…SURING MINDS

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MEASURING MINDS

AN EXAMINER'S MANUAL
TO ACCOMPANY
THE MYERS MENTAL MEASURE

BY

CAROLINE E. MYERS
AND
GARRY C. MYERS, Ph.D.
HEAD OF DEPARTMENT OF PSYCHOLOGY,
CLEVELAND SCHOOL OF EDUCATION

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PREFACE

This Manual attempts to give the aims, purposes, and application of intelligence tests in general and of The Myers Mental Measure in particular. It is written with the hope that it will be of aid to all who use intelligence ratings regardless of what test is used.

The authors take a conservative attitude toward the functions of intelligence tests, pointing out some of their shortcomings but at the same time attempting to show how the ratings of intelligence tests can be used to bring the best results.

The Myers Mental Measure is offered to supply a very practical need of a group intelligence test:

1. That is a single continuous scale of a few pages applicable to all ages.

2. That correlates pretty highly with Stanford-Binet.

3. That is independent of school experience; that finds the bright child who would not ordinarily be found in terms of his school performance.

4. That any teacher can learn to give accurately and that any clerk can learn to score with precision.

5. That is brief and simple, yet scientific.

In this Manual are presented graphs and tables which the authors offer in evidence of their belief that The Myers Mental Measure meets with the above-named criteria.

General and specific directions for giving and scoring the tests are presented together with norms based on over 15,000 cases

MEASURING MINDS

AN EXAMINER'S MANUAL

THE MYERS MENTAL MEASURE: ITS MEANING AND USE

Aims of Intelligence Tests

Intelligence tests aim:

1. To aid the Administrator.

(*a*) To classify his children on the basis of native capacities; especially to pick out children of marked ability.

(*b*) To measure the efficiency of his school organization and his teachers by checking up the school product with the abilities of the children concerned.

2. To aid the teacher.

(*a*) To know what to expect of herself and her individual pupils.

(*b*) To be more keenly aware of individual difference.

3. To aid the employer.

(*a*) To make a hasty classification of his employees, especially to find early his foremen and other leaders.

How Intelligence Tests Differ from Educational Measurements

Educational tests and measurements have been used for a number of years in the public schools with great success.

Along come the intelligence tests to supplement educational measurements making them more effectual. Wherein do the two types of tests differ? Educational measurements are a kind of yardstick designed to evaluate the quantity and quality of school performance. By them the school man can determine how well his children do, in arithmetic or writing or reading, say, as compared with the average performance of several thousand children of different school systems in that school subject. Moreover, by these educational measurements in one or more school subjects the performance by one group of children, or by one school system can be compared with the performance by other groups or systems.

While actual school performance is thus measured considerable information about the intelligence, or capacity to learn, is also obtained. In other words, how well a child can read, or write, or spell, or do arithmetical sums, tells something about that child's intelligence. To get on well in school presupposes a certain degree of native capacity to learn. However, common observation suggests that not all who get on well in school do so because of marked native ability. With a reasonable amount of it some children achieve much because of their excessive zeal and industry. Likewise, often those who have a great capacity to learn get on poorly. Educational measurements tell only how the child has got along in school. To determine how he ought to get along in school is the aim of the intelligence tests. They aim to tell what the child should do and with what relative speed he ought to learn; while educational measurements tell with what speed he has learned. Intelligence tests are prospective; educational measurements retrospective. Of the two therefore the former are the more fundamental. By them the latter are rendered more effectual and certainly more scientific. Unless the relative learning ability of two or more groups of children is known, their degree of performance can not be accurately adjudged. It is not what a given child or group of children actually do in school work that is significant, but what they do in relation to their native abilities. The intelligence test measures relative native abilities. It is obviously desirable, therefore, that an intelligence test should be independent of school experience.

Kinds of Intelligence Tests

Before the late War there were in use several intelligence tests, chief of which were the original Simon Binet, Terman's Stanford Revision of Binet, Goddard's Revision of Binet, and Yerkes-Bridges' Point Scale. Such tests were pretty highly standardized and have been considered to measure intelligence with a high degree of accuracy. But they are all designed to test only one person at a time, requiring from twenty minutes to an hour for each examination. When the army testing began it was readily seen that although the available individual tests could not easily be improved upon in accuracy, to use these measures was far too slow a procedure. Tests were needed to examine several hundred at a time. To supply this need there were developed the Army group tests, Alpha for those who could read and write English, Beta for those who were illiterate in English. Out of the Army testing have grown a number of group intelligence tests adapted to school children. Most have been an imitation of Alpha with emphasis on language exercises, applying, consequently, only to the upper grades and high schools. A few authors, imitating Beta, have developed tests for the first few grades only. The authors of The Myers Mental Measure have combined many of the best principles of Alpha and Beta and Stanford-Binet into a single continuous scale consisting wholly of pictures and applicable to all ages and degrees of school experience. Each section of this test sets tasks easy and simple enough for the kindergarten child and at the same time other tasks hard enough for the university student. In this respect this test is unique.

Desirability of Complete Intelligence Surveys of Schools

Although the Army tests were applied to whole companies, whole regiments, and whole divisions at a time, most testing in schools to date has been spasmodic, on a few classes or a few grades here and there, in a given school system. The first complete intelligence survey of a city school system of any size was made by Supt. S. H. Layton of Altoona, Pa. In this survey The Myers Mental Measure was used because it could be given to all ages and grades of children including high school seniors.*

Since that time other cities have been surveyed in a like manner. All the children of a city, however large, can thus be tested in a single day or half day, by a single continuous scale.

*See Annual Report of the Altoona Public Schools, June, 1920.

By such a survey the superintendent can get a concentrated record of all children of a given grade. He can compare the intelligence ratings by the children of the various classes within this grade. Moreover, he can compare the ratings by each grade with those by every other grade, since the same scale is used throughout. When he follows up by his educational measurements he can determine how a given grade overlaps in amount of school performance, the grades above it and below it. With like overlapping of the grades in the intelligence ratings he can make comparisons that will be very significant.

Whole counties of rural schools, just as whole cities, have been surveyed by this single group intelligence scale.

Spasmodic testing, although not ideal, is worth while. Some of the best information available on the value of intelligence tests has come through such procedure. Indeed, any supervisor, principal, or teacher can profit by the use of an intelligence test, however limited, if the ratings therefrom are used to advantage.

Getting Ready for an Intelligence Survey

If a given school system is to have an intelligence survey, detailed preparation should be made quietly after the fashion of getting ready to "go over the top." Let the superintendent, or an expert designated by him, coach the principals and those of the teachers selected to give the tests. Let every tester be imbued with the idea that the directions are to be followed to the letter and that in order "to put over" these directions each tester must be very familiar with them and with the process of precise reading of "seconds" on a watch. Accurate timing of each test is of the greatest importance.

Getting the Children Ready

At the appointed hour for beginning the test in each building, those testing should be careful to make sure that the children are comfortable and that they assume a coöperative attitude. To the lower grade children this test may be referred to by the tester as a game to be played by set rules. To those of the upper grades, and especially of the high school, this test should be referred to seriously as a test, ratings by which to be matters of official records. But in no case should there be the slightest suggestion that will excite or disturb those taking the test.

In case the teacher tests her own children the greatest danger is that the children will not take the test with sufficient seriousness and that the teacher will still maintain her teaching attitude toward the children. Therefore, in spite of her desire to follow the instructions of the manual verbatim she will, unless very careful, be prone to vary toward giving undue advantage to her children. Every teacher who tests needs to be cautioned strongly on this point.

Intelligence Ratio

The sum of the points made on The Myers Mental Measure is known as the *raw score*. For the purpose of comparing grades and schools by this test this raw score is all that is necessary. But for all other purposes this raw score should be considered in relation to chronological age. Anyone can readily see that a child of nine years who makes a raw score of 40 points is much superior to the nine year old child who makes a score of only 15 points. Hence the best measure is an intelligence ratio computed by dividing the raw score by the age-in-months. For example, Willie Winger has a raw score of 23. He is 109 months of age. Willie Winger has an intelligence ratio of .21. It is obvious that if a child is old for his grade he may make a relatively high raw score. If however, that score is divided by the chronological age-in-months of that child his score (intelligence ratio) will be greatly reduced in value. Probably that child will actually rank relatively low in his class just as he probably should, since most over-aged children of a given grade are in that grade because of their relatively inferior intelligence. *The Intelligence Ratio is very simple. Anyone can compute it. Anyone can understand it. It admits of no confusion. It is a very reliable measure. It can be derived from any group intelligence test.*

Intelligence Ratio Should not be Confused with the Intelligence Quotient of an Individual Test

Unfortunately in the first edition of this Manual the Intelligence Ratio was called Intelligence Quotient. Of course this term was not incorrect but it was slightly ambiguous to some. However, it was clearly explained there to mean "Raw Score divided by chronological age-in-months." Owing to the danger of its being confused with the more traditional use of the Intelligence Quotient (I. Q.) the more appropriate name, *Intelligence Ratio*, has been adopted.

