

1916

## Grading Intelligence by Years and by Points

Warren W. Coxe

Follow this and additional works at: <https://scholarlycommons.law.northwestern.edu/jclc>

 Part of the [Criminal Law Commons](#), [Criminology Commons](#), and the [Criminology and Criminal Justice Commons](#)

---

### Recommended Citation

Warren W. Coxe, Grading Intelligence by Years and by Points, 7 *J. Am. Inst. Crim. L. & Criminology* 341 (May 1916 to March 1917)

This Article is brought to you for free and open access by Northwestern University School of Law Scholarly Commons. It has been accepted for inclusion in *Journal of Criminal Law and Criminology* by an authorized editor of Northwestern University School of Law Scholarly Commons.

## GRADING INTELLIGENCE BY YEARS AND BY POINTS.<sup>1</sup>

WARREN W. COXE.<sup>2</sup>

The Binet-Simon Scale for the measurement of intelligence has become the subject of much professional, as well as popular, criticism. While the scale is being used more and more widely, yet the results are more often discredited than ever before. This paper has been written to review the published results of giving the scale, to examine criticisms which have been made of it and to compare it with the Yerkes Point Scale.

The incident which was originally responsible for the formulation of the Binet-Simon Scale was the order from the Minister of Public Instruction of Paris to the effect that all entrants into the schools for subnormals must be given an examination to test their deficiency. Professors Binet and Simon had been carrying on extensive experiments with tests for children, and upon them devolved the task of constructing the scale.

The first scale<sup>3</sup>, 1905, consisted of thirty tests, arranged in order of difficulty. By its use, the examiner was enabled to classify defectives, but could not determine the age levels. After using these tests for three years, Binet and Simon constructed the Scale of 1908.<sup>4</sup> All we know about the methods used in constructing the scale is that the authors drew from their experience, putting tests at the different ages which the majority of children could answer. Systematic experimentation for the purpose of constructing a scale seems to have been lacking.

The Scale of 1908 increased the number of tests and grouped them by ages, differing from the scales we are using in that the number of tests for each age was not always the same—year thirteen had three tests and year seven had eight. Each test in year seven would thus have a value of one-eighth of a year, while each test in year

---

<sup>1</sup>Contributed by Dr. H. C. Stevens, Director of the Psychopathic Laboratory, the University of Chicago.

<sup>2</sup>The University of Chicago.

<sup>3</sup>A. Binet and Th. Simon, "Méthodes nouvelles pour diagnostic du niveau intellectuel des anormaux. *L'Année psychologique*. 1905, 11:191-244.

Translation by G. M. Whipple in *Manual of Mental and Physical Tests*. Warwick & York. 1910.

<sup>4</sup>Alfred Binet and Th. Simon, "Le développement de l'intelligence chez enfants." *L'Année psychologique*. 1908, 14:1-94.

thirteen would have a value of one-third of a year; yet in calculating age every test was supposed to have a value of one-fifth of a year. The subject was considered past an age when he answered correctly all but one of the tests for that age, and was given one year additional credit for every five tests answered correctly above this level. Some examples will show what inaccuracies this led to. A child answering all the tests through twelve years and two tests in year thirteen would be called thirteen, but had he passed all but one in year twelve, and all but one in year thirteen, he would be considered only twelve and two-fifths years of age. The failure in this case to respond to one test made a difference of more than half a year. Another child, answering all the tests in year six, and five in year seven, would, by one method of counting, be seven years old, and by another method it would be necessary for him to answer two more tests to be called seven.

The 1911 Scale<sup>5</sup> improved the manner of counting by putting five tests in each year, and most revisions have followed that plan. A notable exception is the new Stanford Revision,<sup>6</sup> in which there are six tests for each year, thus making it possible to figure mental age in months rather than in fifths of years, and consequently easier to compare with chronological age. The inaccuracies pointed out in the previous paragraph are also avoided.

But the 1911 Scale does not seem to have been the result of any systematic investigation, the authors making the scale more difficult in the lower part and easier in the upper part, in order, apparently, to meet rising objections. Their replacement of the tests has not proven in accord with experimentation. Because of this careless revising, Wallin prefers to use the 1908 Scale until we have more facts upon which to base a change.<sup>7</sup> The actual changes which were made are not in accord with the data obtained by Goddard from giving the tests to two thousand children.<sup>8</sup> This is the most extensive application of the scale which has ever been made, and involved the examination of children of an entire school system. The Scale of 1908 was used. The six-year test, in which the child is asked to show the right hand and left ear, is placed in year seven in the 1911 Scale. Goddard

<sup>5</sup>Alfred Binet, "La mesure developpement de l'intelligence chez les jeunes enfants". *Bull. de la Societe libre pour l'Etude psychologique de l'Enfant*. 1911, 10 and 11; 187-248.

<sup>6</sup>A complete guide is soon to be published. Record blanks can be obtained from the Stanford University Press, Stanford University, California.

<sup>7</sup>J. E. W. Wallin, "Re-averments Respecting Psycho-clinical Norms and Scales of Development". *Psychological Clinic*, 1913, 7:89-96.

<sup>8</sup>H. H. Goddard, "Two Thousand Children Measured by the Binet-Simon Measuring Scale of Intelligence". *Pedagogical Seminary*. 1911, 18:232-259.

found that it was not too hard for the pupils of year six, eighty-one per cent passing the test. Binet changed the tests of weight discrimination from the ninth year to the tenth, while Goddard found that eighty per cent passed the test in the ninth year, thus making the change needless. Another case is that of changing the test in which the child must recognize the various pieces of money, from the tenth year to the ninth. Goddard found that ninety-five per cent of the ten-year-olds and sixty-eight per cent of the nine-year olds passed the test. If we accept Goddard's standard that a test is correctly placed if passed by seventy-five per cent of the subjects, then this test should not have been changed.

