# A GRADUATED SCALE FOR DETERMINING MENTAL AGE

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# A GRADUATED SCALE FOR DETERMINING MENTAL AGE

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# "A Graduated Scale for Determining Mental Age"

BY

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## A Thesis

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**Acknowledgments.**

In working out a problem which has as its basic material the measuring of human intelligence one is quickly brought to feel his absolute dependence on his fellows. In art, in the other fields of science, in literature, given a well equipped laboratory, or a shelf of carefully selected books and periodicals, the task of working out an investigation becomes one of cataloging and classifying known facts and of establishing new ones. But in the field of psychology the investigator is peculiarly helpless unless he can secure the intelligent co-operation of people who see the value of his work. The author of this monograph was especially fortunate in this respect, and wishes to take this opportunity of expressing his appreciation of the assistance given him by the teaching force of the Lincoln (Nebr.) Public Schools. Thanks are particularly due to Superintendent Fred M. Hunter, who gave him the freedom of the entire system; and to the principals of the eight schools from which the children were selected, namely, E. Ruth Pyrtle, principal of McKinley School, Lena Merrill, principal of Saratoge School, Emma Morrill, principal of Everett School, Mattie Allen, principal of Whittier School, J. Belle Corbin, principal of Bancroft School, Clare McPhee, principal of Capitol School, Bertha K. Green, principal of Clinton School, and Sadie Baird, principal of Elliott School.

The author is greatly indebted to Dr. H. K. Wolfe, head of the Department of Psychology in the University of Nebraska, who suggested and directed the investigation, and to Dr. Winifred Hyde for helpful criticisms during the process of arranging the material.

The Author.

Lincoln, Nebr., July 20, 1915.

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After carefully checking the data and after using the scale in a large number of cases covering a period of three years, the author feels justified in presenting the work in its complete form. The results obtained by the use of the scale are accurate to a marked degree. Correlation of the individual tests with results obtained by the Binet scale are decidedly close.

C. B. C.

Lexington, Ky., July 10, 1918.

# A Graduated Scale For Determining Mental Age.

## Introduction.

THE science of mental measurement is a logical outgrowth of experimental psychology and can be traced indirectly to Fechner and Wundt. Although based upon seemingly intangible psychic phenomena, its methods nevertheless parallel those of the other sciences. There is this difference, however, between the two fields: in the other sciences definite units of measurement have been established and generally accepted, whereas in the science of mental measurement, very few standard units have as yet been fully developed, owing to the peculiar difficulties inherent in any attempt to determine the required norms. "The problem for quantitative study of the mental sciences is to devise means of measuring things, differences, changes and relationships for which standard units of amount are often not at hand, which are variable, and so unexpressible in any case by a single figure, and which are so complex, that to represent any one of them a long statement in terms of different sorts of quantities is commonly needed."[35,6] But in spite of the difficulties encountered a relative degree of success has attended the search for units whereby mental abilities can be relatively measured.

Methods of procedure have been evolved by Fechner,[9] Wundt,[32] Ebbinghaus,[7] Muller,[17] and others, but the application to pedagogical problems has been a comparatively recent development. Undoubtedly the greatest stimulus toward this came from Binet in France, whose work was quickly taken up in Germany and in this country. The various modifications and elaborations of Binet's tests have filled the field with a rich literature.

The current interest in mental tests is undoubtedly largely due to the need felt, on the part of teachers and supervisors, for an efficient instrument wherewith correctly to diagnose and classify school children. This attitude is wholly in keeping with the recent trend of our public school system which is more and more readjusting itself to the problem of meeting the needs of the individual child.

The following investigation is the result of an attempt by the author to find a satisfactory scale for mental measurement

to be used in the public schools. In casting about for standardized tests none was found which combined the age scale with the essentials of diagnosis.

The novice in the work is at once attracted by the Binet-Simon scale, but it is to be doubted if the results obtained in its application can be considered reliable. A careful analysis of the scale, from the standpoint of the psycho-clinicist, reveals many defects which cannot be explained away. The scale falls far short of being the magical instrument which its many exponents claim it to be and will never serve as an instrument of exact analysis. However, a criticism of the Binet scale is beyond the scope of the present work, especially in the light of the literature of the subject.* Its relative success in clinical work would seem to result from the fact that, throughout the scale, there exists a psychological framework which insures approximate results despite a large amount of extraneous material.

