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STANFORD-BINET TESTS OF 112 KINDERGARTEN CHILDREN AND 77 REPEATED TESTS

IRENE CUNEO AND LEWIS M. TERMAN

PURPOSES

The purposes of this study were as follows: (1) To find the distribution of intelligence among kindergarten children; (2) to correlate the results of Stanford-Binet tests with school marks and teachers' estimates of intelligence; (3) to determine the effect of the repetition of a test upon the resulting intelligent quotient; and (4) to secure data which would throw light on the proper location of the tests in the scale.

SUBJECTS

Tests were made of 112 children, 77 of whom were tested twice. Of the 112, 49 were attending the kindergarten of the San Jose State Normal School and included the total attendance of that department. The remaining 63 were chosen at random from kindergartens in San Mateo, Cal.

As far as could be ascertained, our group of subjects may be considered fairly representative as regards social status. The large majority came from middle-class homes, a few from each extreme.

All of the 112 children were American born and the parents of all but six were of North-, Central-, or West-European descent and had been long in America. Of these six, four were Italian and two Portuguese.

The sex and age selection was accidental and resulted in the testing of 65 boys and 47 girls of the following ages:

Age	Boys	Girls	Total
3-7 to 4-0.....	5	4	9
4-1 to 4-6.....	9	7	16
4-7 to 5-0.....	11	9	20
5-1 to 5-6.....	13	13	26
5-7 to 6-0.....	20	11	31
6-1 to 6-6.....	6	2	8
6-7 to 7-0.....	1	1	2
Total.....	65	47	112

CONDITIONS

All the tests were made in a small side room, under conditions which were for the most part quite satisfactory. There

were few distractions or interruptions and the children were interested in the tests. A test usually required from 30 to 40 minutes, but there was little evidence of fatigue. In all but two or three cases suitable rapport was quickly established.

In giving the tests, the directions set forth in Terman's *The Measurement of Intelligence* were adhered to strictly. The responses were recorded verbatim. The tests were all of wide enough range to include one year in which there was no failure and one year in which there was no success.¹

THE DISTRIBUTION OF INTELLIGENCE QUOTIENTS

The intelligence quotients found are given in Table I. This table includes only intelligence quotients resulting from first tests, those resulting from repeated tests being here ignored.

TABLE I. INTELLIGENCE QUOTIENTS FOUND

61	86	96	102	109	113	121
72	86	96	102	109	114	121
75	88	96	102	109	114	122
76	90	97	103	109	114	123
77	90	97	103	109	114	124
79	90	98	103	110	114	124
80	90	98	105	110	114	125
80	91	98	106	110	117	126
80	91	99	106	110	117	126
80	92	100	106	111	118	129
81	93	100	107	111	119	130
82	93	100	107	112	119	130
84	93	101	107	112	120	136
85	94	101	107	113	121	142
85	94	102	108	113	121	146
85	96	102	108	113	121	152

Graph I shows the distribution of intelligence quotients plotted in the form of an ogive. Graph II shows the surface of distribution resulting when the intelligence quotients are grouped in ranges of ten: 60-69, 70-79, 80-89, etc.

The intelligence quotients range from 61 to 152. The median is 105, the lower quartile 93, the upper quartile 114. The semi-interquartile range is $10\frac{1}{2}$.² The distribution closely approximates the normal, but the high median indicates either that the Stanford Revision is still somewhat too easy in the lower range or that the children tested are on the whole somewhat superior.

¹ The tests were all made by Miss Cuneo. Her preparation for the work included a theoretical course in mental measurement, one year of work in experimental psychology, and graduation from a kindergarten training course. The scoring was all checked over by me and the results were worked over and written up by us jointly.—Lewis M. Terman.

² These values are obtained from the smoothed curve.

