army—at one end the feeble-minded, at the other, intelligent men exempted because of the importance of the work they were carrying on in civil life. Terman (10) believes that the recruits were on the whole lower than the whole population; Doll (7) and Goddard (11) consider the army a representative group. At any rate it is the best sample we have or are likely to have for some time of the intelligence of this country, and with the above cautions in mind, army figures will henceforward be used for reference as standing for the population as a whole. For this purpose officers in proper proportion¹ (see Figure 1) have been included with the recruits; the median for this total distribution is 65.

These results may well be compared with the Army figures (5), which indicate, in general, conditions which existed 10 years or more ago, both as to the proportion who continued in school and the stiffness of the requirements they had to meet. With this allowance, the Army figures are not widely discrepant from the results of Army Alpha given in schools of the present day. The difference which appears between the figures for recruits and those for officers shows up in a very interesting way the importance of the part which may be played by other personal qualities than intelligence in determining continuance in school and a commanding position in the world.

From these Army figures it appears that it was even more rare 10 years ago than it is today for a man with less than average Alpha score

¹ The proportion used was approximately one officer to 15 recruits. This is so small a proportion that the effect on the total distribution, while appreciable, is not great; it would have made no significant difference had the proportion used been 1 to 12, or 1 to 18 or 20.

TABLE IV.—ALPHA DISTRIBUTION OF HIGH SCHOOL FRESHMEN

Alpha score	Mt. Clemens	Milan	Mt. Pleasant	Alma	Mich. outside Detroit	Ill., Wis., and Ia.	Total, Ill., Wis., Ia., and Mich.	Per cent
205								
200								
195								
190								
185								
180	.....	.....	.....	.....	.....	3	3	0.17
175	.....	.....	.....	.....	.....	0	0	
170	.....	.....	.....	.....	.....	2	2	0.12
165	1	.....	.....	.....	1	2	3	0.17
160	.....	.....	1	1	2	5	7	0.41
155	.....	.....	.....	.....	.....	7	7	0.41
150	.....	1	.....	2	3	9	12	0.70
145	1	2	.....	.....	3	13	16	0.93
140	1	.....	.....	2	3	17	20	1.16
135	1	2	2	4	9	31	40	2.32
130	1	2	2	3	8	50	58	3.37
125	4	1	2	6	13	67	80	4.05
120	3	3	2	7	15	65	80	4.65
115	6	2	3	11	22	72	94	5.46
110	6	4	2	10	22	73	95	5.52
105	8	2	8	5	23	97	120	6.97
100	5	6	3	12	26	87	113	6.57
95	7	6	5	27	45	112	157	9.13
90	4	7	10	11	32	98	130	7.55
85	8	11	6	18	43	113	156	9.07
80	3	7	11	10	31	88	119	6.92
75	5	7	9	18	39	73	109	6.34
70	6	14	8	11	39	61	99	5.75
65	5	8	6	11	30	37	71	4.13
60	4	4	7	12	27	23	50	2.90
55	3	1	3	6	13	16	29	1.68
50	1	4	.....	8	13	15	28	1.63
45	2	3	1	3	9	5	14	0.81
40	.....	1	.....	.....	1	0	1	0.06
35	.....	1	.....	1	2	4	6	0.35
30	.....	.....	.....	.....	.....	0	0	
25	.....	.....	.....	.....	.....	2	2	0.12
20								
15								
10								
No. cases	85	99	91	199	474	1247	1721	
Median....	96.07	84.64	85.4	90.68	88.84	98.95	96.48	
Median....								
MA.....	15-3	14-6	14-6	14-10	14-9	15-5	15-3	