The term I. Q. has been used very carelessly, often in almost complete ignorance by its user, especially the layman.

Terman first used it in his Stanford Revision of the Binet Test. For each part of that test correctly passed by the child a certain number of months are credited. The total of all these points scored by the child equals that child's mental age-in-months. The child's mental age-in-months (raw score) divided by his chronological age-in-months gives the intelligence quotient (I. Q.) of that child. Let it be remembered, however, that each credit the child earns in the Stanford-Binet is in terms of months, and that no group test gives a score in such terms.

Of course, if the total number of points earned in Stanford-Binet is divided by twelve the mental age of that child will be in terms of years. Then if this mental age-in-years is divided by that child's chronological age-in-years the same I. Q. may be derived as if the divisor and dividend had each been in months.

Analogous to such a procedure an I. Q. as generally used in relation to group tests may be derived from The Myers Mental Measure. To illustrate, a given child making 35 points is, on the average, 10 years old. We may say that he has a mental age of 10 years. See table, page 55. Suppose this child were 9 years old. Then his intelligence quotient is 10 divided by 9 or 1.11. This procedure is in keeping with common usage with group tests but it is obviously not very accurate. Moreover, the term, intelligence quotient, suggests an identity with an I. Q. of a standardized individual test, and consequently suggests clinical attributes. Therefore the authors of The Myers Mental Measure do not recommend its use. They prefer the intelligence ratio—raw score divided by chronological age-in-months, as the more accurate and as unambiguous.

But how can scores by different tests be compared except by intelligence quotients? Save in terms of ranking they never can be compared with accuracy, intelligence quotient or no intelligence quotient. Ratings by any two intelligence scales are not wholly commensurate. Why not admit it? The ratings by any scale have a meaning in respect to that scale and nothing more. This fact makes all the more desirable a single scale that is continuous, that measures the first grade child and at the same time the university student,—in short, that measures intelligence for all ages. If, on the other hand, there is a scale for the first two or three grades, another for the next few grades, and so on, how can the ratings of the lower scale ever be compared with the ratings by the higher scale? Suppose, for example, a given scale that applies only to the first three grades is used, and a second scale that applies only to the next five grades, how can the ratings by the second and third grades be compared with the ratings by the fourth and fifth grades? They never can be compared.

Compilation of Data

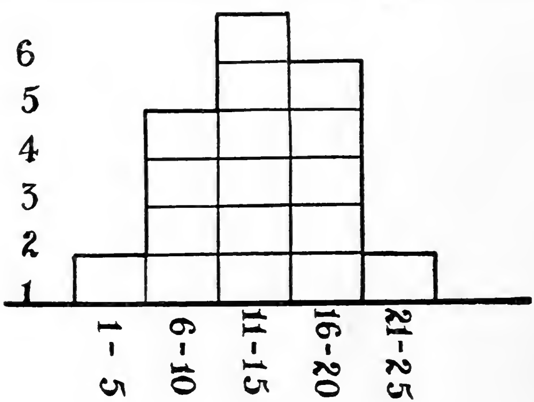
Although every teacher will want the individual scores of her pupils and will want constantly to check up with the school progress of each pupil in relation to this intelligence rating, the administrator and supervisor will be interested most in the ratings by the groups. How shall he proceed to study them?

The first step is to condense the data into larger units. With The Myers Mental Measure it has been convenient to group the individual ratings as follows:

Raw Score		Intelligence Ratio	
Score	Number Cases	Score	Number Cases
1– 5	1	.01–.05	1
6–10	4	.06–.10	5
11–15	6	.11–.15	8
16–20	5	.16–.20	4
21–25	1	.21–.25	1

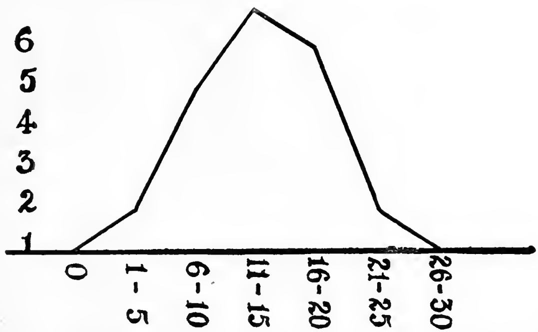
Under "Raw Score" one reads, for example, "One case scored between 1 and 5 points; 4 cases scored between 6 and 10 points, etc." A mere glance at this table tells the reader a great deal about the group. In like manner the intelligence ratio can be read.

One can represent graphically the raw score thus:



The spaces on the base line between the points are the values or scores. Each block represents a case. From the graph one also reads: "One case scored between 1 and 5, 4 cases scored between 6 and 10, etc."

This picture is called the "distribution graph." If, instead of the angular boundaries, the edges were smoothed the graph would look like this:

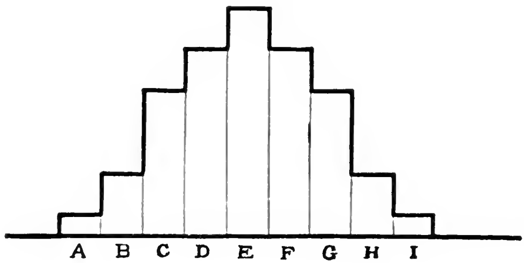


Whether in blocks or in curves the trend taken is that of the Normal Probability Curve of Distribution.

Meaning of the Normal Probability Curve of Distribution

The table above from which this graph is derived is a fictitious one. However, if one were to measure 10,000 individuals of homogeneous groups, i.e., groups whose common element measured is an indispensable element, one would find a distribution similar to that indicated above but a better one.

Suppose one were to measure the head circumference of 10,000 male Americans of Irish descent, 21 years of age. One would find a large number of heads of about average circumference. For each decreasing unit in circumference the number would grow smaller as well as for each increasing unit in circumference. Let these measures from the smallest head among the 10,000 to the largest head among them range in measures represented by *a, b, c, d, e, f, g, h, i.* Representing these measures graphically one would get the following distribution:



Whatever one were to measure in the biological world would distribute after this fashion, if the number of cases were great enough and if they represented random sampling of sufficiently homogeneous groups.

Let it be remembered that a smooth curve of distribution, or one closely after the normal probability curve, can not always be expected for small groups, since relatively small numbers have a poor chance to be wholly representative.

If an intelligence test distributes its scores within each age and grade after the manner of the normal distribution, that test would seem to be a highly reliable one. Let us see what The Myers Mental Measure does.

On pages 18 and 19 are graphically presented distributions, by raw scores and by intelligence ratios, for each age and grade of the 3,092 elementary school children of the East Cleveland schools, by this test. On page 21 are graphic distributions of the raw scores by 810 high school seniors (and of the intelligence ratios by 182 of these), of the raw score by 128 entrants to a city normal school, by 260 elementary school teachers, by 493 college students, and by 170 boys of a school for "Incorrigibles." The intelligence ratios are in hundredths while the raw scores are in integral numbers.

