



1954

## A Study of the Original Norms of the Furfey Developmental Age Scale With a 1952 Population

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A STUDY OF THE ORIGINAL NORMS OF THE  
FURFEY DEVELOPMENTAL AGE SCALE  
WITH A 1952 POPULATION

by  
Edward M. Flaherty

A Thesis Submitted to the Faculty of the Graduate School  
of Loyola University in Partial Fulfillment of  
the Requirements for the Degree of  
Master of Arts

February  
1954

## LIFE

Edward M. Flaherty was born in Waterloo, Iowa, January 31, 1925.

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## CHAPTER I

### INTRODUCTION

In the progress of human life there is a general trend of changes in behavior which appears to be characteristic of various stages of development. This is the pattern of progress as the individual develops, learns to become an adult, and continues in the process of maturing through old age to the end of his life.

Various descriptions of this progress have appeared in literary, scientific and other writings throughout the ages. The manner in which St. Paul contrasted the patterns of behavior of the child and the man,<sup>1</sup> and Shakespeare's description of man's "seven ages" are familiar examples.<sup>2</sup> A less familiar, but interesting example was the graphic depiction of man's life in a progressive series of roles which appeared in an old Dutch plate of about 1520.<sup>3</sup> It portrays performance in relation to age in

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1 St. Paul, Corinthians, I, III, 9.

2 William Shakespeare, "As You Like It," Act III, Sc. 7, Line 139.

3 Walter R. Miles, Mental Health in Later Maturity, Supplement No. 168 to Public Health Report, Federal Security Agency, U.S. Public Health Service (Washington: U.S. Government Printing Office, 1942), p. 35.

terms of ten life periods, each with a characteristic posture, behavior, and representation of mood.

These interpretations of man's progress through life, have set up arbitrary boundaries, or separate stages. However, the concept of growth implies that there is a gradual progress or sequence. Growth is a gradual increase by natural process. It is more than a gain in quantity. Maturity of development is not a matter only of the number of years one has lived, but is the degree of emotional maturity one has achieved in that time.

At any one time it is not enough to evaluate the individual in the light of his physical, intellectual, psychological or legal maturity. These various aspects must be evaluated by some form of holistic approach, even as they are unified in the person.<sup>4</sup> An adequate attempt to understand the individual must take an approach which considers the total personality, the integrated development of the individual.

The basic method of psychology in understanding the individual is through observing his behavior. An adequate understanding and evaluation of behavior makes reference to its beginning, its course of development, and the factors which influence this progress. Psychology recognizes these interacting factors and evaluates behavior, not only in the light of what

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<sup>4</sup> Florence L. Goodenough, Developmental Psychology, 2nd ed., New York, 1945, 531.



is to be expected from the influence of the individual's heredity and environment, but also in light of the length of period in which they have been effective and operating.

The common usage of descriptive terminology implies stages of development which are distinct. These terms describe characteristic types of behavior in indefinite terminology. The present study is concerned with that broad range of development referred to in this manner as "later boyhood, early adolescence, the period of competitive socialization, the questioning age, and others."<sup>5</sup>

The growing child's behavior changes, and the activities of widely separated ages are obviously different. The gradual transition from childhood to adulthood appears to involve a change in the whole psychology of the individual. Furfey attributes these changes to a volitional and intellectual element. He introduced the term "developmental age" to describe the changing volitional life of the growing child.<sup>6</sup>

Furfey defined the term in relation to behavior as it is reflected in interests:

It may be defined as "the progressively increasing and non-intellectual maturity of general behavior which

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5 Paul H. Furfey, "A Scale for Measuring Developmental Age," Mental Hygiene, XIV, January, 1930, 130.

6 Paul H. Furfey, "A Revised Scale for Measuring Developmental Age in Boys," Child Development, II, June, 1931, 102.

shows itself in the growing child's play preferences, in his fantasy life, in his choice of books and movies, in his ambitions, and, in general, in his whole behavior type.<sup>7</sup>

Furfey explicitly indicated in his early work with the scale that he did not presuppose what the ultimate causes of this type of maturity might be. However, he did state that developmental age was not to be confused with mental age, since it denoted maturity other than intellectual, and he cited evidence in support of this view.<sup>8</sup>

The potential importance of the concept of developmental age was twofold. The data about a type of maturity not previously defined and measured introduced a new and valuable theory. Mental age had proven to be revealing and invaluable to teachers, social workers, various clinicians, and others concerned with understanding the behavior of individuals. There was the possibility that developmental age as measured by the Furfey scale would reveal something of the factors effecting the increasing maturity of the growing child, and that it would provide some understanding of the social maturity element, measure it scientifically, and impress the parent, educator, the psychiatrist, and the clinical psychologist with

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7 Ibid., 102.

8 Ibid., 102.

its importance.<sup>9</sup>

In the present study the Furfey developmental age scale was administered to a group of 463 boys. The purpose of the study is to compare the results from this testing in 1952 with the norms established by the author of the scale over two decades prior to the present investigation.