TABLE V.—ALPHA DISTRIBUTION OF HIGH SCHOOL SOPHOMORES

Alpha score	Mt. Clemens	Milan	Mt Pleasant	Alma	Mich. outside Detroit	Ill., Wis., and Ia.	Total, Ill., Wis., Ia., and Mich.	Per cent
205								
200								
195								
190								
185								
180	.....	....	.....	.....	.....	2	2	0.16
175	.....	....	.....	.....	.....	1	1	0.08
170	.....	....	....	....	.....	6	6	0.48
165	2	..	.....	....	2	7	9	0.79
160	1	....	1	.....	2	7	9	0.79
155	.....	....	.....	2	2	15	17	1.36
150	.....	1	....	1	2	20	22	1.76
145	4	....	1	4	9	30	39	3.11
140	4	....	.....	..	4	47	51	4.07
135	.....	....	4	.....	4	34	38	3.03
130	6	2	4	..	12	63	75	5.90
125	6	5	2	2	15	67	82	6.54
120	3	0	8	4	15	76	91	7.26
115	7	3	2	9	21	72	93	7.42
110	5	1	5	5	16	94	110	8.78
105	7	6	3	7	23	70	93	7.42
100	3	3	5	6	17	83	100	7.98
95	2	5	4	9	20	65	85	6.78
90	5	5	9	9	28	67	95	7.58
85	1	5	5	7	18	50	68	5.42
80	4	3	3	7	17	30	47	3.75
75	1	2	5	5	13	31	44	3.51
70	.....	1	2	3	6	22	28	2.23
65	.....	...	3	2	5	16	21	1.68
60	.....	.....	2	3	5	8	13	1.04
55	.....	2	.....	2	4	1	5	0.40
50	.....	1	1	.....	2	3	5	0.40
45	.....	.....	.....	.....	.....	2	2	0.16
40	.....	.....	.....	.....	.....	0	0	..
35	.....	.....	.....	.....	.....	1	1	0.08
30						0	0	.....
25						0	0	.....
20						0	0	.....
15	.....	....	.....	.....	.....	1	1	0.08
No. cases	61	45	69	87	262	991	1253	
Median....	116.79	98.5	100.5	98.06	103.82	112.42	110.84	
Median....								
MA.....	16-7	15-5	15-6	15-5	15-8	16-3	16-2	

TABLE VI.—ALPHA DISTRIBUTION OF HIGH SCHOOL JUNIORS

Alpha score	Mt. Clemens	Milan	Mt. Pleasant	Alma	Mich. outside Detroit	Ill., Wis., and Ia.	Total, Ill., Wis., Ia., and Mich.	Per cent
205								
200								
195								
190								
185	..	..	...	...	.....	2	2	0.20
180	...	.	1	...	1	3	4	0.41
175	..	..	...	2	2	5	7	0.72
170	2	..	1	...	3	8	11	1.13
165	1	..	2	...	3	15	18	1.84
160	1	.	...	...	1	15	16	1.64
155	4	.	2	1	7	32	39	3.99
150	2	..	2	...	4	38	42	4.30
145	2	.	2	3	7	34	41	4.20
140	2	..	4	4	10	51	61	6.24
135	1	..	2	5	8	60	68	6.96
130	3	..	...	3	6	62	68	6.96
125	4	1	4	1	10	66	76	7.78
120	5	..	3	2	10	74	84	8.60
115	5	..	7	4	16	76	92	9.41
110	3	..	2	6	11	68	79	8.09
105	3	..	3	2	8	52	60	6.14
100	3	1	3	3	10	48	58	5.94
95	1	1	2	7	11	42	53	5.42
90	1	..	3	2	6	23	29	2.97
85	1	..	1	4	6	19	25	2.56
80	...	..	1	3	4	13	17	1.74
75	1	.	1	2	4	7	11	1.13
70	...	..	...	3	3	3	6	0.61
65	...	..	...	1	1	3	4	0.41
60	...	..	...	2	2	0	2	0.20
55	1	.	...	2	3	0	3	0.31
50	...	..	...	...	.....	0	0	
45	...	..	..	...	.....	1	1	0.10
40								
35								
30								
25								
20								
No. cases	46	3	46	62	157	820	977	
Median...	124		120	110	117.97	123.72	122.89	
Median MA....	17-1		16-10	16-2	16-8	17-1	17-0	