Median Scores by East Cleveland

(3,092 cases)

By Grades Regardless of Chronological age

Number cases	446	380	380	393	382	371	388	352
Grades	I	II	III	IV	V	VI	VII	VIII
Raw score	14	24	30	38	41	44	48	54
Intelligence ratio	.17	.25	.29	.31	.31	.31	.30	.32

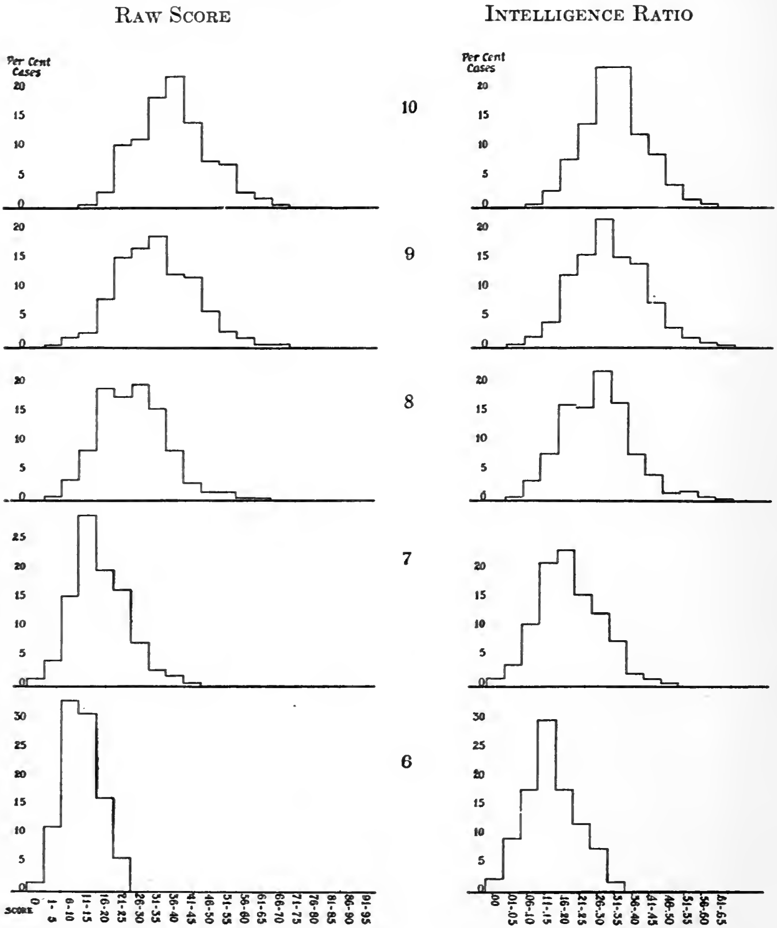
By Chronological Ages Regardless of Grades

Number cases	116	384	375	374	347	392	324	371	269	110	27
Ages	6	7	8	9	10	11	12	13	14	15	16
Raw score	12	16	26	32	37	41	46	49	51	47	47
Intelligence ratio	.14	.19	.27	.29	.31	.31	.32	.31	.30	.27	.24

By comparing these medians with the medians of the larger groups (see pages 54 and 55), which are offered as the Norms for this test, it will be seen that the East Cleveland scores range relatively high, as would be expected, this being a suburban city.

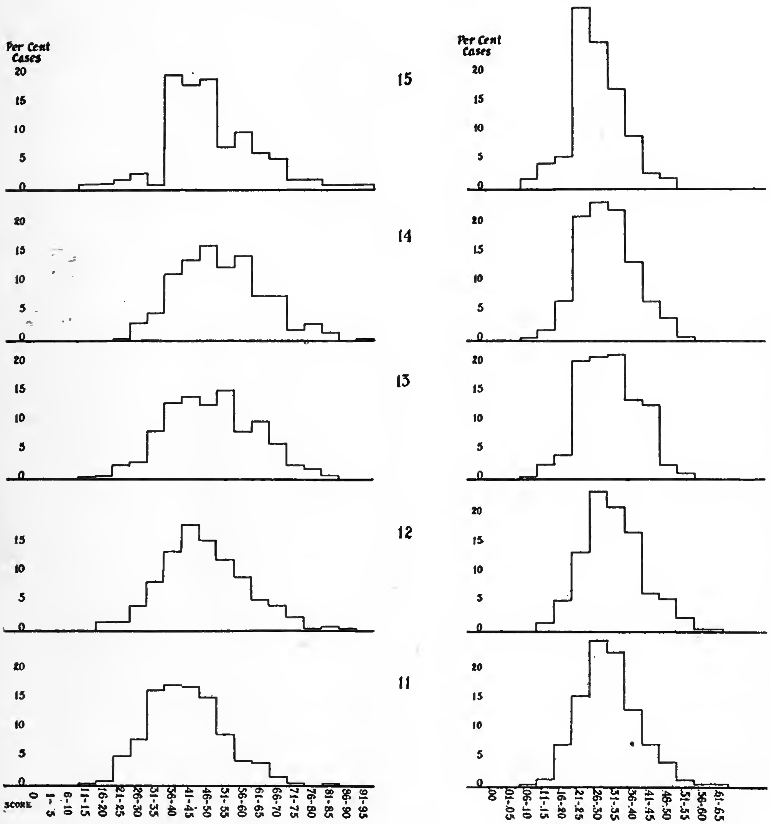
For the raw scores by grades the medians are indicated graphically illustrating an added means of showing inter-relation of all groups within an entire school system.

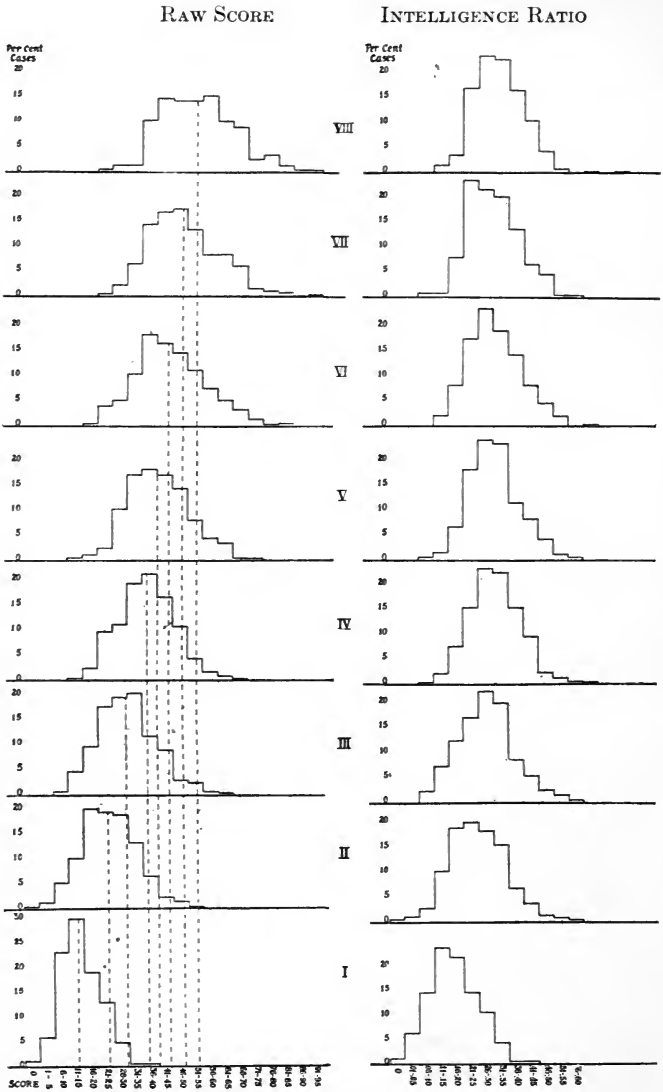
Distribution Graphs of 3,092 Elementary School Children of East Cleveland by Ages. (The ages are represented by the numerals between the pairs of graphs.)



Distribution Graphs *Continued* of 3,092 Elementary School Children of East Cleveland by Ages. (The ages are represented by the numerals between the pairs of graphs.)

Raw Score | Intelligence Ratio

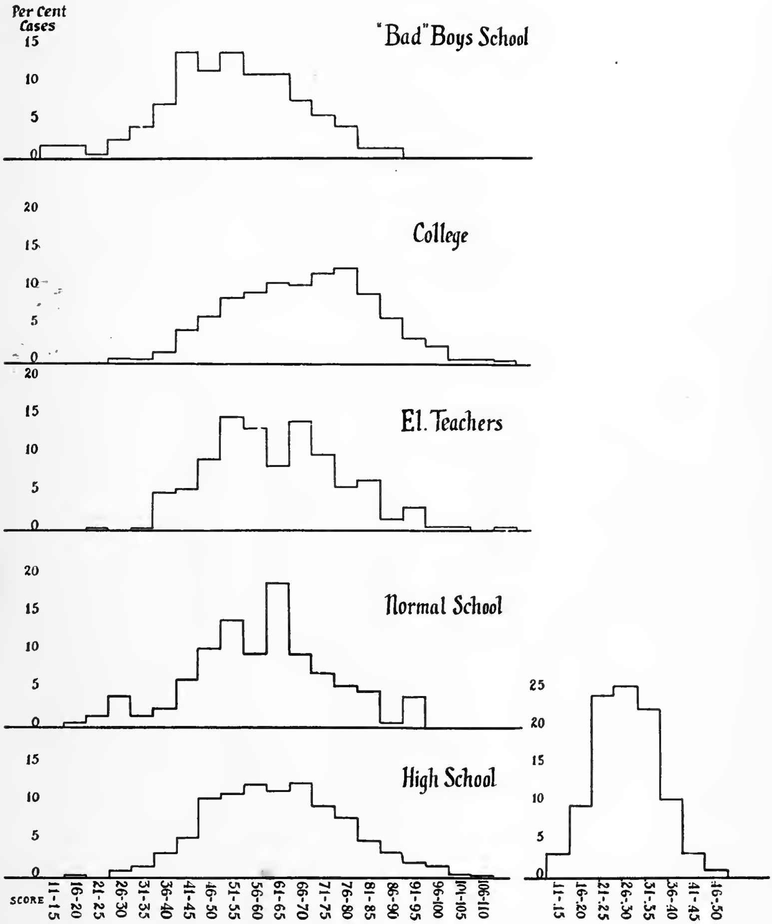




Distribution Graphs of 3,092 Elementary School Children of East Cleveland by Grades for Raw Score and Intelligence Ratio. (The Grades are represented by Roman Numerals.)