GRAPH I. Ogive for Table I, showing distributions of intelligence quotients

GRAPH II. Distribution of intelligence quotients of 112 kindergarten children, sexes taken together

In order to test the former hypothesis the children were divided into two age-groups, the first including those between 3 years 8 months and 4 years 11 months, the latter those between 5 years 0 months and 6 years 11 months. The median intelligence quotient for the younger group was 107.5, that for the older group 102.5. If we could be sure that selection had entered equally into the two groups this would indicate that for children of $4\frac{1}{2}$ years the scale still yields a mental age which is approximately 7% (or 4 months) too high, but that this error largely disappears as we approach the mental age of 6 years. It is possible, however, that in a given kindergarten class the younger children are on the average somewhat better endowed than the older. At least this has been quite generally found to hold true in other school grades, and we can therefore not be certain to what extent the high median I Q is due to the selection of subjects and to what extent it

TABLE II. SHOWING MENTAL AGES FOUND IN THE DIFFERENT CLASSES

A	B	C	D	E
3-10	4-1	3-4	3-4	3-4
4-1	4-1	4-2	4-0	3-10
4-3	4-3	4-6	4-2	4-6
4-3	4-4	4-6	4-2	4-10
4-7	4-7	4-8	4-6	5-0
4-7	4-8	4-8	4-6	5-2
4-8	4-9	4-10	4-8	5-2
4-9	5-5	4-10	4-8	5-8
4-9	5-6	5-0	4-10	5-10
4-11	5-9	5-2	4-10	5-10
4-11	5-10	5-2	5-2	6-0
5-0	5-2	5-4	5-3	6-2
5-1	6-3	5-4	5-8	6-4
5-3	6-6	5-6	6-0	6-6
5-3	6-6	5-6	6-2	6-8
5-4		5-7	6-3	6-8
5-6		5-9	6-6	6-10
5-8		5-10	6-6	7-3
5-8		6-0		
5-10		6-3		
5-11		6-4		
6-0		6-6		
6-0		6-6		
6-0		6-6		
6-0		6-9		
6-1		6-10		
6-2				
6-2				
6-4				
6-4				
6-6				
6-9				
6-10				
7-5				
7-7				

is due to imperfect standardization of the tests. In all probability both factors enter. Certainly the results do not warrant any extensive revision of the lower part of scale as it now stands. For practical purposes it is better for the scale to err, if at all, by being slightly too liberal.

It will be noted that only one subject tested below 70. This child (I Q 61) was recognized by the teacher as hopelessly feeble-minded. On the other hand, 6 tested as high as 130, 3 as high as 140, and one above 150.

DISTRIBUTION OF MENTAL AGES

As already stated, the children of five classrooms were tested. The mental ages found are shown for the five classes separately in Table II.

The range in each class is found to be astonishingly great. In class A it is from 3-10 to 7-7; in B, from 4-1 to 6-6; in C, from 3-4 to 6-10; in D, from 3-4 to 6-6; and in E, from 3-4 to 7-3. Where there is so little homogeneity the task of fitting the work to the individual ability of the children must be very difficult if not impossible. To give the same school tasks to children ranging from 3 years to 7 years in intelligence cannot be justified on any grounds, and the practice of some kindergarten teachers in dividing the class into groups according to mental maturity is strongly to be commended.

TABLE III. SHOWING PER CENT OF KINDERGARTEN CHILDREN AND FIRST GRADE CHILDREN AT EACH MENTAL AGE

Mental Age.....	3 to 3-11	4 to 4-11	5 to 5-11	6 to 6-11	7 to 7-11	8 to 8-11	9 to 9-11	10 to 10-11
Kindergarten.....	4.5	31.2	29.6	32.2	2.7			
First grade.....	2.	15.4	20.4	35.	21.3	4	1.3	.67

Comparison of the mental ages of these 112 kindergarten children with the mental ages of 150 unselected first-grade children tested by Mr. Dickson may be made from Table III and Graph III. In fact, 17% of the kindergarten children equalled or exceeded the median mental age of those in the first grade, 66% equalled or exceeded the lower quartile for the first grade, and three equalled or exceeded the first-grade upper quartile. At least one-fourth of the kindergarten children have a mental maturity which would enable them to do satisfactory work in the first grade, while of Mr. Dickson's 149 who are in the first grade considerably more than one-third ought to be in the kindergarten.

GRAPH III. Showing how kindergarten children and first grade children overlap in mental age
Unbroken line = kindergarten children
Dotted line = first grade children

SEX DIFFERENCES

Comparison of the sexes showed that the girls have a higher median intelligence quotient but less variability than the boys. The facts are summarized in Table III and Graph IV.