TABLE VII.—ALPHA DISTRIBUTION OF HIGH SCHOOL SENIORS

Alpha score	Mt. Clemens	Milan	Mt. Pleasant	Alma	Mich. outside Detroit	Ill., Wis., Ia.	Total, Ill., Wis., Ia., and Mich., outside Detroit	Per cent	Detroit ¹	
									Number	Per cent
205										
200						1	1	0.13		
195						0	0			
190						2	2	0.26		
185						0	0			
180	1			1	2	2	4	0.52	3	0.48
175	1				1	5	6	0.78	3	0.48
170	1			1	2	12	14	1.83	11	1.77
165			1	2	3	15	18	2.35	6	0.97
160			2	1	3	18	21	2.74	17	2.74
155	1		3	3	7	31	38	4.96	19	3.06
150	2		2	3	7	26	33	4.30	30	4.83
145			3	2	5	36	41	5.35	41	6.60
140	2		4	3	9	51	60	7.83	34	5.47
135	1		4	1	6	41	47	6.13	41	6.60
130	1		3	1	5	45	50	6.52	41	6.60
125	1		4	3	8	59	67	8.75	50	8.05
120	4	1	4	7	16	44	60	7.83	44	7.08
115	2		2	2	6	55	61	7.96	48	7.72
110	2		5	4	11	49	60	7.83	46	7.40
105	2		1	6	9	42	51	6.66	49	7.89
100	1		1	6	8	34	42	5.48	32	5.15
95	1		2	1	4	18	22	2.87	33	5.31
90	2		2	1	5	15	20	2.61	19	3.06
85	1		3	1	5	4	9	1.17	22	3.54
80				1	1	7	8	1.04	8	1.29
75			2	3	5	15	20	2.61	11	1.77
70	1				1	3	4	0.52	4	0.64
65				1	1	3	4	0.52	3	0.48
60					0	1	1	0.13	2	0.32
55	1				1	1	2	0.26	3	0.48
50									1	0.16
45										
40										
35										
30										
No cases	28	1	48	54	131	635	766		621	
Median	121.25		127.5	120.71	122.66	127.25	126.42		123.35	
Median MA...	16-10		17-4	16-10	17-0	17-4	17-4		17-0	

¹The median scores of the seniors in seven different high schools in Detroit were as follows:

School	MEDIAN	MA	No. Cases
Northeastern.....	115.0	16-6	108
Eastern.....	118.75	16-9	81
Southeastern.....	120.0	16-10	92
Central.....	123.33	17-0	114
Western.....	125.0	17-2	56
Northwestern..	128.96	17-5	87
Northern.....	128.21	17-5	83

to have entered high school. High school pupils of that day, like present-day high school pupils, had at least average intelligence, as thus measured; in other words, the lower half of the population (in Alpha intelligence), practically without exception, had not continued in school beyond the elementary grades.

It will be seen then that in spite of the wide range of ability in high school freshmen, of which every high school teacher must be conscious, there are nevertheless few (less than $7\frac{1}{2}$ per cent) who have not median intelligence or better, as measured by the Alpha examination. This corresponds approximately to a mental age of 13. The pupils in academic high schools are, in fact, a limited group, which just about covers the upper half of the whole range of American intelligence.

This is significant. Each year a larger and larger proportion of school children has been going on into high-school, until at present about half of the children who enter the first grade may be expected eventually to enter high school. (Local variations in this proportion are great. See Section V.) Since many of the more intelligent children still do not have the chance to go to high school, it will very soon be true that an appreciable per cent who are below average will be attempting the course. Thus the question of the degree of intelligence which is essential for success in the older academic course, and in the newer vocational courses (commercial, manual training, household economics, etc.) becomes of first-class importance.

III. CONTINUANCE IN SCHOOL IN RELATION TO INTELLIGENCE

One way to get a very general look at this problem is to consider continuance in high school in relation to intelligence. It is obvious from the figures that sophomores do better than freshmen in the tests, juniors than sophomores, and seniors still better. Is this because the less intelligent pupils have found the way too hard, and have dropped out? Or is it to be explained by the mental growth of the children, and the additional information and skill which they have acquired? We may grant at once that both causes are at work; improvement in scores (above what practice brings) appears when the same children are tested as freshmen, and again as seniors; while of a given freshmen class those who drop out before senior year are somewhat more largely from the lower than from the upper half of the distribution. (See Cobb and Tape in "School and Society"(12).) It is not yet

FIG. 1.—Distribution of Alpha scores of high school freshmen and high school seniors compared with Alpha scores of literate recruits and officers of the United States army.

FIG. 2.—Per cent of recruits who had entered high school at different Alpha levels.

FIG. 3.—Per cent of recruits who had become high school seniors at different Alpha levels.

FIG. 4.—Per cent of recruits who had entered college at different Alpha levels.

possible to decide just how much of the yearly gain to ascribe to each of these factors. Growth, instruction and added experience are perhaps to be credited with more of it than is elimination of the less intelligent; but all we can say quite surely is that each plays an important part. This yearly gain, which is about 15 points at first, and decreases somewhat, is still found when high school seniors are compared with college freshmen. In Table VIII several college groups have been added for comparison; the gain is about 5 points.