Distribution Graphs by Raw Score of 810 High School Seniors at Graduation, 128 Normal School Entrants, 260 Elementary School Teachers, 493 College Students, and 170 "Bad Boys" also by Intelligence Ratio of 182 High School Seniors.

RAW SCORE | INTELLIGENCE RATIO



These graphs show conclusively that the ratings by The Myers Mental Measure distribute in very close accordance with the probability curve of normal distribution regardless of the age and school experience of the groups studied; what some experts have contended could not be done.

Space will not admit of the tables of distribution from which these graphs are constructed but the medians are presented on page 20.

Since the groups represented by the graphs do not have the same number of cases all the numerical distributions were reduced to a percentage basis. To illustrate, the raw scores for Grade II, East Cleveland are thus reduced:

Score	0	1–5	6–10	11–15	16–20	21–25
Number of cases	1	5	21	39	77	74
Percentage of cases	.26	1.31	5.52	10.27	20.26	19.47

Score	26–30	31–35	36–40	41–45	46–50	51–55
Number of cases	72	50	25	8	6	2
Percentage of cases	18.95	13.16	6.58	2.11	1.58	.52

Such a reduction on the scale of 100 per cent is always desirable when such groups are compared by distribution graphs.

All the tables of distribution from which the graphs are built are incorporated in the larger distribution tables below, which, in turn, incorporate also like tables from the school children of Cleveland, Altoona, Painesville, O., Cleveland Heights, O., Western Reserve University, Ohio Wesleyan University, Hiram College, Lake Erie College, and Wooster College. For the college group the cases are pretty evenly distributed among the four years.

The medians derived from these total distribution tables are offered as tentative norms for The Myers Mental Measure. They appear at the foot of the tables and again, in a more condensed form, on pages 54 and 55.

Distribution of Raw Scores by Grades

15,241 cases

Grades Score	K	I	II	III	IV	V	VI	VII	VIII
0	5	23	6	2					
1– 5	17	244	99	13	8	2	0	1	
6– 10	11	329	195	59	24	6	0	2	
11– 15	7	338	233	155	56	26	2	4	
16– 20	1	213	294	253	137	57	17	25	
21– 25	3	137	246	332	193	134	59	39	6
26– 30	1	74	168	297	248	243	102	89	33
31– 35	..	26	106	234	291	325	187	144	74
36– 40	..	21	55	169	276	317	255	196	151
41– 45	..	5	19	110	194	277	240	215	201
46– 50	..	..	14	55	111	220	217	249	251
51– 55	..	..	7	24	47	144	143	234	209
56– 60	..	..	5	12	27	89	123	143	211
61– 65	..	..	..	2	10	55	55	121	137
66– 70	..	..	..	3	4	15	45	78	103
71– 75	..	..	..	1	1	8	26	20	67
76– 80	..	..	..	..	1	3	12	24	62
81– 85	..	..	..	..	2	1	7	14	23
86– 90	..	..	..	..	..	..	4	1	15
91– 95	..	..	..	..	..	..	1	6	4
96–100	..	..	..	..	..	..	..	3	3
101–105	..	..	..	..	..	..	..	0	0
106–110	..	..	..	..	..	..	..	1	0
111–115	..	..	..	..	..	..	..	0	..
116–120	..	..	..	..	..	..	..	1	..
Total cases	45	1,410	1,447	1,721	1,630	1,922	1,495	1,610	1,550
Median	6.2	12.6	19.2	26.8	33.6	38.6	43.6	47.8	52.4

Distribution of Raw Scores by Grades (*Continued*)

15,241 cases;

	IX	X	XI	XII	Normal School	Elem. Teachers	College
0							
1– 5							
6– 10							
11– 15							
16– 20				1	1		
21– 25				0	2	1	
26– 30	1	2	2	8	5	0	3
31– 35	9	5	2	13	2	1	2
36– 40	19	4	2	27	3	13	8
41– 45	40	25	8	43	8	14	23
46– 50	39	28	15	85	13	25	35
51– 55	48	36	19	90	18	39	43
56– 60	49	37	27	100	12	35	46
61– 65	28	28	24	94	24	22	53
66– 70	29	20	15	101	12	37	51
71– 75	25	25	19	78	9	26	58
76– 80	5	11	13	65	7	15	62
81– 85	11	17	6	40	6	17	45
86– 90	6	3	4	28	1	4	30
91– 95	2	4	1	18	5	8	16
96–100	..	1	2	14	..	1	11
101–105	..	1	1	3	..	1	3
106–110	..	2	..	2	..	0	3
111–115	..	..	..	..	..	1	1
Total cases	311	249	160	810	128	230	493
Median	55.9	59.3	62.0	63.0	61.0	61.4	69.3

Distribution of Raw Scores by Ages

10,859 cases

Age	6	7	8	9	10	11	12	13	14	15	16	17
Score												
0	10	13	4	0	1	1						
1– 5	138	104	56	25	11	4	3	3	1	2	0	1
6- 10	145	198	107	62	26	14	6	6	1	1	0	0
11- 15	101	274	156	101	54	31	11	17	4	3	0	1
16– 20	59	226	205	165	110	53	33	20	10	4	2	0
21– 25	35	172	202	215	149	95	47	32	22	8	1	0
26– 30	13	103	189	236	148	135	88	61	38	13	5	2
31– 35	8	47	140	209	200	193	134	114	56	33	7	2
36– 40	5	29	86	176	219	216	166	142	105	64	8	3
41– 45	1	11	40	126	133	189	167	156	121	56	9	0
46– 50	0	7	30	63	105	150	158	161	151	70	15	2
51– 55	1	5	13	30	80	98	122	155	100	41	10	1
56– 60	..	1	6	23	31	67	101	113	108	44	11	0
61– 65	..	1	2	6	18	37	45	87	68	40	3	2
66– 70	..	..	1	3	8	22	45	58	44	19	5	2
71– 75	..	..	..	..	5	7	21	38	38	11	6	1
76– 80	..	..	..	..	2	4	6	27	34	19	3	0
81– 85	..	..	..	..	3	2	8	7	18	7	2	0
86– 90	..	..	..	..	0	..	3	5	7	3	1	2
91– 95	..	..	..	..	0	..	2	1	2	4		
96–100	..	..	..	..	1	..	2	1	..	3		
101–105	..	..	..	..	..	..	0					
106–110	..	..	..	..	..	..	1					
Total cases	516	1191	1237	1440	1304	1318	1169	1204	928	445	88	19
Median	9.7	16.1	23.2	29.2	34.8	39.1	43.9	47.6	49.5	48.7	50.0	47.2

Distribution of Intelligence Ratio by Grades

11,827 cases

	I	II	III	IV	V	VI	VII	VIII	XII
00	23	6	2						
.01–.05	209	102	19	15	3				
.06–.10	265	172	80	54	23	6	11	1	
.11–.15	298	245	195	135	81	42	25	24	6
.16–.20	230	284	268	241	224	126	118	95	18
.21–.25	166	229	273	272	334	256	251	238	44
.26–.30	109	172	284	334	367	288	232	352	46
.31–.35	58	130	176	279	292	240	245	341	41
.36–.40	28	50	95	161	177	174	157	226	19
.41–.45	15	27	58	87	108	95	77	140	6
.46–.50	2	15	28	27	57	48	41	46	2
.51–.55	4	8	12	16	19	24	11	11	
.56–.60	2	6	3	6	10	7	4	2	
.61–.65	0	0	0	2	1	5	3	1	
.66–.70	1	1	2	1	..	..	2	0	
.71–.75	..	..	1	..	..	..	..	1	
Total cases	1410	1447	1496	1630	1696	1311	1177	1478	182
Median	.145	.195	.244	.275	.285	.299	.299	.314	.285