TABLE IV. COMPARISON OF SEXES

	Median I. Q.	Lower quartile	Upper quartile	Q.
Boys	103	90	114	12
Girls	108	96.5	116.5	10

Although the brightest subject tested was a boy, it is seen that the girls have a significantly higher intelligence quotient. A part of this superiority may be accounted for by the fact that the median age of the girls is three months less than that of the boys. Sixty-four per cent of the girls were below the age of $5\frac{1}{2}$ years, but only 47.7% of the boys. If, as seems probable, the scale grades somewhat more leniently at five years than at six, this would give a slight advantage to the girls in our comparison. When both boys and girls were

divided into two age groups, those below and those above five years, it was found that the median intelligence quotient for the younger group was higher for both sexes. For the boys, the median of the younger group was 104; that of the older group 102. For girls, the median of the younger group was 110; that of the older group 106. The girls are superior in each group, but the fact that there is a larger proportion of the total number of girls in the younger group than is the case for boys would give a slight advantage to the girls in the comparison of both age groups taken together. It is unlikely, however, that this alone would account for the difference between 103 (median for boys) and 108 (median for girls).

It is probable that, age for age, girls are slightly superior to boys in the kind of intellectual ability measured by the usual type of intelligence test. This conclusion is borne out by the results of many other investigations by the test method. It is also in harmony with sex comparisons based on teachers' ratings and school marks. In the present study, 56 of the boys and all the girls were rated for intelligence and 46 of the boys and 36 of the girls for quality of school work. The results are shown in Table V.

In something like a dozen separate studies we have found that for a given age or grade, girls invariably make a better

TABLE V. SEX DIFFERENCES IN INTELLIGENCE RATINGS AND SCHOOL WORK

	Very inferior	Inferior	Average	Superior	Very superior
Intelligence: Boys.....	1	9	35	8	3
Girls.....	0	3	29	10	5
School work: Boys.....	1	10	27	6	2
Girls.....	0	3	21	11	1

For teachers' ratings, therefore, we have:

	Inferior and very inferior	Average	Superior and very superior
Boys.....	17.9%	62.5%	19.8%
Girls.....	6.4%	61.7%	31.9%

For quality of school work:

	Inferior and very inferior	Average	Superior and very superior
Boys.....	23.9%	58.7%	17.4%
Girls.....	8.3%	58.3%	33.3%

showing than boys when rated by their teachers either for intelligence or quality of school work.

Comparison of the intelligence quotients of our boys and girls for variability shows that the girls are decidedly less variable. The boys range from 61 to 152, with a semi-interquartile range of 12. The girls range from 75 to 146, with a semi-interquartile range of 10. Application of Pearson's formula for determining the coefficient of variability ($C = \frac{Q}{M}$)

shows the girls 20.5% less variable than the boys. This supports the usual view as against that of Karl Pearson and Dr. L. S. Hollingsworth. It does not agree with our data on 1,000 unselected children, but is in harmony with two other Stanford University studies.

The sex differences found in the individual tests are given elsewhere in this paper. In general, such differences were not large.

CORRELATIONS OF TEST RESULTS WITH TEACHERS' RATINGS AND WITH SCHOOL MARKS

As already stated, 103 of our 112 children were rated by their teachers for intelligence.⁸ We did not give the teachers any definition or criterion of intelligence, but simply asked them to classify the children on the basis of intelligence into

⁸ The names of 9 boys were omitted from the list by oversight.

five groups: "very inferior," "inferior," "average," "superior," and "very superior." The results of this classification were shown in the preceding section.

The correlation of intelligence quotients with the teachers' estimates of intelligence (Pearson method) proved to be only $.29 \pm .06$. This correlation is much lower than we are accustomed to find in the case of children attending classes above the kindergarten. Such correlations usually fall between .50 and .75. The low correlation found for kindergarten children may be partly accounted for by the nature of the kindergarten curriculum. The work is very general and for the most part very easy. Nothing is taught which offers the teacher a solid basis for estimating the pupil's intelligence.

Certain disagreements between ratings and intelligence quotients were plainly due to constant errors on the part of the teachers. There was frequent failure to take account of age differences. The 6-year-old is rated "superior" on an intelligence quotient about 10 to 20 points lower than a $4\frac{1}{2}$ -year-old must have to reach this class. The former gets in as easily with 100 I Q as the latter with 115 or 120.

The following cases illustrate this error: G. J., age 3-8, mental age 4-2, I Q 113, was rated as "inferior;" while M. L., also testing at 113, but aged 5-9, was rated "superior."