If these data compare positively with the available norms, then it will demonstrate the applicability of the instrument for use with boys of the contemporary generation. If comparison shows a significant difference between established norms and the experimental group, then analysis of these results may reveal a valuable basis for understanding boys' behavior which will be of interest to those concerned with their general welfare.

The Otis Self Administering Test of Mental Ability was administered to the experimental group of boys in the testing period. It is the secondary purpose of this study to investigate Furfey's implication that little or no relation exists between developmental age and mental age.

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<sup>9</sup> Sister Celestine Sullivan, "A Scale for Measuring Developmental Age in Girls," *Studies in Psychology and Psychiatry* from Catholic University of America, III, May, 1934, 1.

## CHAPTER II

### REVIEW OF THE RELATED LITERATURE

In 1930 Furfey cited the fact that intelligence tests, so much emphasized at that time, were inadequate in telling the whole story of an individual's personality. This was a growing feeling in the field of psychology, presaging the swing to the broader developments of personality testing which have evolved up to the present day.

The term developmental age was suggested to indicate the degree of maturity of personality which is manifest in a changing interest in amusements, a changing reaction toward other persons, and generally a changing personality. Before that time the facts of changing maturity and certain types of behavior typical of children of different ages were recognized, but only in indefinite terms such as references to "later boyhood," "early adolescence," "the questioning age," and others.<sup>1</sup> The scale Furfey devised introduced into the field of child psychology quantitative methods to replace a descriptive, non-specified approach. This not only served to make a developmental stage

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1 Paul H. Furfey, "A Scale for Measuring Developmental Age," Mental Hygiene, XIV, January, 1930, 130.

more readily estimable, but was also a definitive presentation of an implicitly recognized continuum of growth in early life.<sup>2</sup>

Interests as a basis for estimating development have been an enduring criterion. A recent statement by a writer in the field of child psychology says: "The extent to which a child replaces early childhood interests with more mature interests is a good measure of social development of maturation."<sup>3</sup>

Furfey's work with his preliminary scale was conducted between 1925 and 1930. He summarized this early work in a publication of 1931. Reports of this work are enumerated in the bibliography of this present paper. The early scale consisted of four tests, two of which dealt with play preferences, one with reading preferences, and one with attitudes. Administration of this scale to 450 boys in Washington, D.C. revealed two defects of its construction. By the method of split-halves and the Spearman-Brown formula, the reliability of the scale of this group was only .76. It was also felt that the scoring system was somewhat cumbersome.<sup>4</sup>

The author strove for higher reliability on the

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2 Ibid., 136.

3 Karl C. Garrison, Psychology of Adolescence, 4th ed., New York, 1951, 134.

4 Paul H. Furfey, "A Revised Scale for Measuring Developmental Age," Child Development, II, June, 1931, 103.

revision by "lengthening the scale and by selection of more sharply diagnostic items. The final scale consisted of six tests concerned with specific areas of play preferences, vocational ambitions, reading preferences, and the things the child would like to have, to see, and to think about.

The new method of scoring was simpler, and yielded better reliabilities. The eleven coefficients of reliability for the separate age groups of eight through eighteen years ranged from .85 to .96, with a mean reliability of .91.

The revised scoring was based on the presentation of the items in pairs, for alternative choice by the subject. This method of paired comparisons is a familiar and effective pencil-paper technique used in many popular test forms.

Each pair of selected items consisted of one showing increasing popularity with age, and another which showed decreasing popularity as chronological age increased. The criterion of popularity for each pair was a graph representing the increase and decrease by lines which crossed at or about the middle of the age range. This empirical selection of the items for the revised Form B-3 was based on data from the preliminary studies.

Two hundred and twenty-four items made up the form given to 982 grammar and high school boys of the ages eight to eighteen. This population was selected from three major cities of the east and midwest United States. Of the number of items,

only 28 were discarded as not being discriminative. Those remaining were scored plus if they were chosen with increasing frequency with increasing age, while those preferred with decreasing frequency as age increased were scored minus. Thus, a higher score characterizes older age groups. This manner of scoring makes allowance for the gradual changes occurring during growth periods, without attempting to distinguish a certain age group by a whole pattern of play activities, attitudes, and diverse interests. This cumulative aspect of maturity as reflected in the scoring makes the scale more applicable for use with individuals. It agrees with conclusions from an earlier research on play interests which stated in part

Changes are not sudden and characterized by periodicity, but are gradual and contingent. . . . Nor can any age or group of ages between 8 and 19 inclusive be characterized as disclosing play behavior primarily social or primarily individualistic. Such a practice is unwarranted.<sup>5</sup>

With his population Furfey found that scores increased with notable regularity from age eight to twelve, then more distinctly and rapidly to age sixteen. After sixteen there was little tendency to increase. He also noted that, in its failure to increase after sixteen, developmental age resembles the Binet mental age. This incidental note becomes more important in reference to the present study.

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<sup>5</sup> Harvey C. Lehman and Paul A. Witty, "Periodicity and Growth," Journal of Applied Psychology, XI, February, 1927, 115.