DISTRIBUTION OF INTELLIGENCE RATIOS BY AGES

10,859 cases

Age / Score	6	7	8	9	10	11	12	13	14	15	16	17
00	10	13	4	0	1	1						
.01–.05	114	86	59	29	14	10	7	6	1	2	0	1
.06–.10	113	153	110	77	45	25	13	21	10	6	2	2
.11–.15	92	246	148	140	107	86	47	38	34	18	4	0
.16–.20	68	225	198	233	186	150	116	117	80	53	16	4
.21–.25	55	167	194	250	183	254	212	224	189	109	23	4
.26–.30	27	134	217	250	295	285	259	238	220	106	22	0
.31–.35	17	88	139	204	206	231	211	240	185	82	15	5
.36–.40	10	35	72	133	130	142	170	161	120	40	5	0
.41–.45	6	22	50	70	83	85	68	108	57	19	1	2
.46–.50	3	9	25	30	35	29	40	34	26	6	..	0
.51–.55	0	6	12	18	12	14	14	13	6	3	..	0
.56–.60	0	5	6	5	4	5	6	4	..	0	..	1
.61–.65	1	0	2	1	3	1	6	0	..	0		
.66–.70	..	2	1	..	..	..	..	..	..	1		
Total cases	516	1191	1237	1440	1304	1318	1169	1204	928	445	88	19
Median	.121	.181	.235	.258	.280	.283	.297	.301	.294	.276	.260	.241

The reason for plotting the graphs from the East Cleveland groups only instead of from the combined ratings of the several cities is because that city, practically without a foreign population, represents the most homogeneous large group of any of the groups studied. From mere inspection it will be seen that the ratings of the East Cleveland children approach more closely the normal probability curve of distribution in the first one or two grades and school years than do the ratings by the several cities combined. However, for all other grades and ages the combined ratings not only are quite as nearly normal as the East Cleveland groups but, in consequence of their much larger numbers they are much smoother.

Since the skewness in the first grades and ages increased with the number of foreign children in the several cities studied it is very highly probable that this skewness for the first grades and ages of the combined groups is due to the presence there of the relatively large number of children who did not understand English. Although this test "gets across" very well with non-English speaking people who understand spoken English, neither this very simple picture test nor any other available group test does justice to those not understanding English. Because of this fact the authors of The Myers Mental Measure are now developing a test which presumes to be a measure equally good with non-English speaking persons not understanding English and all other types of persons. It will be especially suited to members of Americanization classes.

Group Comparison by Medians

Ordinarily groups are compared in terms of averages. A measure much simpler than the average, a measure which to most means about the same as the average, and which, when the distribution is approximately normal, is practically the same as the average, is the median. The median score is that score above which fall as many cases as the number of cases that fall below it.

Suppose for example, nine children scored as follows: 19, 17, 20, 23, 25, 24, 22, 21, 18. Arranged in order their scores would be 25, 24, 23, 22, 21, 20, 19, 18, 17. Here the middle case is 21, or the score of that individual above whose score as many cases fall as the number who fall below it. When one has a large group the procedure is, in general, the same, though of course not quite so simple.

Now let us compute the median from the distribution:

Raw Score	Number cases
1– 5	2
6–10	5
11–15	8
16–20	5
21–25	2
Total number cases	22

The median will be the value reached by counting down 11 cases or up 11 cases. It will be seen that the median raw score will fall somewhere in the step 11–15. Counting down, 7 cases are used up above this step 11–15. Four more cases are needed out of the 8 cases. Therefore $\frac{4}{8}$ of 1 step will be added to the value used up. One step equals 5 points. Then $\frac{4}{8}$ of 5 equals 2.5. Since values of scores counting down increase, the median is 11 plus 2.5 or 13.5.

To verify this median let us count upward. Again 7 cases are used up and 4 are needed out of the group of 8 cases. Therefore $\frac{4}{8}$ of 1 step equals $\frac{4}{8}$ of 5 or 2.5. Since the scores decrease in value counting downward the median is $16-2.5$ or 13.5.

By extending the lines representing the median of each group on the distribution graphs as with graphs on page 20, one can easily see how much each group reaches or exceeds or falls below in value the median of every other group. In that way one can get a bird's-eye view of the ratings of a whole school system.

One can also compare the values where the highest number of cases fall. This measure is called the *mode*. For example for grade one (East Cleveland) the mode by raw score is at 11–15, for grade two, at 16–20. It will be seen that the mode approximates the median. If the distribution were wholly normal these two measures would be identical.

What are Norms?

A test does not mean much until it is standardized i.e., until ratings by it have been compiled from a relatively large number of representative cases from each age and grade for which that test is designed. The average or the median score by a standardized test for each age and grade is called the norm or standard for that age and grade by that test. By virtue of its norms or standards is a test said to be standardized. The norms for The Myers Mental Measure are in terms of the median (see pages 54 and 55.)

Although the distribution graphs are based on the 3,092 cases of East Cleveland the norms, and the tables from which these norms were derived, are based on 15,241 cases. From these norms one reads for example that the median first grade child makes a raw score of 13 points, and intelligence ratio of .15; the median fifth grade child makes a raw score of 39 points and an intelligence ratio of .29; the median child of 8 years makes a raw score of 23 points, and an intelligence ratio of .24; the median child of 12 years makes a raw score of 44 points, and an intelligence ratio of .30.

Only 36 out of the 15,241 cases, including kindergarten and first grade children, failed to score. This means that this same scale of four pages which is so difficult that no adult has ever made a perfect score on it, is at the same time, so easy that the first grade child almost never wholly fails to score. Only 5 of the 45 kindergarten children failed to score. However, the kindergarten children were tested in groups of from 2 to 6, as they should be with this or any other group intelligence test.

Correlation with Stanford-Binet

The Myers Mental Measure* was checked up with Stanford-Binet on about 300 school children pretty equally distributed throughout the grades, with a correlation of about .80 for each grade. For the respective grades the correlations were from first to eighth inclusive; .81, .83, .86, .85, .78, .78, .89, .68. With the first four tests of Alpha given to 39 convalescent soldiers this test correlated .91.

These high correlations for the respective school grades are all the more significant since they are obviously on relatively homogeneous groups. Had the correlation been computed regardless of grade it would have been much higher.†

Who Shall Interpret the Ratings of an Intelligence Test?

By following the instructions of the test literally almost anyone can give a group test with precision, but interpretation of the ratings require considerable skill. The

* A Group Intelligence Test. Caroline E. Myers and Garry C. Myers. School and Society, Sept. 20, 1919. Pp. 355–360.

† "A Grave Fallacy in Intelligence Test Correlations." Garry C. Myers. School and Society. May, 1920, pp. 528-529.

superintendent or his clinical psychologist or expert in measurements are usually the competent interpreters. Any teacher, however, can learn a great deal about her children, of value in her teaching, by studying their comparative ratings in the test, especially when these ratings are reduced to intelligence ratios. Even where there is an expert to interpret the data, the teacher should have in her class record-book, opposite the name of each child, his intelligence ratio and she should have in her book the norm for that grade. She should be urged to check up constantly each child's school progress with his rating. However, the teacher should be cautioned against attempting individual diagnoses on the basis of such ratings. Each child's rating she should consider merely as a probable measure of his ability and in no wise as a final perfect measure. In case a child's school progress does not reasonably correspond with his intelligence rating he should be referred to the clinician. Furthermore, neither the clinician nor the teacher should divulge to the children their intelligence ratings.

Pitfalls in Interpretation

Too many teachers, and even administrators, look upon intelligence tests as a kind of panacea for all ills, as an infallible measure. There is a tendency to interpret a score by any child as a perfect measure of that child's intelligence. Indeed there is a wide tendency for teachers and others to refer to the *intelligence* of this child or that.

For example, "This child has an intelligence of 43 or of 72" is a type of a current bad usage. Instead one should get into the habit of saying, "This Child's raw score by The Myers Mental Measure," for example, "is thus and so."

Using the Ratings

In a large number of cases intelligence ratings have been made and left to go unused. Although some schoolmen may find such ratings a kind of fashionable ornament, these ratings are justified only when used.