N. W., age 3-11, mental age 4-3, I Q 108, is rated "inferior;" J. M., age 6-11, mental age 6-6, I Q 94, is rated "superior."

M. S., age 4-1, mental age 5-4, I Q 130, is rated "inferior;" J. P., age 6-3, mental age 6-10, I Q 109, is rated "very superior."

This tendency to ignore age differences seems almost universal among teachers. There is probably no other cause of so much misunderstanding of pupils. Even when specifically told to take age into account teachers fail to do so to anything like an adequate extent. They have not grasped the significance of age norms.

The correlation between ratings and intelligence quotients was also lowered by the tendency of teachers to grade too many pupils "average."

It was possible to have 35 of the children rated by two teachers. The correlation found was $.49 \pm .085$.

INTELLIGENCE QUOTIENTS AND SCHOOL WORK

The pupils in four classes, 82 in all, were rated for quality of school work as well as for intelligence. The same classification was used, very inferior, inferior, average, superior, and very superior. The correlation of school success (based on this classification) and intelligence quotient was $.267 \pm .07$.

The factors which entered to produce a lower correlation between intelligence quotients and teachers' ratings are also operative here. Teachers base their estimate of a pupil's intelligence chiefly on ability to do the school tasks, disregarding age.

MENTAL AGE AND SCHOOL WORK

The correlation between mental age and school work is shown in Table VI. The correlation ($r = .43 \pm .05$) is moderately high, but lower than we have ordinarily found for children in the grades above the kindergarten. The corresponding figure for Dickson's first grade children was .725.

From Table VI it will be seen that not a single pupil of the 21 who tested below 4-9 in mental age was graded above "average" in school work, and that only one of the 33 testing above 5-9 was graded below "average."

TABLE VI. SHOWING CORRELATION BETWEEN MENTAL AGE AND QUALITY OF SCHOOL WORK

	Very Inferior	Inferior	Average	Superior	Very Superior
Mental age					
7-4 to 7-10.....			1		
6-10 to 7-3.....			1	1	1
6-4 to 6-9.....			9	3	
5-10 to 6-3.....		1	9	5	1
5-4 to 5-9.....		2	3	3	
4-10 to 5-3.....		2	13	4	
4-4 to 4-9.....		3	5		
3-10 to 4-3.....	1	4	5		
3-4 to 3-9.....		1	2		

$$r = .43$$

REPETITION OF TESTS

In order to secure data on the reliability of the intelligence scale for diagnostic purposes, 77 children were retested in three groups:

Group A, 25 pupils, interval of 2 days between tests.

Group B, 21 pupils, interval of 5-7 months between tests.

Group C, 31 pupils, interval of 20-24 months between tests.

The correlations were computed by the Spearman's footrule and the R values were changed to r values by a conversion table. The results were as follows:

Group	Interval	r correlation	P.E.
A	2 days	.95	.013
B	5-7 months	.942	.014
C	20-24 months	.852	.034

TABLE VII. SHOWING RESULTS OF 77 REPEATED TESTS

Group A, 2 days			Group B, 5-7 mos.			Group C, 2-24 mos.		
Age (Real)	I. Q.	I. Q.	Age	I. Q.	I. Q.	Age	I. Q.	I. Q.
1st Test	Test 1	Test 2	Test 1	Test 1	Test 2	Test 1	Test 1	Test 2
4-4	146	144	4-1		130	4-6	152	141
3-10	126	135	6-6		126	4-6	142	129
4-9	126	133	5-10		124	5-6	136	128
4-11	122	119	5-3		124	3-11	130	124
5-3	117	123	5-6		118	4-6	129	119
5-8	114	105	5-10		114	4-0	123	119
3-8	113	109	5-11		112	4-11	121	126
5-8	112	114	5-10		111	4-11	121	117
4-3	110	118	5-1		110	5-1	121	116
5-0	103	107	5-8		109	6-4	121	108
5-1	102	105	6-3		109	5-2	120	107
4-6	100	112	4-10		107	5-8	119	115
5-7	98	101	4-11		105	5-1	117	130
4-11	98	98	5-5		101	4-9	114	109
5-4	98	92	5-11		97	5-5	111	114
4-10	96	96	5-11		96	4-4	110	116
5-11	96	103	3-8		91	5-1	108	112
4-3	94	90	5-2		90	5-11	107	113
4-6	93	93	6-2		86	5-8	106	99
4-10	93	93	5-10		86	5-9	103	102
4-7	91	94	5-6		61	4-0	102	100
5-11	82	84				4-11	93	98
5-8	80	80				4-6	90	108
8-1	77	79				6-4	90	106
4-6	76	85				5-3	90	96
						5-6	85	100
						5-1	85	80
						4-10	80	108
						6-0	79	87
						5-2	75	98
						5-8	72	101