The work of Lehman and Witty is not closely related to the area of Furfey's investigations, but its similarity in thought and design makes it of interest here. They used interests in a particular activity (doll play) as one criterion of maturity. The study showed evidence that interest in that type of play activity waned with the onset of pubescence in girls.<sup>6</sup> This change of a particular interest is similar to the more general change of behavior toward more mature conduct. Evidence indicates these broad behavior changes occur at the time of transition from pre-pubescence to adolescence, as does the interest in doll play.

In a series of reports in 1932 and 1933 Rauth and Furfey presented evidence supporting this relationship.

However, there occurs an interesting change in the emphasis of their thinking. It proceeded from concern with the direct relationship of physiological maturity and developmental age to concern with the single causal factor in this relationship, the presence of the sex hormone. Later, the authors indicate a plurality of causes of social maturation.

In a 1932 study they reported an investigation of the relationship between physiological maturity and developmental age. The eighty-four subjects were studied in three separate

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6 Harvey C. Lehman and Paul A. Witty, "A Study of Play in Relation to Pubescence," Journal of Social Psychology, I, February, 1930, 522.



groups to eliminate the influence of chronological age. Thirty-three boys were thirteen years old, thirty-two were fourteen years, and nineteen were aged fifteen.

Developmental age was measured on the revised scale, which has a reliability of .94 in this age range. According to Crampton's norms, the subjects were classified in two groups. Those who were prepubescent or pubescent comprised one group, and all those who were post-pubescent were placed in the other group.

Biserial coefficients of correlation and partial correlations with chronological age constant were calculated for the variables of puberty and maturity of behavior. The coefficients reported are as follows:

	13 yrs.	14 yrs.	15 yrs.
Biserial $r$ (Kelly Pearson Formula)	-.16	.42	.79
Partial $r$ (CA constant)	-.16	.43	.80

On the basis of these data the authors concluded:

With chronological age constant, there seems to be a slight positive relationship between physiological maturity as measured by the Crampton norms and maturity of behavior as measured by the developmental age scale.<sup>7</sup>

The object of a study reported in 1933 was to test the

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<sup>7</sup> J. Edward Rauth and Paul H. Furfey, "Developmental Age and Adolescence," Journal of Social Psychology, III, November, 1932, 471.

connection between characteristic behavior changes of adolescence and the presence of sex hormones in the blood stream. Since there was no practical way to measure the degree of hormone presence, an indirect method of comparison was undertaken, on the assumption that increased physical growth is generally considered an important secondary sex characteristic of adolescence, and is due to the increased secretion of those hormones into the blood stream.

Positive correlations were calculated for the relationships of the variables physiological age and developmental age. Attempting to define causal relationships, the authors eliminated as unreasonable the possibility that DA might be caused by growth or that the reverse might be true. The remaining hypothesis is here quoted directly:

There remains, therefore, the possibility that both increased DA and increased growth are due to a common cause and it seems reasonable to suppose that this common cause is the presence of the sex hormone in the blood stream. It is known that this hormone is responsible for the rapid growth at adolescence. We can scarcely escape the conclusion, therefore, that the maturity of conduct which is shown to be related to it, is due to the same cause.<sup>8</sup>

In summary, then, this study indicated a small but constant and significant relationship between DA and physical measurement in a group of 43 adolescent boys, but no such re-

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<sup>8</sup> J. Edward Rauth and Paul Hanly Furfey, "A Brief Report - The Maturational Factor in Adolescent Conduct," Child Development, IV, December, 1933, 92.

lationship in the study of 70 preadolescent boys.

Rauth and Furfey stated their data indicated "that the characteristic adolescent maturity of conduct is actually due to the presence of the sex hormone."<sup>9</sup> This study demonstrated a more clear and extensive understanding of maturational behavior, and in this relation, developmental age.

Reporting to the Fourth Conference on Research in Child Development of the National Research Council in June, 1933, Furfey presented a summary of published and unpublished studies on concomitants of developmental age. These studies, particularly the unpublished ones, were interesting in that they show the broader approach to the concept of developmental age in contrast to the areas of more obvious development such as physiological and chronological ages. The studies he reviewed on that occasion are concerned with the possible plurality of causes for development of social maturity.

Furfey's summary in this report of 1933 indicates the necessity of qualifying the conclusions it is possible to draw from the studies. He suggests that the studies are not definitive because of unrefined techniques, and because groups worked with were small. He regarded the studies as preliminary.

With these reservations in mind, Furfey presented the

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9 Ibid., 93.

following conclusions.

He said there is a definite and considerable relation between DA and puberty, and also between DA and home conditions. In the first instance, it has been demonstrated that there is a decided increase in DA as boys enter adolescence. Secondly, a low DQ was found to be significantly related to an over-protected home environment. The reverse was also supported by evidence which he cited.

Some relationship was demonstrated between DA and dental age, mental age, and socio-economic status. These relationships are apparent, but not clearly described or understood.

A possible relationship was suggested between DA and two other variables. (It seems that residence in institutions effected a lower developmental quotient in children.) Also, city children may be expected to have a higher DA than children of more sparsely settled areas.