Selecting Ability Groups within Grades

In general, these ratings should be used as follows: Arrange the names of the children of a given grade of a given building in order of the scores of those children. For The Myers Mental Measure the scores to be used in such grouping are the intelligence ratios. Having determined the number of classes and their respective sizes count off, beginning with those children rating highest, the number of children desired for the brightest class. Then count off the number desired for the next brightest class, and so on for that entire grade.

After a few weeks those children advancing in their school work more slowly or more rapidly than their section would warrant should be examined by the clinical psychologist and reclassified by her accordingly. In the absence of a clinician the teacher's careful records will determine the position of the few probable misfits. In all events the teacher's judgment in reference to such "variable" children should be taken into account.

It would seem that at promotion time the children of each ability section of a given grade would naturally be promoted to the corresponding ability section of the higher grade. In practice it is not so simple, since the number promoted from all sections within a given grade or failing promotion in the corresponding sections of the next higher grade is not always the same, there will have to be a reshifting from group to group at promotion.

Here is the scheme for promotion of ability groups worked out with illiterate soldiers by the authors of The Myers Mental Measure for the War Department, which scheme has been pretty closely adhered to in practically all the Army Americanization Schools.*

In promotion, pool the names of all who are to be promoted to a given grade with those who are to remain in that grade. Opposite each name place the original intelligence rating (the intelligence ratio for children below the high school) of that pupil. Then rank these names in order of their respective rating, and beginning with the highest, count off the number desired for each successive ability group as in the original classification. By this scheme the desired size of each class can be determined exactly and the ability grouping in accordance with intelligence ratings will be as nearly perfect as possible.

This plan does not necessitate retesting. Certainly it would not be desirable nor economical to test children

* "Prophecy of Learning Progress by Beta." Garry C. Myers., Jr. Ed. Psychol. April, 1921, pp. 228–231.

each school term. However, it may be very desirable to test them every few years.

Acceleration of Bright Children not Most Desirable

What shall be done with the brighter children? There is considerable precedent for accelerating them, letting them do two or three terms of work in one. More often individuals have been allowed to skip grade largely on the strength of their intelligence rating.

The authors of The Myers Mental Measure deplore this attempted solution of the problem of the bright child because it tends to get through the school earliest the very children who ought to profit most by staying in school longest, and who, in turn, ought to get most in school for social service. In other words, *acceleration of the bright child, in the long run, is a loss to the community.*

Enrichment of the Curriculum within Each Grade According to Ability Groups

Instead of speeding up the progress through the grades there should be a broadening and enriching of the course of study within each grade, for the brighter children. Let that be specified in black and white just as the regular traditional curriculum for Grade II, for example, is specified. Then for the next higher-ability group let there be just as specific a course—the minimum requirement plus certain very definite work for this second section. For the next higher section let there be the requirement of this second ability group plus a specific addition. Let each addition be in terms of breadth and not a reaching over into fields of a higher grade; and by all means let the requirement for each ability group be put down specifically and let these requirements be strictly adhered to.

This will mean that in the long run the grades earned by the best section will not be higher than the grades earned in a lower section. It will mean that a child in the best section may fail promotion as well as the child of a lower section, or he may be shifted to a lower section, if he fails to measure up to the high standard of his section.

Scheme Presupposes Ungraded Classes for Lowest Deviates

Ordinarily the lowest rating section will, on the whole, be more inferior to the next ability group than this group will be inferior to its next higher group, because of the extremely low cases who hardly adapt themselves at all to school procedure. Consequently there is needed in each building of ten or more rooms an ungraded class to include these deviates of low-grade intelligence in order to free the lowest sections of each grade from their burden, and in order to make these children happier by giving them the kind of activity they can best profit by.

Right Use of Intelligence Ratings Will Mean Social Responsibility

This will mean social responsibility in terms of capacity. The child who falls in the upper groups will readily get the idea that by virtue of his being in that group much more is expected of him, that after all society not only will expect more of him but will demand more. His only distinction for being in the best section will be the opportunity for more work. By such procedure the intelligence test becomes a tool for wider and more effective democracy.

Wrong Use of Intelligence Tests are a Social Danger

Unfortunately very often when there has been division of grades into ability groups all the different ability sections have had practically the same work to do. This means that the teacher and the children of the better sections could attain a high grade of work with but small effort. It means, too, that those of the better sections learn to look upon themselves as superior individuals with consequent freedom from certain drudgery of their unfortunate neighbors of the lower ability group, and with the opportunity to exaggerate their awareness of superiority by earning higher grades. Snobbery, on the part of the children of the better group, and jealousy, and all sorts of unrest, on the part of the parents of the children in the lower groups is the inexorable consequence. The children of the lower groups are stamped as all the more inferior. The administrator consequently has his troubles, for there is a scramble by the solicitous parents to have their children stamped as superior, and certainly not to be "stigmatized" as inferior.

Since the greater percentage of the children from the highest social and economic group fall into the brightest class and the greater percentage of the children from the lowest social and economic group fall into the dullest class,* the problem becomes all the more acute.

* "Comparative Intelligence of Three Social Groups within the Same School." School and Society, April 30, 1921, pp. 536–539.

If, on the other hand, for each ability group within each grade there is a specifically prescribed course increasing in breadth and richness with the ability of the groups, the solution is rather simple. The anxious parent, then, whose child is classed in the lowest group, and who insists that his child belongs in the highest group, can be made to see that that child, although able to pass his grade in the lowest section, would fail to make his grade in the brightest section. This parent can be convinced that his child is where he belongs. Let him not only see his boy recite where he is in the lowest section, but let that parent become familiar with how much more would be expected of the child, as indicated by the curriculum definitely prescribed, if that child were in the brightest section. Moreover, let such a parent actually see the children of the brighter section at work.

A MATTER OF EDUCATING TEACHERS AND THE PUBLIC

Support of the heartiest nature will back up this program and result in the right kind of education of the teachers and the public. What we need is the revamping of the whole school system so that there will be ability groups for whom in each grade, throughout that whole school system, there will be a properly adjusted curriculum commensurate with the ability of the several groups.

ADVANTAGES TO CHILDREN OF ABILITY GROUPING

Provided of course the curriculum is so adjusted as to properly enrich the work for these brighter children, the children from whom should come the bulk of the leaders of the community, the bright children should profit most from ability grouping.

Advantages to the Bright Child

Teachers do not always find the bright child. Sometimes the whole school fails to discover him. The bright child, just because of his superior ability, may discover, in the first few weeks of school, that what his classmates do is so commonplace as to be beneath the dignity of his effort. Thus with wounded pride, such a child may not only grow listless but actually may build up habits of defense where he definitely tries to become oblivious to the monotonous routine of the school. Consequently there comes a time when those his inferior classmates, by dint of mere repetition and exposure to class routine, master the school requirements to a point where the content and technique may be beyond this bright child. This bright child may be all the more annoyed by the fact that those he is sure are of less ability have mastered what by him is not easily handled. Such a bright child may appear to the teacher as a hopeless child and indeed almost stupid.

If, on the other hand, that child had been stimulated to expend a reasonable amount of effort from the beginning and had developed a correct attitude and correct habits of school procedure, his rare ability might easily have been realized by appropriate development.

It is not enough that a test check up pretty well with teachers' judgments. If the measure of a good test were that test's ability to check up by its scores with the judgment of the teacher then intelligence testing would hardly be justified. The chief service of an intelligence test is to find ability that the teacher is not likely to find. In other words, a good test ought to tell what a child can do rather than what he has done or will do. Once rare ability is discovered it is the teacher's job to see that such ability develops.

It is not always an easy job to develop the bright child. Even though the teacher knows a certain child has superior ability she may have difficulty with that child, especially if he has been discovered only after he has gone pretty far through the grades. By that time his habits of listlessness and indifference may be so fixed that he will not be reached by the ablest teacher. Such a child should have been found in the first grade and never should have been allowed to develop his bad attitudes. Hence the obvious desirability of classifying children on entering school.

Advantages to the Mediocre Child Who is Over-industrious

Perhaps most of the nervous breakdowns in school are among the children of mediocre ability. Such children, endowed with unusual industry, are keenly sensitive to the suggestion of anxious parents and friends to the end that they feel they must rank high or among the best in their class. By undue expenditure of effort these children sometimes do attain to high rank and even to the first place in their class. But it is at a tremendous cost. In such cases industry is mistaken for native capacity to learn. Certainly a good many unhappy boys and girls, especially of the adolescent age number among this group of unfortunates.

An intelligence rating, then, will often suggest that certain individuals are scoring too high in school performance. If such ratings are properly checked up, they afford the teacher and principal the kind of information that ought to be a great blessing to that kind of child. Not only will the school seek to guide that child to expend less energy at learning but every effort will be used to help the parents and friends to see the danger of their urging him on unduly.