Furthermore, the 1911 Scale is very much inferior to its predecessor, in that tests are altogether lacking for certain ages, namely, eleven, thirteen and fourteen. This seriously affects the scoring. A subject answering all the tests for year ten and three for year twelve would be ten and three-fifths years of age. It would never be possible for him to be between eleven and twelve years old. Were there some means provided to weight the tests for twelve and also for fifteen, the trouble would be partly obviated, but, as designed, one feels very uncertain of results in the upper part of the scale.

Table II, in which the positions given the tests by the different revisers is shown, reveals the fact that there is no general agreement upon the tests which should be included in any particular age. This divergence of opinion is much more marked in the upper years than in the lower. For year ten, twenty-two different tests have been suggested and a like-number for year twelve, as shown in Table I. The disagreement in tests is also a disagreement as to the mental functions which should be tested. One would expect that an examination of the tests included under an age would give an idea of the mental life of the child at that age. But if one chooses any age in the upper part of the scale in Table I, and follows across the sheet, noting the tests which appear under the various revisions, he will find that little idea can be obtained concerning the mental life of the child. The revisers disagree too widely. In fact, it seems that no set of five tests can give an idea of the child's mental life, and therefore a scale made up like this one is fundamentally wrong. It seems, therefore, that one ought not to be satisfied with a scale which tests only a few mental functions, but needs one which will tell the degree of development of each of the more important functions for each age.

TABLE I.

Age	BINET-SIMON TESTS FOR 1908.	BINET-SIMON TESTS FOR 1911.
3	Points to mouth, eye and nose. Repeats 6-syllabled sentences. Repeats 2 digits. Enumerates parts of pictures. Knows family name.	Points to mouth, eye and nose. Repeats 6-syllabled sentences. Repeats 2 digits. Enumerates parts of pictures. Knows family name.
4	Names objects shown. Repeats 3 digits. Knows sex. Compares 2 lines.	Names objects shown. Repeats 3 digits. Knows sex. Compares 2 lines.
5	Repeats 10-syllabled sentences. Counts 4 pennies. Copies square. Compares 2 weights. Divided rectangle.	Repeats 10-syllabled sentences. Counts 4 pennies. Copies square. Compares 2 weights. Divided rectangle.
6	Aesthetic comparison. Tells morning from afternoon. Defines concrete objects by use. Executes triple command. Repeats 16-syllabled sentences. Knows right hand and left ear.	Aesthetic comparison. Tells morning from afternoon. Defines concrete objects by use. Copies diamond. Counts 13 pennies.
7	Describes pictures. Repeats 5 digits Counts 13 pennies. Copies diamond. Knows number of fingers. Copies "The little Paul." Knows coins from sou to franc. Recognizes omissions in drawings.	Describes pictures. Executes triple command. Knows right hand and left ear. Adds 3 single and 3 double sous. Names 4 chief colors.
8	Counts from 20 to 1. Compares 2 objects from memory. Writes from dictation: "The sun shines." Names 4 chief colors. Adds 3 single and 3 double sous. Recalls 2 items from passage read.	Counts from 20 to 1. Compares 2 objects from memory. Repeats 5 digits. Recognizes omissions in drawings. Names date

## WALLIN'S REVISION.

Points to eye, nose, mouth,  
hair.  
Repeats 6-syllabled sentences.  
Repeats 2 digits.  
Enumerates parts of pictures  
Knows family name.

Knows objects shown.  
Repeats 3 digits.  
Knows sex.  
Compares two lines.

Repeats 10-syllabled sentences.  
Counts 4 pennies.  
Copies square.  
Compares 2 weights  
Divided rectangle

Aesthetic comparison. Knows  
age  
Tells morning from afternoon.  
Defines objects by use.  
Executes triple command.  
Repeats 16-syllabled sentences.  
Knows right hand and left  
ear.

Describes pictures.  
Repeats 5 digits.  
Counts 13 pennies.  
Copies diamond  
Knows number of fingers.  
Copies "See little Paul."  
Knows coins from penny to  
quarter.  
Recognizes omissions in draw-  
ings.

Counts from 20 to 1.  
Compares 2 objects from mem-  
ory.  
Writes from dictation.  
Gives value of 3 1c and 3 2c  
stamps.  
Knows colors.  
Remembers 2 ideas from pas-  
sage.

## GODDARD'S REVISION.

Points to eyes, hair, nose, ears.  
Repeats 6-syllabled sentences.  
Repeats 2 digits.  
Enumerates parts of pictures.  
Knows family name.

Knows objects shown.  
Repeats 3 digits.  
Knows sex.  
Compares two lines.

Compares 2 weights.  
Copies square.  
Divided rectangle.  
Counts 4 pennies.

Knows right and left.  
Repeats 16-syllabled senten-  
ces.  
Aesthetic comparison.  
Defines by use.  
Triple command.  
Knows age  
Knows morning from after-  
noon

Notes omissions in pictures.  
Knows number of fingers.  
Copies sentence.  
Copies diamond.  
Repeats 5 digits.  
Describes pictures.  
Counts 13 pennies.  
Names 4 coins.

2 memories from reading.  
Adds small coins.  
Knows colors.  
Counts 20 to 1.  
Writes from dictation.  
Compares 2 objects.