Relationship was disclaimed definitely between DA and seven other variables, e.g.: a) physical measurements, b) carpal ossification, c) race, d) geographic location of residence, e) delinquency, f) companionship, and g) family position.

At the time of presentation of the revised Form B-3 the author claimed strong logical validity for the test. Construction is based on the preferences of play, books, fantasies, ambitions, and the like, which are the components of the definition of the

concept, development age. This logical validity was recognized of course, as not entirely satisfactory.

Empirical validity of the test depends on the analysis and choice of items from the data of the preliminary studies as outlined above. In the preliminary forms scores were for each subject correlated with rating forms completed by their teachers, while rating forms are weak criteria, and at best only partially valid, they were the most available and satisfactory criteria for this new area of investigation.

Chronological age is a rough criterion for the validity of the test. Correlation coefficients of .82 over the entire range of ages 8 to 18 substantially means only that there is considerable spread of developmental age in each group.<sup>10</sup>

The reliability of the instrument was strictly measured in that the effect of chronological age was eliminated by computing the coefficients for each age group.

In relation to other factors, such as intelligence, physiological age, weight and height Furfey cited certain studies made prior to his final revision.<sup>11</sup>

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10 Paul H. Furfey, "Toward Understanding Children. Addresses Given Before the 4th Annual Iowa Conference on Child Development and Parent Education." University of Iowa Extension Bulletin, No. 283, 1932, 9-21.

11 Furfey, Paul H., "A Revised Scale for Measuring Developmental Age in Boys," Child Development, II, June, 1931, 112-113.

In Lawlor's work with the preliminary test, developmental age was correlated with mental ages measured on several frequently used tests. Lawlor reported correlations which were low.<sup>12</sup> In some instances, negative correlations have been found. However, correlations of mental age and developmental age were not calculated on any large samples, which may account for the wide scatter of results. These results are summarized in a table from the 1933 report by Furfey.<sup>13</sup>

At the time of the publication of the revised Form B-3, Furfey stated that the only significant correlation of MA and DA was for a group of 35 boys at age 14. A coefficient of  $-.12$  was obtained. A partial correlation of  $-.08$  was obtained for 66 subjects between the ages of 12 and 16 years. Mental age was measured on the Cleveland Classification Test. On the basis of these data, Furfey concluded that there is no demonstrable relationship between developmental age and intelligence.<sup>14</sup>

As a check of Furfey's conclusion that there was no relationship between mental age and developmental age, Boynton

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12 Furfey, Paul H., Ibid., 112.

13 Paul H. Furfey, "Social and Physical Factors in Developmental Age," from Report of the 4th Conference on Research in Child Development of the National Research Council, Chicago, Illinois, June 22-24, 1933, 7.

14 Furfey, "A Revised Scale for Measuring Developmental Age in Boys," Child Development, II, June, 1931, 114.

and Lowe examined all boys in the sixth, seventh, and eighth grades of a Tennessee state school for dependent and mildly incorrigible (sic) children.<sup>15</sup>

With their population of 90 boys they used form B-3 of the Furfey scale and the Otis Self Administering Test of Mental Ability. They reported a coefficient of correlation of  $+.33 \pm .06$  between developmental age and mental age. They regarded this as sufficient evidence for some relation between the variables, possibly that one may influence the other. A higher coefficient of  $+.47$  was yielded when the effect of chronological age was eliminated. The difference of these coefficients was interpreted by these writers to suggest that the relationship between mental age and developmental age is less than between "brightness" and developmental age. Brightness would then be significantly related to responses made on the Form B-3 scale.<sup>16</sup> These conclusions were supported by the general correlation of  $+.47 \pm .07$  between mental age and chronological age for all boys of 14 years or over.

Boynton and Lowe cited opinions of other writers that intellectual maturity is reached at or about fourteen years.<sup>17</sup>

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15 Paul L. Boynton and Paul E. Lowe, "Developmental Age of Industrial School Boys," Child Development, V, 1934, 59-62.

16 For Otis use of the term "brightness" confer Otis Manual Directions.

17 Boynton and Lowe, Ibid., 60.

Above this age, then, measures of mental ability sample relative brightness instead of mental growth. These concepts support the suggestions Boynton and Lowe made regarding the relationship between mental ability and that which the Furfey test measures.

Also, differing from Furfey's statement of the relationship of the factors of developmental age and chronological age, Boynton and Lowe found in their group as a whole little evidence of the expectation that chronological maturity be accompanied by developmental maturity.

But, before generalizing these conclusions or statistical findings, it is important to note that the population of the study is a group of institutionalized boys. According to Furfey's analysis of the data of a comprehensive socio-economic study on developmental age by Merwick, the developmental age of such a group might be expected to be lower than that of a population of noninstitutionalized boys.<sup>18</sup>

Fogwell found a similar difference in favor of the non-delinquent group of her study comparing that type of subject with the delinquents from a midwest training school for boys.<sup>19</sup>

In both Furfey's analysis and Fogwell's conclusions, the lower developmental age which Boynton and Lowe reported for

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18 Paul H. Furfey, Ibid., 9.