TABLE VIII.—MEDIAN ALPHA SCORES, HIGH SCHOOL AND COLLEGE GROUPS

	Fresh- men	Sopho- mores	Juniors	Seniors	College fresh- men
Mt. Clemens.....	96.07	116.79	124.0	121.25	
Milan.....	84.64	98.5			
Mt. Pleasant.....	85.4	100.5	120.0	127.5	
Alma.....	90.68	98.06	110.0	120.71	
Michigan (outside Detroit).....	89.05	103.82	117.97	122.6	
Illinois, Iowa and Missouri.....	98.95	112.42	123.72	127.25	
Illinois, Iowa, Missouri and Michigan.....	96.65	110.84	122.89	126.42	
Detroit.....				123.35	
New York (Kansas report)....	92.0	104.0	118.0	132.0	
Emporia, Kan.....	80.0	105.0	101.0	111.0	
Stanton, Va.....	91.0	114.5	136.0	117.0	
Kansas report.....					129.0
Ohio State University.....					130.0
University of Illinois.....					131.0
Oberlin College.....					148.4
Yale University.....					159.7
Recruits who had entered high school (tested 15 years out of school on the average).....	97.76	104.61	111.36	115.06	118.7
Officers who had entered high school (tested 15 years out of school on the average)....	140.68	141.34	141.97	142.55	143.3

This relation of intelligence to continuance in school may be brought out also in another way. The Army figures show very definitely that at the time these recruits were of high school and college age, say 5 to 10 years ago, the more intelligent youths all along the line

remained longer in school than those who made lower scores. Table IX shows the per cents entering high school, college, etc., at each Alpha level. Figure 2 illustrates the first column of this table, and shows the situation for high school freshmen. Of those scoring less than 35 on Alpha, 4 in 100 reported that they had entered high school; of those scoring 155 or better, 92 in 100, or 23 times as many, so reported. This comparison, based on Alpha scores, omits the illiterate group altogether. It is probable that, had they been included, the chance of entering high school would be at least 30 times as great for those over 155 as for those below 35.

TABLE IX.—PER CENT RECRUITS ENTERING HIGH SCHOOL, COLLEGE, ETC., AT VARIOUS ALPHA LEVELS

Alpha score	School continuance		
	Per cent entering high school	Per cent high school seniors	Per cent entering college
155 and above.....	93	73 0	53 0
135-154.....	84	55 0	39 0
115-134.....	72	38 0	21.0
95-114.....	55	22 0	11 0
75- 94.....	45	14 0	7.0
55- 74.....	23	6.0	3.0
35- 54.....	10	2.0	1 2
Below 35.....	4	0.7	0.3
Total.....	36	22.0	20 0

Figure 3, illustrating the second column of Table IX, shows similarly the proportions who reported that they became seniors and (practically all of them) graduated from high school. Of those scoring less than 35, less than 1 per cent, and of those scoring 155 or over, 73 per cent, reached the senior year in high school. Thus the chance of reaching this level is over 100 times as great for the highest as for the lowest group. Here again the contrast would be intensified had we had a comparable measure of the illiterate group, and included them.

Figure 4 shows comparable figures for entrance to college. A quarter of 1 per cent of the lowest group, and 53 per cent of the highest group, reported that they had entered college. The chance

of college entrance at that time appears to have been almost 200 times as good for those highly endowed intellectually as for the lowest fifth. Were illiterates included, the contrast would in this case also be strengthened.

This educational selection of intelligence is evidenced also in the large yearly increase in Alpha medians when the test is given throughout a school. Of course not the whole of this increase is due to elimination of the less intelligent pupils. To determine the exact amount which is due to this cause is at present impossible, but its existence is easily proved. Even the amount by which Alpha scores increase each year is not readily determined from data so sketchy as are these. The average figures from Table X are, from freshman to sophomore year, 15 points; from sophomore to junior year, 10 points; and from junior to senior year, 4 points. Fifteen points is approximately the amount by which, in the lower part of the scale, the score increases with an increase in *mental* age of 1 year. If 15 points up here is equivalent to 15 points lower down on the scale (which is quite problematical) then high school pupils, after the first year, are growing more slowly mentally than when they were younger.