Age	BINET-SIMON TESTS FOR 1908.	BINET-SIMON TESTS FOR 1911.
9	Definitions superior to use. Makes change, 80 centimes from 1 frank. Names date. Recalls 6 items from passage read. Recites days of the week. Arranges 5 weights	Definitions superior to use. Makes change, 80 centimes from 1 frank. Recites months. Knows all coins. Solves 3 easy problem-ques- tions.
10	3 words in 2 sentences. Solves 5 hard problem-ques- tions. Recites months. Knows all coins. Solves 3 easy problem-ques- tions.	3 words in 2 sentences. Solves 5 hard problem-ques- tions. Arranges 5 weights. Criticizes 'absurdities.' Copies drawings from memory.
11	3 words in 1 sentence. Defines abstract terms. Rearranges sentences. Names 60 words in 3 minutes. Criticizes 'absurdities.'	
12	Explains pictures. Repeats 7 digits. Repeats 26-syllabled sentences. 3 rhymes in 1 minute. Completion test.	3 words in one sentence. Defines abstract terms. Rearranges sentences. 60 words in 3 minutes. Resists line suggestion.
13	Cut and folded paper test. Juxtaposed triangles. Distinguishes abstract terms.	
14		
15		Explains pictures. Repeats 7 digits. Repeats 26-syllabled sentences. Makes 3 rhymes in 1 minute. Completion test.

WALLIN'S REVISION.

Definitions better than use.  
 Makes change 4c from 25c.  
 Remembers 6 ideas from pas-  
 sage.  
 Knows days of week.  
 Arranges 5 weights.  
 Gives date.

3 words in 2 sentences.  
 Solves 5 hard problem-ques-  
 tions.  
 Solves 3 hard problem-ques-  
 tions  
 Gives months.  
 Knows all coins.  
 Repeats 6 digits.

3 words in one sentence.  
 Defines abstract terms.  
 Rearranges sentences.  
 Criticizes absurdities.  
 60 words in 3 minutes.

Repeats 26-syllabled sentence.  
 Problem of diverse facts.  
 3 rhymes in 1 minute.  
 Repeats 7 digits.

Cut and folded paper.  
 Juxtaposed triangles.  
 Differences between abstract  
 terms.

WHIPPLE'S REVISION.

Knows date.  
 Gives days of week.  
 Makes change 4c from 25c.  
 Definitions superior to use.  
 6 memories from reading.

Names months.  
 Knows all coins.  
 3 words in 2 sentences.  
 Hard problem-questions.  
 Easy problem-questions.

Criticizes absurdities.  
 3 words in 1 sentence.  
 Gives 60 words in 3 minutes.  
 Defines abstract terms.  
 Rearranges sentences.

Repeats 7 digits.  
 Gives 3 rhymes.  
 Repeats 26-syllabled sentence.  
 Problem of diverse facts.

Cut and folded paper.  
 Juxtaposed triangles.  
 Differences between abstract  
 terms.

Age	BINET-SIMON TESTS FOR 1903.	BINET-SIMON TESTS FOR 1911.
Adult		Cut and folded paper test. Juxtaposed triangles. Distinguishes abstract terms. Distinguishes king and president. Gives sense of selection read.
16		
18		
Age	GODDARD'S REVISION.	HUEY'S REVISION.
3	Points to nose, eyes and mouth. Repeats 6-syllabled sentences. Repeats 2 digits. Enumerates objects in pictures Knows family name.	Points to eyes, nose and mouth or pictures of these. Repeats 2 digits. Repeats 6-syllabled sentences. Enumerates objects in pictures. Knows family name.
4	Knows sex. Names objects shown. Repeats 3 digits. Compares 2 lines.	Knows sex. Names objects shown. Repeats 3 digits. Compares 2 lines.
5	Counts 4 pennies. Copies square. Compares 2 weights. Divided rectangle. Repeats 10-syllabled sentences.	Counts 4 pennies. Copies square. Compares 2 weights. Divided rectangle. Repeats 10-syllabled sentences.
6	Aesthetic comparison. Tells morning from afternoon. Defines objects by use. Executes triple command. Knows right hand and left ear.	Aesthetic comparison. Tells morning from afternoon. Defines objects by use. Executes triple command. Knows right hand and left ear.

WALLIN'S REVISION.

WHIPPLE'S REVISION.

PROPOSED SYSTEM OF TERMAN  
AND CHILDS.

KUELMANN'S REVISION.

Names key, knife and coin.  
Enumerates parts of pictures.  
Repeats 3 digits.  
Knows sex.  
Compares 2 weights.  
Problem questions.

Enumerates objects in picture.  
Points to ears, eyes, mouth,  
hair.  
Knows family name.  
Repeats 6-syllabled sentence.  
Repeats 2 digits.

Counts 4 pennies.  
Divided rectangle.  
Copies square.  
Aesthetic comparison.  
Defines by use.

Knows sex.  
Names objects shown.  
Repeats 3 digits.  
Compares lines.  
Discrimination of forms.

Tells morning from afternoon.  
Names 4 chief colors.  
Executes triple command.  
Repeats 13-syllabled sentences.  
Vocabulary index.

Counts 4 pennies.  
Copies square.  
Compares 2 weights.  
Divided rectangle.  
Repeats 10-syllabled sentence.

Knows right hand and left  
ear.  
Knows number of fingers.  
Counts 13 pennies.  
Repeats 4 digits.  
Solves 3 easy problem-ques-  
tions.  
Vocabulary index.

Knows right hand, left ear,  
right eye.  
Aesthetic comparison.  
Tells morning from afternoon.  
Defines by use.  
Executes triple command.