19 Ibid., 10.



their population can be better understood in relation to environment. Another factor in the comparison of their data with the original norms would be the results of another analysis of Merwick's data. At each age level the mean score for urban subjects was higher than that of the rural subjects.<sup>20</sup>

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20 Ibid., 8.

## CHAPTER III

### PROCEDURE

The aim of this study, as previously stated, is to compare the original norms of the Furfey Developmental Age Scale, Form B-3 with the results of administration to a large contemporary population. In addition, an investigation of the relationship between developmental age and mental age was attempted. The Otis Self Administering Test of Mental Ability, Intermediate Examination, Form A, was the instrument chosen to measure the mental age of the subjects.

The Furfey test was chosen for this research to determine the advisability of its use as a contemporary clinical tool. It attempts to measure the degree of a type of maturity which, it seems, is indicative of a boy's normal, healthy social and emotional development. As an acceptable and valid measure of this aspect of growth it can be of considerable value to those whose interest or responsibility centers about the care, aid, and guidance of such development.

For the second part of the examination the Otis test was found suitable for various reasons. This test is widely used and recognized as an adequate and practical method for measuring

mental ability in school groups. In addition, the Otis test is similar to the Furfey scale in several aspects of construction and method of standardization. The theoretical construct for the discrimination of ability for slow and fast progress in school (an application of the Otis instrument)<sup>1</sup> is similar to that of the discrimination of slow and fast maturing of interests, as the Furfey scale reflects.

There are certain practical considerations, also, which influenced the choice of the Otis. The method of administration of the two tests is similar. An attractive feature which first influenced choice of the Otis over some other similar instrument was its flexible time limit. However, it was found in a pilot study that the thirty-minute time limit plus the necessary time for subjects to complete the Furfey scale was not excessive of the time for the entire examination per group allowed by school schedules and agreed upon in the preliminary arrangements with school administrators.

Reliability of the Otis S-A, determined by means of correlation between different forms of the same test, is reported in the manual as  $.953 \pm .006$  for one group and  $.943 \pm .007$  for the other group. The probable error for the two groups was 2.85 and 2.78 respectively. The method of standardization is cited as

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1 Arthur S. Otis, Otis Self-Administering Tests of Mental Ability, Manual of Directions and Key. Chicago, Illinois, 1928, 3.

the best assurance to the validity of the Otis Mental Ability Tests.<sup>2</sup> The standardization was conducted with grammar and high school students who were classified as "good" students or "poor" students. The inclusion of each item is justified, say the authors, on the basis of being discriminatory between students who progressed slowly and those who progressed rapidly.

A frequently heard objection against pencil-paper intelligence tests or instruments for measuring mental ability is that success depends on reading ability and comprehension. But both of these group tests would be affected in a similar way by the reading ability of the subject. Thus, it was felt that this objection did not vitiate the individual performance on one test any more than the other.

These two pencil-paper tests were administered to boys of two midtown schools in a large midwestern metropolis. The coeducational grammar school of a Catholic parish provided the population from 10 years through 13 years. The remaining subjects to complete the age range through sixteen years were available in a Catholic high school for boys, and the tests were administered to students of the first and second year classes. From the total population tested, 424 suitable sets of tests were yielded.

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2 Ibid., 12.

Administration was conducted in the classrooms of the school during the regular school day. It was explained to the subjects that they were being asked to help in a project of scientific research. They were told the general nature and purpose of such research, and the purpose of the immediate project was explained in terms of the importance of research about people, and particularly about boys.

The tests were then administered according to the instructions and procedures set down in the manual for each. The Otis S-A was given first, as it was timed. Those who finished before the allowed thirty minutes were instructed not to cause any disturbance to others still working.

The subjects were next presented the Furfey scale to complete. There was no time limit set. All subjects were given ample time to finish. In some few cases individuals were stopped before they completed all six sections when the demands of school schedules made this necessary. This was done to keep up with the schedule of examinations in the various classrooms as well as to avoid imposition on the regular school routine.

In making their choices, the boys were told to make one for each item, even though they did not feel they liked either one. This was the instruction also for any item in which they were not familiar with one or the other of the pair of choices.

The Furfey tests were scored according to the instruc-

tions indicated by the author. Chronological ages were calculated from the date of birth as indicated by the subject on the test form, and figured as of the date of examination. Scores were tallied and checked, and developmental ages were recorded according to the table Developmental Age Equivalents of Specified Scores published by the author. Half credits were given for the omitted items. However, in the total scores, fractions were dropped, and the next lowest whole number was considered the total score for purposes of conversion to developmental age equivalents.

Scoring of the mental ability tests followed closely the directions set down in the manual. The necessary precautions suggested for avoiding scoring errors were taken, and the scores were recorded. These scores were then converted to Binet mental age equivalents using the table provided in the Otis manual. The scores were also converted to Otis IQs, using the IQ scales published by the author of the test.

The chronological age, developmental age, mental age and IQ for each subject were recorded on individual cards.