The greatest obstacle encountered in the practical application of any method is the lack of coherence and system. In the measuring of mental processes the tests must necessarily cover a wide range in order to determine the true ability of the subject. Tests which ascertain ability in one phase must be supplemented by tests applicable to other operations of the mind. Take, for example the Ebbinghaus "Combinationsmethode," familiarly known as the completion method. [8, 401], [29, 288] In this test a story is given to the child with syllables or entire words omitted from the text. The problem is for the child to fill in the blank spaces in an intelligent manner in the least possible time. The author claims that this is a "real test of intelligence, a simple, easily applied device for testing those intellectual activities that are fundamentally important and significant both in the school and in life." Actual application, however, shows that the test is not as comprehensive as the author claims, is difficult to evaluate,[24] and is dependent on school training.[30] But, in spite of these objections, it may be used as one of a group owing to its close correlation with intelligence.[8, 126]

The scale proposed in the present monograph is an attempt to combine the determination of mental age with psychological diagnosis. It is composed of nine separate tests, divided into three general groups, as follows:

A. Perception, tests I. and IX.
B. Memory.
   (a) Auditory, tests II. and III.
   (b) Visual, test IV.
   (c) Logical, test V.
C. Judgment.
   (a) Visual proportion, test VI.
   (b) Constructive problems, test VII.
   (c) Definitions, test VIII.

The characteristic features of the scale are as follows: (1) The same tests are used for all ages and the mental age determined by the manner of the individual reaction, measured in

*For criticisms of the Binet scale see especially references 7, 22, 23, 24, 27 and 35.

terms of the relative number of points for each age. (Norms have been established for the ages six to fourteen, inclusive.) This method dispenses with a great amount of unnecessary labor, both on the part of the experimenter and of the child, because of the fact that standing is measured in terms of ability to react. (2) The tests chosen are necessarily of such a nature as to appeal to the interest of the child regardless of age. Moreover, as a proof that they are genetic tests of intelligence, the ability to react to each test increases uniformly as we go up the age scale, with a fairly wide range between the upper and lower limits. (3) The tests measure native ability regardless of training. This feature opens up a wide field for discussion. For example, Binet uses as tests, counting, knowledge of money, family name, dates, and others which may be influenced by training. One of my tests is for the child to name all the objects that he can think of during one minute, with the eyes closed. This may be open to criticism of training, but the evidence shows that the more intelligent the child, the greater the number of associations, even though the type of words suggest the influence of previous training or environment. (4) The tests are comprehensive, that is, they are so arranged that the several basic mental operations may be analyzed. (5) They are compact and systematic. The apparatus, aside from the stop-watch, can be made in the school room or office, and, with the exception of the card of objects, may be carried in a large envelope. The number of tests is small but each is important. (6) The tests may be easily and quickly applied. It is believed that any teacher who understands the principles of psychological method can, after perhaps fifty trials, conduct the test in about thirty minutes, with comparatively accurate results. (7) The results may be accurately evaluated, provided the data are correct. This is made possible by the systematic scoring by means of points.* (8) The results are significant from the standpoint of the clinical psychologist, indicating to the trained observer the type of the subject.

It is believed that the scale is a simple and coherent system which may be efficiently used, both to determine mental age and mental type. In the hands of the novice it will indicate not only the group to which the child belongs, but also his predominating characteristics. The expert will find it valuable as an index to further tests which may be deemed necessary for a more complete analysis of the subject's mentality. In any case, with careful manipulation, the mental age will be closely determined.

## Source of the Data.

In establishing the norms presented in this work the tests were given personally by the author to about 550 children of the Lincoln Public Schools. Of this number, 75 were tested before the method was fully worked out, about 75 more were tested

*The entire plan of the work was completed and the data more than half collected before the method of the point scale used by Yerkes and Bridges (34) was available. Reference to their scale will show the radically different methods between the two systems.