Age	GODDARD'S REVISION.	HUEY'S REVISION.
7	Describes pictures. Names 4 chief colors. Counts 13 pennies. Notes omissions in drawings. Copies diamond.	Describes pictures. Names 4 chief colors. Counts 13 pennies. Notes omissions in drawings. Copies diamond.
8	Counts from 20 to 1. Compares 2 objects from memory. Repeats 5 digits. Gives days of the week. Adds 3 1c stamps and 3 2c stamps.	Counts from 20 to 1. Compares 2 objects from memory. Repeats 5 digits. Names days of week. Adds 3 1c stamps and 3 2c stamps.
9	Definitions superior to use. Makes change. Gives date. Repeats months. Arranges 5 weights.	Definitions superior to use. Makes change 4c from 25c. Gives date. Repeats months. Arranges 5 weights.
10	3 words in 2 sentences. Comprehends easy questions. Draws design from memory. Knows money. Repeats 6 digits.	3 words in 2 sentences. Solves 5 hard problem-questions. Solves 3 hard problem-questions. Copies design. Knows all coins.
11	Criticizes 'absurdities.' Gives 60 words in 3 minutes. 3 words in 1 sentence. Rearranges sentences. Gives 3 rhymes.	3 words in 1 sentence. Rearranges sentences. Gives 60 words in 3 minutes. Criticizes 'absurdities.' 3 rhymes in 1 minute.
12	Repeats 7 digits. Defines abstract terms. Repeats 26-syllabled sentences. Completion test. Resists line suggestion.	Repeats 26-syllabled sentences. Problem of diverse facts. Resists line suggestion. Repeats 7 digits. Defines abstract terms.

---

 PROPOSED SYSTEM OF TERMAN  
AND CHILDS.
 

---

Describes pictures.  
Copies diamond.  
Names 4 coins.  
Recognizes omissions in drawings.  
Repeats 14 to 16-syllabled sentences.  
Vocabulary index 14%.

---

Counts from 20 to 1.  
Compares 2 objects from memory.  
Writes from dictation, "The pretty little girl."  
Repeats 5 digits.  
Vocabulary index 18%.  
Ball and field score 2

---

Names date.  
Arranges 5 weights.  
Recalls 4 items from reading.  
Adds 3 1c and 3 2c stamps.  
50 words in 2 minutes.  
Vocabulary index 23%.  
3 hard problem-questions.  
Completion test.

---

3 words in 1 sentence.  
Repeats 6 digits.  
Makes change 4c from 25c.  
Vocabulary index 26%.  
Completion test Score 20.  
Ball and field Score 3.  
Interprets fables.  
Copies design.

---

Solves 5 arithmetic problems.  
Solves 4 hard problem-questions  
Completion test Score 25.  
Vocabulary index 30%.  
Interprets fables.  
Sees points to five jokes.

---

Rearranges sentences.  
Notes 4 of 5 absurdities.  
Recalls 7 items in passage read.  
Repeats 26-syllabled sentences.  
Resists line suggestion.  
Vocabulary index 36%.

---



---

 KUEHLMANN'S REVISION.
 

---

Describes pictures.  
Names 4 pieces of money.  
Knows number of fingers.  
Recognizes omissions in drawings.  
Repeats 5 digits.

---

Counts from 20 to 1.  
Compares 2 objects from memory.  
Names months.  
Adds 3 1c and 3 2c stamps.  
Copies diamond.

---

Definitions superior to use.  
Makes change.  
Gives date  
Knows coins.  
Arranges weights.

---

3 words in 2 sentences.  
Comprehends easy sentences.  
Draws design from memory.  
Counts dots.  
Form board puzzle.

---

Criticizes 'absurdities.'  
Names 60 words in 3 minutes.  
Defines abstract words  
Rearranges sentences.  
Gives numbers to parts of form.

---

Repeats 7 digits.  
Gives 3 rhymes.  
Repeats 24-syllabled sentences.  
Completion test.  
Resists line suggestion.

---

Age	GODDARD'S REVISION.	HUEY'S REVISION.
13		
14		
15	Interprets pictures. Interchanges hands of clock. Code test. Writes opposites of simple words.	Interprets pictures. Interchanges hands of clock. Code test. Writes opposites of simple words.
Adult	Cut and folded paper. Juxtaposed triangles. Distinguishes abstract terms. Distinguishes president and king. Gives sense of selection.	Cut and folded paper. Juxtaposed triangles. Distinguishes abstract terms. Distinguishes president and king. Gives thought of selection.
16		
18		

PROPOSED SYSTEM OF TERMAN  
AND CHILDS.

KUHELMANN'S REVISION.

Repeats 7 digits.  
Interprets fables.  
Vocabulary index 42%.  
Arithmetic reasoning.  
Completion test 36%.  
Problems of fact.

Reverses clock hands.  
Interprets fables.  
Interprets pictures.  
Vocabulary index  
Completion test  
Code test.

Reversed triangle.  
Distinguishes president and  
king.  
Ball and field Score 4.  
Completion test.  
Gives sense of selection.

Reverses clock hands.  
Juxtaposed triangles.  
Distinguishes between ab-  
stract terms.  
Summarizes passage from  
memory.  
Cut and folded paper test.