## CHAPTER IV

### RESULTS

The first step in analysis of the findings in this study is to describe the structure of the population used. The chronological age for the group ranged from ten through sixteen years. This is a narrower range than that of Furfey's unselected group in which the span was eight to eighteen years.

Mean chronological age of the 424 boys of the study was 13.13 years with a standard deviation of 1.67. Selection of suitable completed Furfey test blanks included only those on which the score was within the limits of the published norms, i.e., sixty-three to 181. Those scored below sixty-three were considered to be tests of subjects who lacked adequate ability for the performance required, or without the proper test attitude. Those subjects whose scores were beyond the extrapolated values of the norms (181) were not included.

The mean mental age was 13.75, with a standard deviation of 2.48 and a range of 10.66 years between the mental ages of 7.75 and 18.41 years. Construction of the Otis test is such that a score is directly converted to Otis IQ without the use of mental age. Scores were converted to Binet mental ages through

the use of a table of equivalents in the manual of the Otis test.<sup>1</sup>

The population had a mean Otis IQ of 105.38, with a standard deviation of 12.90. The range was from sixty to 140, with a span of eighty points.

Table I is a presentation of these data. Developmental age had the highest mean. Mean mental age was only .16 years lower. The mean chronological age was .62 years less than the mean developmental age. Details of these distributions are presented in Appendix I.

TABLE I  
SUMMARY DATA OF 424 BOYS ON THE FURFEY  
SCALE AND THE OTIS TEST

Measure	CA in years	DA in years	MA in years	IQ
Mean	13.13	13.91	13.75	105.38
Standard Deviation	1.67	2.35	2.48	12.90
Range	10.17-16.91	7.50-17.50	7.75-18.41	60-140

The limits of a chronological age group as used in this study are the same as Furfey defined in his work, i.e.--the

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<sup>1</sup> Manual, 5.



chronological age group "thirteen years" includes all subjects of the population who have passed their thirteenth birthday, but who have not yet reached their fourteenth birthday.<sup>2</sup>

In the various chronological age groups it will be noticed from Table II that developmental age is consistently

TABLE II

MEAN SCORES AND INTELLIGENCE QUOTIENT OF CHRONOLOGICAL AGE GROUPS ON THE FURFEY SCALE AND THE OTIS TEST

Age	N	Mean CA	Mean DA	Mean MA	Mean IQ
10	50	10.60	11.23	11.73	107.58
11	76	11.50	12.14	12.09	103.43
12	80	12.49	13.32	13.08	102.98
13	85	13.47	14.76	14.69	107.72
14	70	14.49	14.78	15.23	103.52
15	44	15.49	15.93	15.46	103.88
16	19	16.41	15.70	16.16	105.26

larger than chronological age, with the exception of the highest chronological age group at sixteen years. In that group the mean developmental age is nine months lower than the mean

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<sup>2</sup> Furfey, Paul H., "A Revised Scale for Measuring Developmental Age in Boys," CD, II, 111.

chronological age. However, the influence of a sampling error would be great for so small a group. This group is too small to be comparable with the other chronological age groups of the population used. Any conclusions drawn from or based on such a comparison would be unreliable.

The downward trend in the difference between the mean chronological age and the means of the developmental age and mental age is readily noticed. This trend may be accounted for by two factors. The sixteen year olds in the present study were in second year high school and their classmates were mainly boys younger than themselves. In addition to such association it is reasonable to expect that academic dislocation would affect a boy's level of interests in general. This is an example of the influence of environment on interests.

With these considerations in mind, it would seem advisable to use these nineteen subjects only so much as they may be a part of the whole population. For purposes of comparisons among the various chronological age groups it does not seem reasonable to include them in the range.

The developmental age level obtained in this study appears consistently higher than the level of Furfey's group, that is, higher than the published norms for the scale.

Table III shows a comparison of mean scores of chronological age groups in Furfey's study and the present work. Here,

TABLE III

COMPARISON OF MEAN DEVELOPMENTAL AGE SCORES OF A 1952  
POPULATION WITH SCORES OF THE ORIGINAL STANDARDIZ-  
ING POPULATION FOR THE FURFEY SCALE

	<u>FURFEY'S GROUP*</u>		<u>1952 EXPERIMENTAL GROUP</u>	
	N	Mean Score	N	Mean Score
10	99	92.09	50	98.00
11	124	98.30	76	107.00
12	127	108.40	80	123.23
13	99	122.90	85	145.98
14	114	138.20	70	148.10
15	105	152.26	44	157.77
16	79	164.27	19	154.47

\*The age range for Furfey's group was from eight to 18 years.

with the single exception of the sixteen year olds, the higher developmental age of each chronological age group of the present study is again apparent.

Figure I (page 31) is a graphic presentation of the raw scores of the Furfey scale for the author's population and for the subjects in the 1952 study. These raw scores are compared to the chronological ages. With Furfey's group, it will be noted that the scores increase regularly up to the age of twelve, and then more sharply from age twelve to sixteen. The higher scores of

the experimental group at the different age levels can be seen in this graph. Also, the increased acceleration of the curve occurs at the eleventh year, one year earlier than in Furfey's group. Then there is a notably sharp increase from twelve to thirteen years, followed by a tendency to level off. The drop in score for the last group has been previously discussed. However, here it can be seen that with the original standardizing group, there was a similar decrease in the score for the terminal groups.