The total increase from freshman to senior year may be estimated at about 30 points. Tables X and XI facilitate a comparison of Army figures with school figures, and an estimate of those elements which in the Army group were constant. Maturity, for instance, plays no part in the difference in the Army figures, for the men were all examined at the same time, after manhood was reached, instead of at different stages in the growth period; the separation into groups those who had left school as freshmen, sophomores, etc.—was made afterwards. Part of the effect of instruction also is not present in these Army differences—whatever part is temporary, and is afterwards forgotten and lost. But the groups of recruits do differ, and this remaining difference must be due to the effect of educational selection, and the more permanent effects of instruction. This remaining effect is strikingly less than the immediate effect of growth and instruction which we find in the groups examined year by year while in school. In general, it is not much over half as great. In other words, the indication is that mental maturity—mere mental growth, independent of environment—together with the temporary effects of instruction, is responsible for a good half of the change of score from freshman to sophomore year; from junior to senior year it accounts for about one-fifth of the change. Educational selection, and the permanent effects

of instruction, seem to account for nearly half of the increase from the first to the second year, and almost the whole of the yearly increase later on. Improvement in native intelligence, *i.e.*, inner development, or mental growth apart from instruction, is almost certainly still going on when these children enter high school. It is almost equally certain that very little of it goes on during their last year in high school.

TABLE X.—HIGH SCHOOL ALPHA SCORES

	Schools						Army	
	Mich.	Ill. Wis. and Ia.	N. Y. (Kan. report)	Em- poria, Kan.	Stan- ton, Va.	Minn survey	Recruits	Officers
Freshmen.. .	88	99	92	80	91.0	93	98	140.7
Sophomores...	104	112	104	105	114.5	105	105	141.3
Juniors.....	118	124	118	101	136.0	111	111	142.0
Seniors.....	123	127	132	111	117.0	120	115	142.6

TABLE XI.—YEARLY INCREMENTS

	Schools						Army	
	Mich.	Ill Wis and Ia	N. Y. (Kan. report)	Em- poria, Kan.	Stan- ton, Va.	Minn. survey	Recruits	Officers
Freshman to sophomore..	16	13	12	25	21 5	12	7	0.7
Sophomore to junior.....	14	12	14	—4	21 5	6	6	0.7
Junior to senior.....	5	3	14	10	—19.0	9	4	0.6
Freshman to senior.....	35	28	40	31	24 0	27	17	2.0

In the officer group, maturity not only, but also selection and differences in amount of instruction are eliminated from the question, since very few men got into the officer group who had not had college training. Practically all of them are present in the group for each high school year, the drop in numbers being less than 3, 5 and 5 per cent for the three intervals. Accordingly, with none of the causes of

difference present, we should expect to find almost no difference in the Alpha scores. Actually, for each year interval the increase is less than one point Alpha score.

The influence of intelligence on continuance in school appears also when we look at the elimination which takes place among the freshmen of least intelligence. Since the facts from our previous tables indicate that a freshman who scores 77.5 will as a senior score about 90, we can get a rough notion of the extent of this elimination without necessarily following a freshman group all the way through. The assumption must be made that successive entering classes are of approximately the same size; then, we may compare the number in the freshman class who score below 77.5 with the number in the senior class who score below 90. Comparisons of this kind show that in the Michigan schools, 87 per cent of the freshmen below 77.5 drop out before senior year. In Madsen's group (Ill., Ia., and Wis.) about 84 per cent drop out. In general, at this Alpha level of intelligence, only about one in seven remains to graduate.

In the Army group, no adjustment between freshmen and senior scores needs to be made, since (as explained above) all the tests were made several years after the men left school. Here we find, among the recruits, that 78 per cent of those below 85 Alpha were eliminated. Among the officers, where the total elimination amounted to only about 10 per cent, 24 per cent of those scoring below 85 were nevertheless eliminated before senior year.

We have said that children who at 14 years of age score less than 60 to 65 on the Alpha examination are not likely to enter high school. Can we now, in summary, make a similar statement about the probability of graduation? Table VII shows that in the best high schools very few seniors score below 90 (MA about 15). We may estimate that this corresponds to a freshman score of 77.5 and can then say that not more than 1 freshman in 6 or 7 of those who as freshmen score below 77.5 (MA 14 years) remains to graduate.

(To be Concluded in December.)