Age	BOBERTAG'S ARRANGEMENT.	STANFORD REVISION.
3	Repeats 10-syllable sentences. Counts 4 pennies. Copies square. Defines by use. Repeats 4 digits.	Points to parts of head. Repeats 6-syllabled sentence. Repeats 3 digits. Enumerates parts of pictures. Knows name. Knows sex. Names familiar objects.
4	Aesthetic comparison. Executes triple command. Repeats 16-syllabled sentences. Divided rectangle. Describes pictures.	Compares lines. Discriminates forms. Counts 4 pennies. Copies square. Problem-questions. Repeats 4 digits. Repeats 12-syllabled sentence.
5	Repeats 5 digits. Copies diamond. Knows coins from 1 Pf. to 1 Mk. Recognizes omissions in drawings. Knows right hand and left ear.	Compares 2 weights. Knows colors. Aesthetic comparison. Defines better than use. Divided rectangle. Triple command. Gives age.
6	Counts 20 to 1. Compares 2 objects from memory. Names 4 chief colors Solves 3 easy problem-questions. Gives 1 point from newspaper reading.	Knows right and left. Repeats 16-syllabled sentences. Notes omissions in faces. Counts 13 pennies. Easy problem-questions. Knows 4 coins. Knows morning from afternoon.
7	Ball and field Score 2. Counts 20 to 1. Problem-questions. Gives similarities. Defines superior to use. Writes from dictation. Vocabulary index. Knows 6 coins.	Knows number of fingers. Describes pictures. Repeats 5 digits. Ties bow knot. Compares 2 objects. Copies diamond. Names days. Repeats 3 digits backwards.
8		

Age	BOBERTAG'S ARRANGEMENT.	STANFORD REVISION.
9	<p>Defines by superordinates.            Makes change 80 Pf. from 1 Mk.            Explains pictures with help.            Names date.            Arranges 5 weights.</p>	<p>Knows date.            Arranges 5 weights.            Makes change.            Repeats 4 digits backwards.            Adds 3 1c and 3 2c stamps.            3 words in 1 sentence.            3 rhymes.            Names months.</p>
10	<p>3 words in 2 sentences.            Knows all German coins.            Reports 6 points in newspaper reading.            Repeats 26-syllabled sentences.            Repeats 6 digits.</p>	<p>Vocabulary index.            Absurdities.            Draws designs.            8 memories from reading.            Problem-questions.            60 words in 3 minutes.            Repeats 6 digits.            Repeats 22-syllables.            Form-board.</p>
11	<p>Makes 1 sentence for 3 words.            Defines abstract terms.            Rearranges sentences.            Criticizes 'absurdities.'            Explains pictures.            Give 3 rhymes in 1 minute.            Completion test.            Solves hard problem-questions.            (3 successes count 1 year.            6 successes count 2 years).</p>	<p>Repeats 5 digits backwards.            Gives similarities of 3 things.            Vocabulary index.            Defines abstract words.            Ball and field.            Interprets fables.            Rearranges sentences.            Interprets pictures.</p>
12		
13		
14		<p>Vocabulary index.            Induction test.            Diverse facts.            Distinguishes president and king.            Arithmetic reasoning.            Reversed clock hands.            Repeats 7 digits.</p>
15		

Age	BOBERTAG'S ARRANGEMENT.	STANFORD REVISION.
Adult		
16		Vocabulary index. Interpretation of fables. Distinctions between abstract words. Problem of enclosed boxes. Repeats 6 digits backwards. Code test. Repeats 28-syllabled sentences. Comprehension of physical relations.
18		Vocabulary index. Cut and folded paper. Repeats 8 digits. Gives sense of selection. Repeats 7 digits backwards. Ingenuity test.



TABLE II.

SHOWING THE POSITION OF THE TESTS IN THE VARIOUS SCALES. THE NUMBERS REFER TO THE AGE IN WHICH THE TEST IS FOUND.

Name of the Test.	Binet 1908	Binet 1911	Wallin	Whipple	Goddard	Huey	Terman and Childs	Kuhlmann	Bobertag	Stanford
Copies designed .....	10	..	..	..	10	10	..	10	..	..
Repeats twenty-six syllables.....	12	15	12	12	12	12	..	10	..	..
Diverse facts .....	12	15	12	12	12	12	9	12	..	14
Three words in one sentence.....	11	12	11	11	11	11	10	..	11	..
Defines abstract terms.....	11	12	11	11	12	12	..	11	11	12
Rearranges sentences .....	11	12	11	11	11	11	12	11	11	12
Three rhymes in one minute.....	12	15	12	12	11	11	..	12	11	9
Resists line suggestions.....	12	..	..	..	12	12	12	12	..	..
Cut and folded paper.....	13	A	13	13	A	A	..	15	..	18
Juxtaposed triangles .....	13	A	13	13	A	A	A	15	..	..
Distinguishes abstract terms.....	13	A	13	13	A	A	..	15	..	16
Repeats seven digits.....	12	15	12	12	12	12	13	12	..	14
Distinguishes king and president.....	A	..	..	..	A	A	A	..	..	..
Gives sense of selection.....	A	..	..	..	A	A	A	15	..	18