From these comparisons of the mean scores as presented in Table III and Figure I it is readily seen that when compared to Furfey's population the present experimental group of boys has a more mature level of interests at each age, except the sixteen year level.

Since the scatter of scores for the several age groups of the original study is not available, it is not possible to determine the level of significance between the Furfey norms and the present results.

The higher achievement on the developmental age scale is obvious and fairly consistent in the experimental group. What explanation would show the reason for this difference between the 1952 scores and the norms established two decades earlier is not clear from the available data. Nevertheless, the social changes which may have occurred in that elapsed period would be reflected in an inventory of interests such as the Furfey scale.

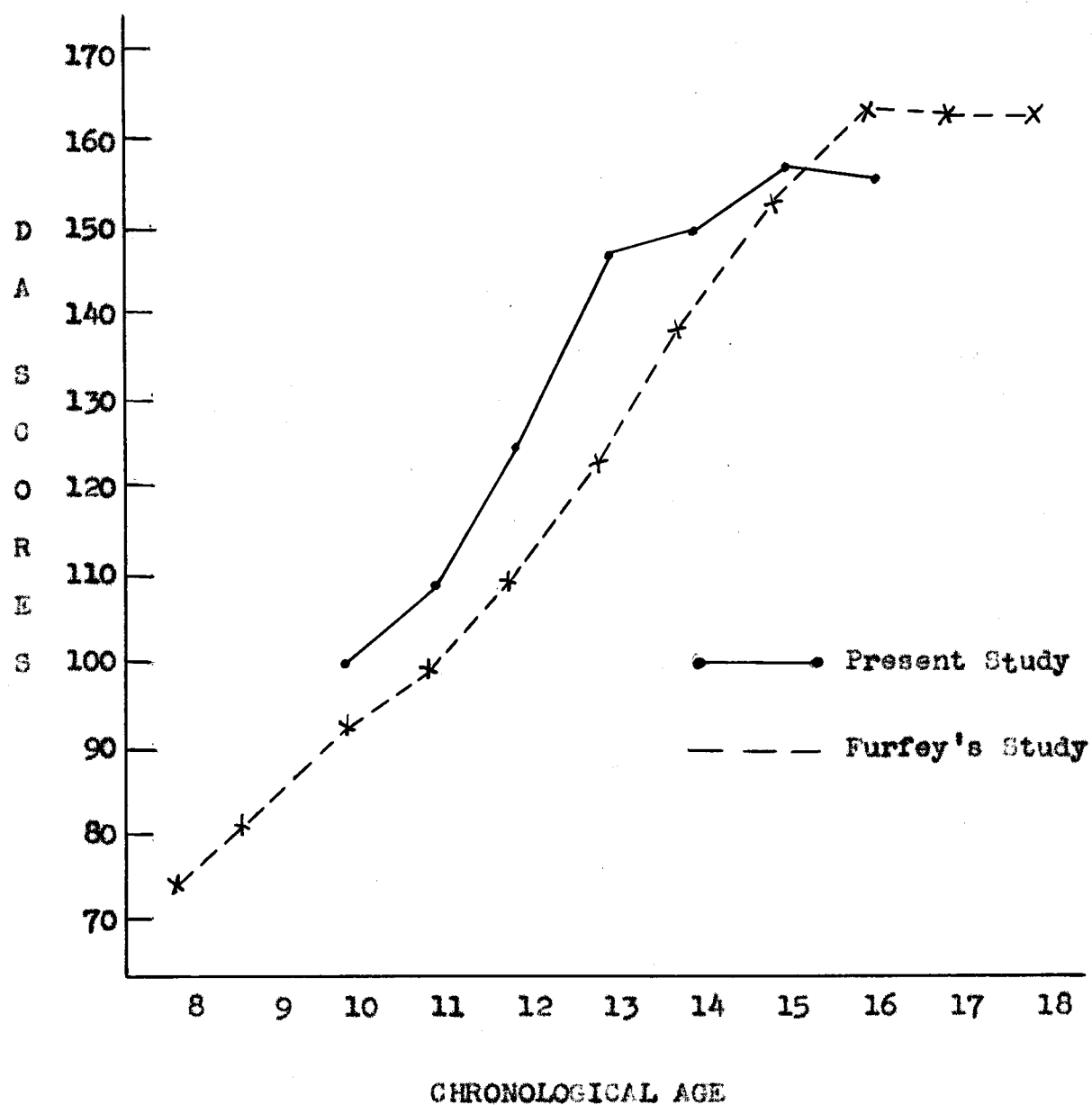


FIGURE 1

RELATION BETWEEN MEAN DEVELOPMENTAL AGE SCORE FOR  
CHRONOLOGICAL AGE GROUPS OF FURFEY'S STUDY  
AND THE 1952 STUDY

The growing learning boy of the present has had greater stimulation and a broader, perhaps richer experience through radio, movies, and television than the boy of the previous generation had access to. Advances in these media of communication may well have had an effect on the individual directly, and also indirectly in the way that these forms of entertainment have influenced the contemporary culture of these boys.