Advantages to the Dull Child

The low-grade child will also profit by classification into ability groups. Of course one hears on every side that by such grouping the children of lower ability will lose by the absence of the stimulating influence of the brighter children. But this argument is ill founded. In the first place, in the traditional school, the brightest children are so superior to the dullest children that the latter cannot hope to compete at all. Their inferiority is multiplied in their own eyes because of the display of the bright children's excelling ability. On the other hand, if the dull child is with those more nearly of his level of intelligence he is not so often discouraged. Moreover, just because there are others in his class of like ability his lessons necessarily are far more easily within his reach. Consequently he can learn more and feel happier in doing so than while in the traditional class.

What of the Single Class School Grade?

In case there is only one class to a grade in a given building or a school system, obviously there would be two or more ability sections within that class selected just as if they were separate ability classes of the same grade.

Intelligence Ratings in Country Schools

In the ungraded district school the problem of intelligence classification grows more complex. Although the teacher cannot well increase her groupings, if she has several grades, she can find early those of marked ability and encourage them, and stimulate them to high activity. Likewise she can find in the ratings reasons why certain children have failed to make progress in spite of great care and effort on her part. Just because it applies to all ages and grades The Myers Mental Measure is well adapted to ungraded rural schools. Within about 25 minutes all the children of such a school can be tested as a single group. A number of entire counties have been surveyed by it. For the same reason this test has proved, in the several states where it is being used, to be very well suited for use in corrective and penal institutions in classifying learners into ability groups for school training.

Advantages of the Use of Intelligence Tests to the Supervisor and School Administrator

By the aid of intelligence tests the administrator can evaluate his school product much more accurately than he can without their use. If, for example, he finds, by means of the best standardized educational measurements that one class or one school is superior or inferior to another class or school how is he to know the cause of such disparity? The tendency often used to be to assume that the difference was a matter of the schools and in the last analysis a matter of the teachers. But by the use of intelligence tests it has been found that such differences are often attributable to differences in native abilities of the children compared. When children are divided into ability groups within each grade the results obtained by each group, of course, can be expected to be in proportion to the abilities of the several groups. Any variation can, for the most part, be located in the teaching. Therefore, by knowing the relative intelligence rating of the several classes of a given grade the supervisor and administrator can be able to evaluate pretty accurately the relative merits of the teachers of that grade. This obviously promotes fairness to the teachers.

Advantages to the Teacher

By promoting fairness to the teacher from the supervisor and school administrator, teaching morale and consequent efficiency will inexorably heighten. Moreover, the teacher can better evaluate her own efforts by checking up the school progress of each child with his intelligence rating and by comparing his class rating and class achievement with those of other classes. She is always eager to know whether this child or that is getting along as rapidly as he should and sometimes suffers grave anxiety about certain children doing very poorly in school. An intelligence test reveals to her that such children usually are low in abilities and consequently should not be expected to make much progress.

On the other hand, she may also discover that a few such children have considerable ability and as a result she will set about with renewed effort and varied methods to develop them. At any rate the information from an intelligence test, which as a rule, is more reliable than her judgment, will greatly decrease her anxieties, increase her efficiency and add to her encouragement.

Advantages to the Industrial Employer

Intelligence ratings aid the employer to pick out his potentially ablest men early. Especially is this true where the type of work is such as to admit and develop unskilled persons, from whom it is desired to pick foremen and other leaders. Because it is independent of school experience and applies to all ages The Myers Mental Measure works particularly well with unskilled laborers.

General Directions to Examiners

1. Up to and including the fourth grade, all children should be tested in their regular class rooms. In case of overcrowded rooms the proper number of children should be removed therefrom. These overflow children from several grades can be assembled in any available room to be tested together. In like manner those children absent on the day of the test and those entering school subsequent thereto can, on a later date, all be assembled for the test regardless of grade. From the fifth grade upward as many as can be comfortably seated at appropriate writing places (preferably in every other seat) in the assembly hall, regardless of the number of grades included, can be tested at one time.

2. The room should be as quiet as possible, devoid of disturbances. The door should be closed. The teacher or any other person should not be allowed to walk about the room looking over the children's papers while they are at work.

3. The desk should be cleared.

4. Each child should be provided with two sharp pencils.

5. The children should be made to feel at ease.

6. Children, as well as adults, should know from the outset, by the examiner's attitude, that no fooling will be tolerated.

7. Let the examiner proceed in a quiet but effective manner with a voice in moderate pitch, giving the directions slowly, clearly, and distinctly.

8. The examiner should avoid undue haste or anything that will annoy or excite those to be examined. Neither should he pause unduly between tests.

9. There should be strict precaution against copying.

10. Below the fifth grade, age records, to be accurate, should be got from the school office.

11. Because the first grade is the hardest to test it is best for the examiner to begin with about the third grade, then proceed downward to the first grade, and then upward from the fourth grade. It is never well to test from the highest grades downward because of coaching dangers.

12. The examiner must be thoroughly familiar with the directions, so that he can accurately read them with ease. There is no objection to memorizing them if they are learned verbatim. Any variation, however, by addition to the specific directions of the test, subtraction from them,

or modification, will render the ratings of questionable accuracy.

13. There should be as few examiners as possible to test a given system in the same day or half day.*

All examiners of a given system should be coached by the superintendent, or a competent person designated by him, in giving the test in exact accordance with directions.

14. Time should be recorded with great precision, exactly to the second, and from the word "Go." A stop watch is essential. In the absence of a good stop watch, one with a second hand may be substituted, if read with great accuracy. No one should presume to *count* seconds without a watch.

15. Inquiries by the children or adults at the close of the test in respect to correct answers should unoffensively be ignored.

16. The scoring can be done by clerical aides or anyone able to follow the directions accurately; but the directions for scoring must be followed to the letter regardless of what may *seem* to the scorer to be right or wrong. As a rule a teacher should not score the papers of her own children. In case the teachers do the scoring it is recommended that, in any large school building, teachers be divided into squads of four, with each one of the squad responsible for a page. All combining and adding of scores should be checked up by a second individual.

* Supt. W. H. Kirk of East Cleveland had all his 3,092 elementary children tested in the same half day.

THE MYERS MENTAL MEASURE

Directions for Giving the Tests

"We are going to give you some papers. We will lay them on your desk this side up. (Examiner demonstrating.) You may look at the pictures on the first page as much as you wish but don't turn the pages.

"Now write your name at the top of the page. In the next space write the number of years you were old at your last birthday. (Examiner pausing until all have finished.) Now count the number of months since your last birthday and put that number in the next space. In the next space write your grade. (This direction can be given only to children above the fourth grade: Age records for children below the fourth grade should be got from the school office.)

"I want you to do some things for me. Some of them will be very easy and some will be hard. You will not be able to do all of them, but do the very best you can.

"I am going to ask you to draw some lines and make some marks. Listen closely to what I say. Don't ask any questions and don't look at anybody's paper but your own."

Test 1

(In giving directions it is safe to assume that first and second grade children can go no farther than row seven, and third and fourth grade children no farther than row nine on this page. All other pages given just as to upper grades.)

"Look at your paper. Just below where you have written your name there are several rows of pictures. First you will be asked to do something with the row with the girl and the flower, and then something with the alligator, toad, and eagle, and then something with the row of fruit, then something with the row beginning with a cat, and then the row beginning with a soldier; and so on down the page, one row at a time.

"When I say 'Stop,' stop right away and hold your pencil up so. (Examiner demonstrating.) Don't put your pencils down to your paper again until I say 'Go.'

(For the first and second grades—"Now let me see if you know what I mean. Pencils up! Go! Pencils up! Go.") "Listen carefully to what I say, do just as you are told to do. Remember, wait until I say 'Go'.

"Now pencils up. Look at the row with the girl and the flower. (E. pause here.) Draw a line from the girl's hand to the flower. Go! (Allow not over 5 seconds.)

(With Kindergarten and first grade instead of saying "Look at the row, etc." say "Put your finger on the row.")

"Pencils up! Look at the row with the alligator. Make a cross *above* the alligator and another cross *below* the toad. Go! (Allow not over 5 seconds.)

"Pencils up! Look at the row of fruit. Draw a ring around the apple and make a cross *below* the *first* banana. Go! (Allow not over 5 seconds.)

"Pencils up! Look at the row beginning with a cat. Draw a line from the cat's paw that shall pass *below* the duck and fish to the mouth of the rabbit. Go! (Allow not over 5 seconds.)