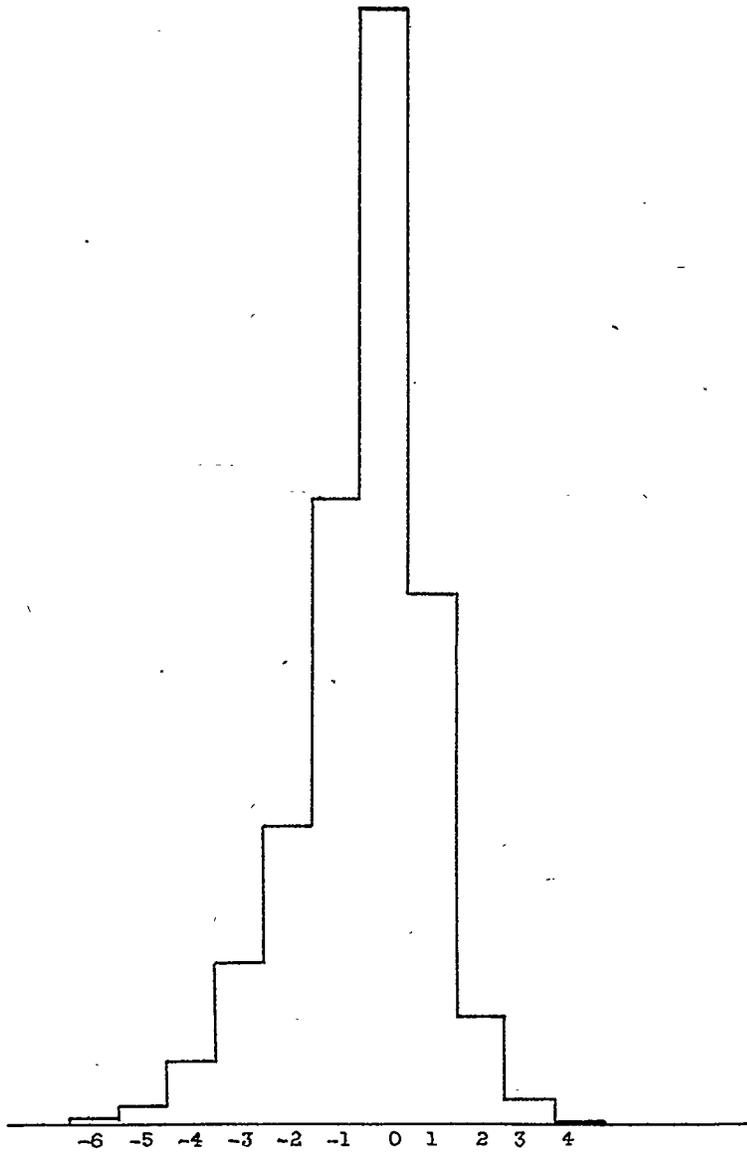
Not only does the development of the scale show lack of scientific method, but applications have failed to justify it. The first adverse criticism of the scale was that of Decroly and Degand.<sup>9</sup> They gave the tests to forty-nine children of the better class in Belgium, and found that they tested very much above their age. Binet accounts for this by saying that the children were of a higher social level than those whom he tested in Paris. Miss Katharine Johnston gave the tests to 218 girls in the schools of Sheffield, England, and found the tests too difficult.<sup>10</sup> Binet, in commenting upon these results, said "one must, therefore, no longer consider the retardation or advance of three years as an anomaly."<sup>11</sup> If we are to consider the tests above ten as being unsatisfactory and are to understand that a deviation of six years is possible normally, what can we learn with certainty about the mental age of children?

<sup>9</sup>O. Decroly et Mlle. J. Degand, "La mesure de l'intelligence chez des enfants normaux d'après les tests de MM. Binet et Simon." *Arch. de psychol.* 1910, 9: 86, 88.

<sup>10</sup>Katherine L. Johnston, "M. Binet's Method for the Measurement of Intelligence—Some Results." *Journal of Experimental Pedagogy*, 1911, 1:24-30.

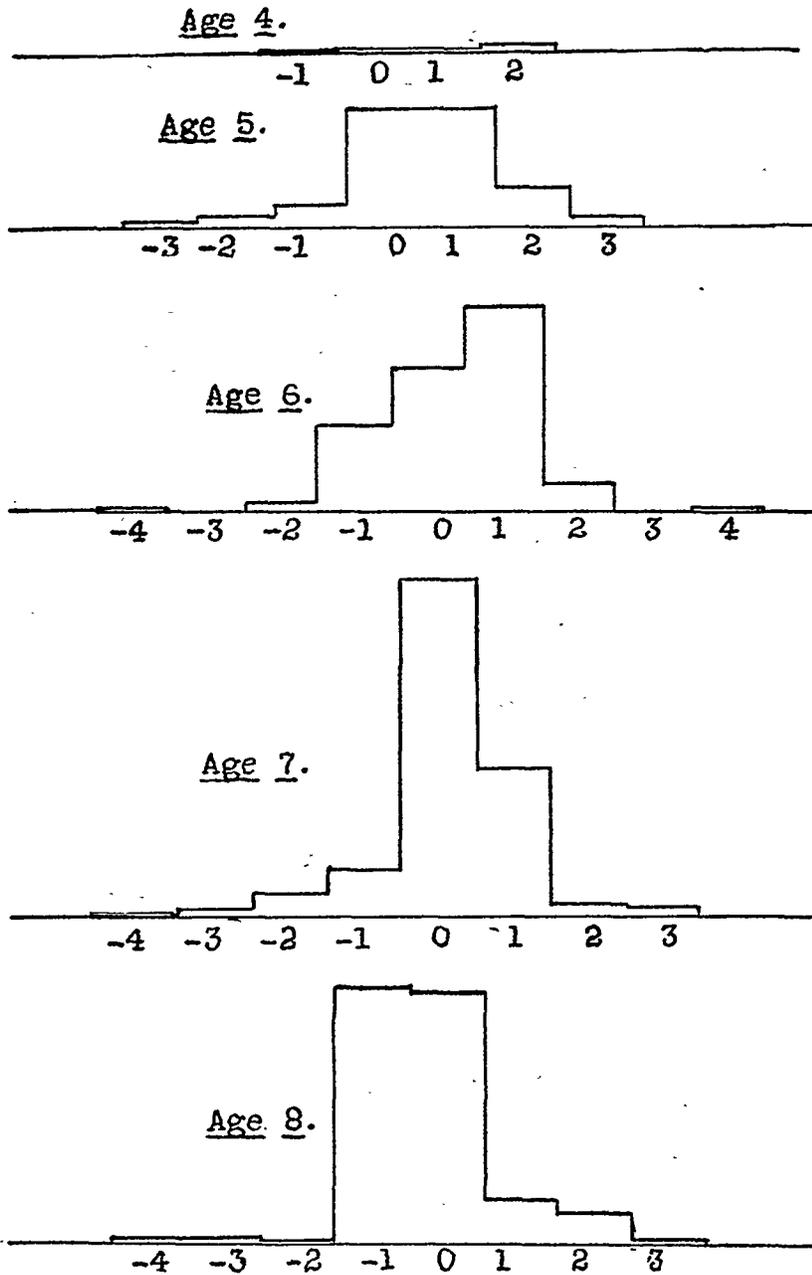
<sup>11</sup>A. Binet, "Nouvelles recherches sur la mesure du niveau intellectuel chez les enfants d'école." *L'Année psychologique*, 1911, 17: 145-201.