The correlations for Group A and Group B are seen to be very high, and for Group C somewhat lower. This is what we should expect, considering the greater interval by which the tests of Group C were separated. In Group A there was no change greater than 12 points, and only two above 9 points. In Group B there was no change greater than 13 points, and only three above 8 points. Group C gave three rather wide discrepancies, one of 23, one of 28, and one of 29 points. The last two of these three cases should probably be thrown out, as the mental age recorded for the initial test was based on the child's refusal to respond to most of the tests above the four year group. This was interpreted at the time as inability to respond. In all probability it was due to shyness,

a disturbing factor which is sometimes difficult to overcome in testing children of kindergarten age.⁴

In general the agreement between the first and second tests is close enough to show that whatever abilities the scale tests are measured with a high degree of reliability. This is best seen in the low median amount of change. The median change and the lower and upper quartiles of the changes were as follows:

Group	Median change	Lower quartile of changes	Upper quartile of changes
A	3	2	7
B	6—	3	7
C	6+	5	13
A, B, C, together.....	6	3	8

When we consider the *direction* of the changes we find that the gains and losses are pretty evenly divided in each of the three groups.

	Retests showing gains	Retests showing loss	Central tendency of change
A	14	6	+2
B	9	11	—1
C	15	16	0

It appears, therefore, that in the case of young children memory of a previous test has no appreciable influence after the lapse of a few months, and that the effect is negligible even after an interval of only two days. This fact is important for the practical usefulness of the scale.

Do bright or dull children gain more in the repetition of a test? In each of the three groups, A, B, C, we have compared those above 100 I Q (first test) with those below 100, in regard to the amount of gain or loss.

In Group A, there are 12 children who earned an I Q of 100 or more in the initial test. Eight of these gained in the second test and four lost. Of the thirteen who tested below 100, six gained, two lost, and five neither gained nor lost. The central tendency for those above 100 represents a total average gain of 2.75 points; the central tendency for those below 100 is toward an average gain of 1.2 points.

In Group B, seven of the twelve children above 100 I Q. show a gain, six a loss, and one no change. Of the seven below 100, three show a gain and four a loss. The central tendency for those above 100 was toward an average gain of 1.4; for those below 100, an average loss of 2.

⁴ The initial tests given to Group C were Miss Cuneo's first experience in the use of the Binet scale. This may explain in part the lower correlation for Group C.

TABLE VIII. SHOWING PER CENT PASSING AT DIFFERENT AGES

	AGE			
	4	5	6	7
III				
Points, etc.....	100	100	100	100
Key, etc.....	100	100	97	100
Pictures.....	94	100	100	100
Sex.....	100	100	100	100
Name.....	94	94	97	100
6-7 syllables.....	94	100	100	100
3 digits.....	100	100	100	100
IV.				
Lines.....	72	94	100	100
Forms.....	Omitted			
4 pennies.....	67	83	89	100
Square.....	39	81	92	96
Comprehension.....	78	92	94	100
4 digits.....	94	94	92	100
12-13 syllables.....	78	88	92	100
V.				
Weights.....	17	52	73	100
Colors.....	33	65	73	96
Prettier.....	61	71	77	96
Definitions.....	61	75	80	100
Patience.....	17	60	73	87
Commands.....	50	73	80	96
Age.....	28	44	66	96
VI.				
Right-left.....	33	46	73	87
Omissions.....	28	35	61	87
13 pennies.....	11	44	59	100
Comprehension.....	44	62	81	96
4 coins.....	11	38	62	87
16-18 syllables.....	11	40	56	91
A. M., P. M.....	28	44	50	78
VII.				
Fingers.....	0	8	31	70
Pictures.....	17	29	64	83
5 digits.....	17	46	64	91
Bow knot.....	6	4	28	65
Differences.....	0	17	34	57
Diamond.....	0	8	30	78
Days.....	Usually omitted			
3 digits bkd.....	Usually omitted			
VIII.				
Ball-field.....	11	6	36	57
20-0.....		2	14	39
Comprehension.....	11	15	30	70
Similarities.....	0	10	31	48
Definitions.....	0	0	8	39
Vocabulary.....	0	0	5	9
Six coins.....	0	2	2	26
Dictation.....	Omitted			