"Pencils up! Now look at the line beginning with a soldier. Draw a line from the tip of the soldier's gun to the tip of the sword that shall pass *below* the drum and *above* the boat. Go! (Allow not over 5 seconds.)

"Pencils up! Look at the row with the table. Make a cross *below* the comb and then draw a line from the handle of the pitcher *above* the clock and shoe to the top of the barrel. Go! (Allow not over 10 seconds.)

"Pencils up! Look at the square and circle. Make a cross that shall be in the circle but not in the square and make another cross that shall be in the circle and in the square and make a third cross that shall not be in the circle and not be in the square. Go! (Allow not over 10 seconds.)

"Pencils up! Look at the row with the two pails. Draw a short straight line below the middlesized tree, draw a circle around the cup and then draw a line from the top of the smallest tree to the top of the largest tree. Go! (Allow not over 15 seconds.)

(N.B. *Examiner*—In reading don't pause at the word CUP as if ending a sentence.)

"Pencils up! Look at the row beginning with a duck. Draw a line from the tail of the duck *above* the fox to the feet of the turkey and then continue the line *below* the tree to the nose of the Indian and back to the ear of the fox. Go! (Allow not over 15 seconds.)

(N.B. *Examiner*—In reading don't pause at the word TURKEY as if ending a sentence.)

"Pencils up! Now look at the row beginning with a pear. Cross out every fruit that is next to a knife but *not* next to an animal or book and make a cross *above* every fruit that *is* next to a book. Go! (Allow not over 15 seconds.)

"Pencils up! Look at the line beginning with a spider. Make a cross *below* every spider that is next to a butterfly and make a cross *above* every butterfly that is next to a spider or a toad but not next to an elephant. Go! (Allow not over 20 seconds.)

"Pencils up! Look at the row of circles. Draw a line from the first circle to the last circle that shall pass below the second and fourth circles and above the third and fifth circles—make a cross *in* the first circle, a cross above the fourth circle and anything *except* a cross in the last circle. Go!" (Allow not over 20 seconds.)

(Be sure the page is not turned until demonstration chart for Test 2 is used.)

Test 2

"Now look at your small paper like this. (E. holding one in his hand.) Here are three pictures—a duck, a dishpan, and a shoe, but none of them are finished. Who can tell me how to finish the duck? (After some child has given answer:) Now with your pencil put the eye in the duck. Who can tell me how to finish the dishpan? Draw the handle on the dishpan." (Proceed in like manner with the shoe.)

"Now turn over your large sheet this way (E. folding so that only page 2 is visible) to the picture of the coffee pot. Look at my paper. (E. holding up proper test sheet.)

Here are a number of pictures. None of them are finished. Each one has just one thing missing. Work like this (E. demonstrating by pointing to each picture from left to right in the first three rows). Finish as many as you can before I say 'Stop.' Work fast." (Total time 4 minutes.)

Test 3

"Take this small paper again and turn it over to the side with the tree at the top. Now look at my paper. (E. demonstrating by slowly pointing from left to right of each row.) See, it's in rows. Look at your paper like this. In the first row on your paper there are two things, only two, alike in some way. Who can tell me what they are? (Pause for response.)

"Pencils up! We will draw a short line under each of the trees. Go! Pencils up! In the next row there are three things, only three, alike in some way. What are they? Draw a line under each flower. Go! Pencils up! (Proceed in the same way for third row, always giving ample time for every child to finish. Before doing more the experimenter makes sure every child has properly marked each item of the demonstration sheet, helping any child who has not succeeded.)

"Now turn over your large sheets. You have a picture of a log at the top. Now don't say anything. (With small children examiner gesturing with hand over mouth.) Now look at my paper. (E. demonstrating as for chart.) See, the pictures are in rows. In each of these rows there are a number of things alike in some way. Pencils up. Look at the row beginning with a log. In this row there are two things, only two, alike in some way. Draw lines under them. Go! (Allow not over 5 seconds for any row in test 3.)

"Pencils up! In the next row beginning with a robin there are two things, just two, alike in some way. Draw lines under them. Go!

"Pencils up! In the row beginning with the square there are two things, just two, alike in some way. Go!

"Pencils up! In the row beginning with the oyster there are three things, just three, alike in some way. Go!

"Pencils up! In the row beginning with the shoes there are three things alike in some way. Go!"

"Pencils up! In the row beginning with the umbrella there are three things. Go!

"Pencils up! In the row beginning with the piano there are four things. Go!

"Pencils up! The next row begins with a ladder. In it there are four things. Go!

"Pencils up! In the row beginning with the fish there are four things alike in some way. Go!

"Pencils up! In the last row there are five things. Go! Pencils up!"

Test 4

"Turn your page this way (E. demonstrating). You have the boy and grapes at the top.

"In each row on this page there are four things, only four, alike in some way. Draw lines under them as you did before. Begin with the first row. When you get that row done do the next row, then do the next row and then the next row. Whole page. (E. demonstrating by gestures on the page.) Go!" (Total time 5 minutes.)

Answers are considered right or wrong. No partial credits are given. A good scheme is to have for each scorer a correctly marked test sheet with each unit so numbered as to indicate credits assigned.

Test 1.—Direction Test.

No credit is given for any answer in which more is done than is required.

Underlining in place of crossing out or a straight line instead of a cross is wrong.

Credits Given.—

To row 1—one point; to rows 2, 3, 4, 5—two points each; to rows 6, 7, 8—three points each; to rows 9, 10—five points each; and to rows 11, 12—ten points each.

Test 2.—Picture Completion Test.

Any way of clearly indicating missing part receives credit. So long as proper missing part is given, additional parts do not make answer wrong.

Credits Given.—

To coffee pot, saw, tree, stove and telegraph—one point each; to clothes on line and man at mirror—two points each; to all other pictures—five points each.

Note.—Parts missing—coffee pot, handle; saw, teeth; tree, axe; stove, pipe; telegraph, wire or wires; man at mirror, glasses (one glass indicated is counted); clothes on line, clothespins on line; wringer, clothes coming from wringer; candle, shadow by spool; blocks, shadow lengthened or two blocks added; teakettle, steam from spout or cover; house, smoke from chimney; ocean, waves on water; boy, tracks on snow.

Test 3.—First Common Elements.

Each row counts one point.

NOTE—Correct common elements in order of rows. Dogs, birds, circles, weapons, footwear, things with four legs, musical instruments, animates or inanimates, things that give light or things to eat, squares with dot in center and above.

Test 4.—Second Common Elements.

To all rows up to 9—one point each; to rows 9, 10, and 11—three points each; to rows 12, 13, 14, and 15—five points each.

NOTE.—Correct common elements in order of rows. Boys, animals, toys, means of travel, things made of metal, things to eat or things not good to eat, flying things, things found in the kitchen, things of glass, things of wood, measures, bipeds, harmful animals, scenes of summer, deeds of kindness.

NORMS

BY GRADES REGARDLESS OF CHRONOLOGICAL AGES

No. cases	45	1410	1447	1721	1630	1922	1495	1610	1550	311	249	160	810	493
Grades	K	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	College
Median raw score	6	13	19	27	34	39	44	48	52	56	59	62	63	69
Median Intelligence ratio	.	.15	.20	.24	.28	.29	.30	.30	.31					

By Chronological Ages Regardless of Grades

Number cases	516	1191	1237	1440	1304	1318	1169	1204	928	445	88
Chronological age (Mental age)	6	7	8	9	10	11	12	13	14	15	16
Median raw score	10	16	23	29	35	39	44	48	50	49	50
Median intelligence ratio	.12	.18	.24	.26	.28	.28	.30	.30	.29	.28	.26

1. These grade norms are for the end of the school year. For September they would be almost a grade less.

2. In interpreting the scores by ages it should be remembered that only the ratings of the elementary school children for each year are included. From the twelfth year onward the brightest children have passed from the grades to the high school. Hence the relatively lower ratings for the upper ages are as they should be.

3. From the table entitled "Chronological Ages Regardless of Grades" one reads, for example, "the median child 6 years old scores 10 points; the median child 10 years old scores 35 points." Or reading upwards, "the child scoring 10 points has a Mental Age of 6 years, the child scoring 35 points has a Mental Age of 10 years."

4. Intelligence ratio equals raw score divided by chronological-age-in-months. Intelligence ratio does not mean much above the high school and perhaps is not worth computing above the eighth grade.

5. For comparing groups use raw score; for classifying learners use intelligence ratio.