GRAPH I.—SHOWING THE DISTRIBUTION OF ALL AGES TAKEN TOGETHER.



*Those whose mental age and chronological age correspond, are represented on the base line by zero. Those retarded are to the left and those accelerated are to the right.*

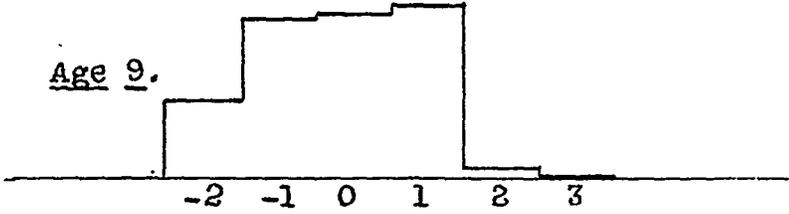
GRAPH II.—SHOWING THE DISTRIBUTION BY AGES.



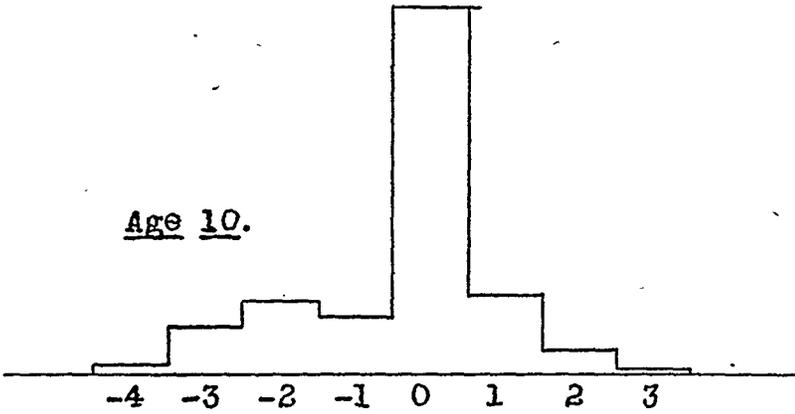
Those whose mental age corresponds with chronological age are represented on the base line by zero. Those retarded are to the left and those accelerated are to the right.

GRAPH II—Continued.

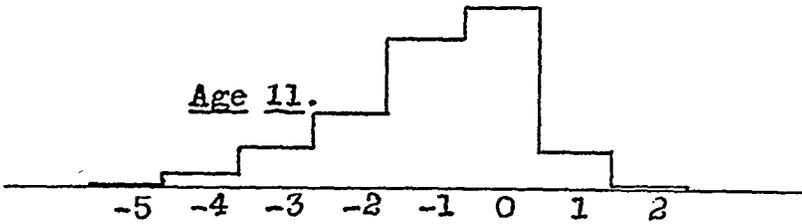
Age 9.



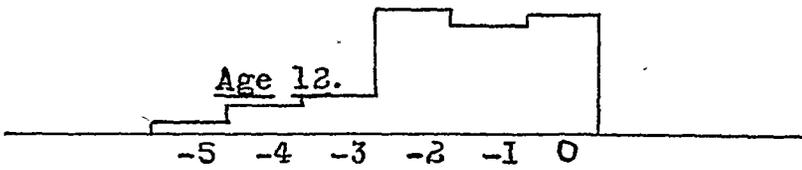
Age 10.



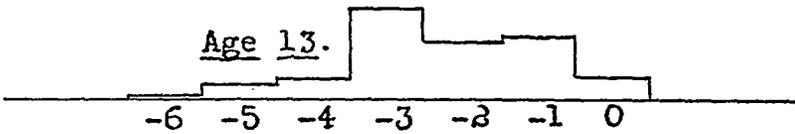
Age 11.



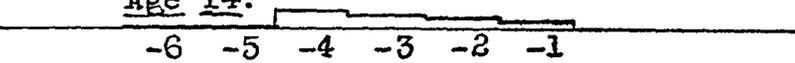
Age 12.



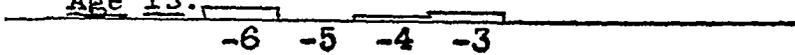
Age 13.



Age 14.



Age 15.



The trained psychologists do not give the tests and interpret the results with any degree of uniformity. They not only differ with regard to what tests should be included in the scale, but in the manner of giving. A number of examples might be cited, but the following show what is meant: The problem-question, "What's the thing to do if you have missed a train?" is worded by American revisers in five different ways, and only one of these <sup>12</sup> makes explicit whether one is going away or coming home. There is even greater variation in standards of correct response, especially in the following tests: Copying diamond, copying square, comparing two objects, definition's tests, tests asking for enumeration, description or interpretation of pictures, rearrangements of sentences, three rhymes in one minute, differences in abstract terms and differences between king and president.

It will always be impossible entirely to eliminate the "personal equation" in giving tests, but it is very desirable that it be as small a factor as possible. Because of a lack of a standardized method of giving the tests and because of the wide latitude possible in interpreting the responses, the "personal equation" becomes altogether too large a factor. The tests need to be made more objective.