In Group C the situation was reversed. Only five of the twenty above 100 I Q gained, while nine of the ten below

100 gained. Above 100, the central tendency was toward an average loss of 3.6 points; below 100, toward an average gain of 14.3. As already stated, we believe that the excessive gains made by a small number of children of Group C who fell low in the initial test was due to failure in the first test to overcome timidity. The scores of Groups A and B offer a better comparison because they were made after much more experience in testing kindergarten children, and the data for these two groups indicate that bright children profit but little more from memory of a recent test than do dull children.

DATA ON THE INDIVIDUAL TESTS

Table VIII gives the per cent passing each test at the ages 4, 5, 6 and 7. Age 4 includes the range 3-6 to 4-5, age 5 the range 4-6 to 5-5, etc. The 77 repeated tests are counted as though they were tests of so many children in addition to the 112. The effect is that of $112 + 77$, or 189 tests in all.

It will be seen from Table VIII that the several tests of any given year differ little in difficulty. In IV, the "comprehension" test is relatively easy for its group; in V, "patience" and "age" are relatively hard; in VI, "comprehension" is relatively easy; in VII, "bow knot," "differences" and "fingers" are relatively hard, while "pictures" and "five digits" are relatively easy; in VIII, vocabulary test is much too difficult.

Although the age-groups merge into one another in difficulty, the tests of no group seriously overlap those of an adjacent group.

Table IX shows the average per cent of passes, by age, for the tests of each group taken together.

TABLE IX. AVERAGE PER CENT OF PASSES FOR THE TESTS OF EACH AGE GROUP TAKEN TOGETHER

	Average per cent passing at each age			
	4	5	6	7
Tests of III (combined).....	97%	99%	99.5%	100%
IV.....	71	88.6	93.1	99
V.....	38.1	63	74.5	95.7
VI.....	23.7	44.1	63.1	89.4
VII.....	6.6	18.6	41.8	74.
VIII.....	3.1	5.	18.	41.

Sex differences in per cent passing were not numerous or large. The comparison was made separately for the two ages 4-7 to 5-6 and 5-7 to 6-6. There were not enough subjects above and below these ages to justify further comparison. The significant differences found are presented in Table X.

TABLE X. TESTS SHOWING SEX DIFFERENCES

Test	Per cent passing				Advantage
	Age 4-7 to 5-6		Age 5-7 to 6-6		
	Boys	Girls	Boys	Girls	
Colors.....	59	72	64	88	Girls
Prettier.....	56	88	72	84	"
Patience.....	48	72	72	76	"
Right-left.....	33	60	74	72	"
Omissions.....	26	44	54	72	"
16-18 syllables...	67	80	74	88	"
A. M., P. M....	56	32	56	40	Boys
5 digits.....	44	88	59	72	Girls
Bow knot.....	7	0	21	40	"

SUMMARY

1. The Stanford-Binet scale was given to 112 representative kindergarten children. Of these, 77 were tested twice.

2. The intelligence quotients ranged from 61 to 152, with the median at 105. The distribution closely approximated the normal. The difficultness of the Stanford Revision in this part of the scale was found to be not far from correct. If there is any error it is on the side of leniency.

3. The girls had a higher median intelligence quotient than the boys, but had a coefficient of variability 20 per cent less than that of the boys.

4. The mental ages ranged from less than $3\frac{1}{2}$ to more than $7\frac{1}{2}$ years. This gives rise to a serious problem in kindergarten instruction.

5. The correlations found between intelligence quotients and teachers' ratings, mental age and school marks, etc., were rather low. This was traced to certain constant errors to which teachers are subject and to the fact that the kindergarten work offers little basis for the estimation of intelligence.

6. Repeated tests gave a correlation of .94 after a half-year interval, and a correlation of .85 after a two-year interval.

7. Tests repeated within 48 hours showed little effect of practice. In repeated tests the bright profit slightly more than the dull.

8. The per cents passing each test at each age do not appear to warrant any radical changes in location or scoring of tests.

9. But few of the tests showed significant sex differences in per cents passing.