Thus it will be seen that we are far from having a standardized scale—we are not agreed as to the tests which should be given in each year, nor are we agreed as to the method of giving them. After eight years of use, the results cannot be said to be gratifying. A rightly constructed scale ought to become more reliable and more accurate as the scale is administered to greater and greater numbers of children. Revisers have urged the use of a uniform system of giving and of scoring the tests, and the Informal Conference on the Binet-Simon Scale, meeting at Buffalo, urged the use of a standard scale, but we do not have such a standard today and we cannot with accuracy compare the results of different psychologists.

Some have expressed doubts as to the value of a statement of the mental age of the child, saying that it is of more use to know the stage of development of each of the mental capacities, or, as Pyle states: "It is more important, it seems to me, to know specifically the condition of the child with reference to the development of the separate mental traits than to know his average performance with respect to them all."<sup>13</sup> In none of our present scales do we have at

<sup>12</sup>F. Kuhlman, "A Revision of the Binet-Simon System for Measuring the Intelligence of Children," *Journal of Psycho-Asthenics*. No. v. *Monograph Supplement*, 1912.

<sup>13</sup>W. H. Pyle, "A Suggestion for the Improvement and Extension of Mental Tests." *Journal of Educational Psychology*, 1912, 3: 95-96.

each age tests which represent the mental capacities of the child at that age. Pyle<sup>14</sup> would have tests which would determine "the degree of development of logical memory, rote memory, attention, imagination, association and two aspects of mind more complex, learning capacity and reasoning."

Where the scale has been applied, the results are not such as would warrant the statement that the scale is satisfactory. The most serious attempt to standardize the tests for each year has been made by Goddard.<sup>15</sup> He publishes the results for each test and for each year. His conclusions as to the reliability of the tests are based upon combined results of the whole experiment. Considering the data thus, he is able to present a distribution which approaches the normal curve, as shown in Graph I. But the interest of the examiner is not in the combined results, but in the results of each year. Plotting the curves for the individual years, we have the distributions as given in Graph II. It is noticeable that in the lower ages, the curve is skewed towards the upper end, while in the upper ages the skewing is very markedly in the other direction. Thus a lumping together of the results of all the years results in a balancing which covers up the deviations from the normal curve.

From what has thus far been said, it seems to the writer that revisions based upon the plan of the Binet-Simon Scales are not going to give us what we want—we need a scale based upon an entirely new plan. The following is an attempted summary of what appears to be the most important characteristics of such a scale:

1. It should be possible to make the scale more refined and accurate with use.
2. It should furnish an accurate diagnosis of the intellectual level of a child. In order to do this it will be necessary to establish norms for each of the more important mental traits.
3. It should make possible a grading by half-years, at least in the lower years.
4. It should make more complete and more accurate the tests in the years above ten.
5. It should be based upon natural ability, not upon school subjects or recent experiences.
6. It should be as little affected as possible by the "personal equation" of the examiner, and to this end should be made objective.

<sup>14</sup>W. H. Pyle, "A Suggestion for the Improvement and Extension of Mental Tests." *Journal of Educational Psychology*, 1912, 3: 95-96.

<sup>15</sup>H. H. Goddard, "Two Thousand Normal Children Measured by the Binet-Simon Scale of Intelligence". *Pedagogical Seminary*, 1911, 18: 232-259.

7. It must not be cumbersome to use.

8. It should be easily applied to different social classes and to different nationalities as well as to both sexes.

The first man who attempted to rectify the fundamental weakness of the Binet Scale was E. B. Huey. Before his death he constructed a point scale, in which a selected number of tests were used and a system of partial credits devised for the scoring. The tests, which were selected, were not grouped by years, as in the Binet Scales, but arranged in order of difficulty. Each subject was given all the tests and the age level was determined by the number of points made. Where confusion arose in the Binet tests because of the desire on the part of the examiner to give credit for a partial response, here the partial credit is granted. Where information gained from the child in giving the Binet tests could not be used to the child's credit, here it can be.

Since the death of Huey, the work has been taken up by Robert M. Yerkes, James W. Bridges and Rose S. Hardwick; "A Point Scale for Measuring Mental Ability"<sup>16</sup> is the result of their labors. This scale attempts to test the following mental functions: Motor Co-ordination, perception (visual), discrimination (visual and kinæsthetic), association, suggestibility, memory, imagination, judgment, analysis and comparison and ideation. Twenty tests taken from the Binet tests, are included in their scale, the answers being scored by points, the highest total possible being one hundred. The authors summarize the advantages of a point scale as follows:

"1. It is committed to no hypothesis as to the correlation existing between chronological and mental age, or between the different mental functions at different stages of development.

"2. It is capable of giving results of ever-increasing reliability and precision as data accumulate and norms are established.

"3. The method of scoring—by subdivisions and partial credits—affords a basis for fuller and more exact comparisons between different individuals and between different examinations of the same individual.

"4. It minimizes the influence of the personal equation of the examiner, reduces the number of doubtful cases and the time spent on such cases, and thus favors the standardization of the procedure and makes for uniformity of results.

---

<sup>16</sup>Robert M. Yerkes, James W. Bridges and Rose S. Hardwick, *A Point Scale for Measuring Mental Ability*. Warwick & York. 1915.

"5. It works with a smaller amount of testing material and thus makes possible a better choice of material.

"6. It is not subject to the criticism that the tests are wrongly placed.

"7. The point scale can be applied to all individuals, while the Binet-Simon Scale could not be applied to individuals who display mental instability."

The validity of the point scale method of measurement can be proven only by extensive application, but the prospects are good for greater standardization than was possible with the old scale. In determining age level, the results in the laboratory here show it to be much superior. The one point of weakness seems to be in not giving definite enough information about the separate mental functions, and thus in not furnishing a picture of the mentality of the subject.