It is also quite likely that the higher score is a function of the test itself. Unfamiliarity with some of the possible choices in the various pairs or items of the scale would possibly account for a spurious choice, thus affecting the final score. These factors are deserving of consideration as possible explanations for the upward trend of average scores within the various chronological age groups of the present study.

Besides showing the trends within the whole population and for the particular groups for the various factors measured, it is important to demonstrate their relationships. Table IV presents the coefficients of correlation for developmental age with chronological age, mental age, and intelligence quotient, and a partial correlation for developmental age and intelligence quotient in which the effect of chronological age is eliminated by holding it constant.

It is noted that the influence of chronological age on developmental age is considerable and significant. For the

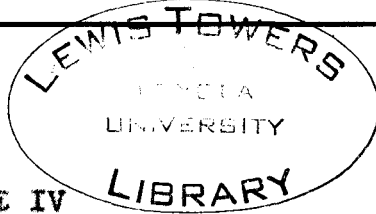


TABLE IV

COEFFICIENTS OF CORRELATION OF DEVELOPMENTAL AGES OF 424 BOYS WITH CA, MA, IQ, AND WITH IQ (AGE CONSTANT)\*

	r	P
DA with CA	.660	.001
DA with MA	.550	.001
DA with IQ	.194	.001
DA with IQ (Age Constant)	.257	.001

\*Note: The age range of this study was ten through 16 years.

present study, a coefficient of correlation of .66 ( $P = .001$ ) was found. This is in general agreement with Furfey's results.

Mental age as measured on the Otis test also seems to be an important factor in the maturity of boys' interests as measured on the Furfey scale. In this study there was an  $r$  of .55 ( $P=.001$ ) between MA and DA. While the latter  $r$  is not as significant as that of CA and DA, it does indicate that maturity of interests is, to a noteworthy degree, a function of mental age.

Developmental age is apparently subject to little influence from Otis IQ. The  $r$  for developmental age and intelligence quotient, though somewhat smaller, is not significantly different from the  $r$  of these two factors when the influence of chronological age is eliminated by calculating a partial cor-

relation with the latter factor held constant. This is substantially in agreement with Furfey's report of  $-.12$   $r$  for developmental age and mental ability as measured on the Cleveland Classification Test with a group of thirty-five boys, fourteen years old. There is a similar agreement between the partial correlation reported for this study and that of Furfey's work with sixty-six boys between the ages of twelve and sixteen years. The same instrument was used for this second group for the measurement of mental ability. For the group, the partial  $r$  with chronological age constant was  $-.08$ .<sup>3</sup>

The consistently higher level of developmental age in the 1952 experimental group is a possible basis for the more positive  $r$  of developmental age and intelligence quotient. It is well to note that Furfey felt his data were evidence that there is no demonstrable relationship between developmental age and intelligence.

The present study yields data which seem more in agreement with the conclusion of Boynton and Lowe. Working with a group of boys in a southern industrial school, they concluded that brightness if not mental age is significantly associated with ability to respond on the developmental age test. The same instruments of measurement used in this present experiment were

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3 Ibid., 112.



employed by Boynton and Lowe.

## CHAPTER V

### CONCLUSIONS

This study was conducted with a 1952 population to investigate the applicability of the Furfey Developmental Age Scale and its norms, which were established in 1931. A secondary purpose was to study the implication made by the author of the scale that little or no relation exists between developmental age and mental age.

The Furfey Test for Developmental Age, Form B-3 is a scale devised to measure developmental age as it is reflected in a boy's choice of pastimes, in his fantasy life, his ambitions and the like. This scale and the Otis Self-Administering Test of Mental Ability were administered to a group of approximately 460 boys, ten through 16 years old. Of this number, 424 subjects' tests were found suitable. Measures were taken for each individual's chronological age, developmental age, and mental age, as well as intelligence quotient. Chronological age was calculated to the nearest month. The raw scores of the two tests were converted to expressions of the appropriate measures through use of the available norms and tables of equivalent values.

Statistical analysis of the data indicated that there

was a normal distribution within the population for the variable factors of developmental age, mental age and intelligence quotient. Chronological age also appeared to be of normal distribution in the sample.

The mean chronological age was 13.13, with a range of ten through 16 years, and a standard deviation of 1.67 years. The mean developmental age was 13.91, with a standard deviation of 2.35 years within the range of 7.5 to 17.5 years. Intelligence quotients yielded a slightly higher than "average" mean at 105.38 but two standard deviations of 12.90 about this mean included better than two-thirds of the entire group. Intelligence quotients of the group ranged from 60 to 140. Mental age had a mean of 13.75 years, and the standard deviation was 2.48. The mental age range was 7.75 through 18.41 years.

The level of developmental age achievement on the Furfey scale was studied for each chronological age group, and compared with the mean achievement of the corresponding chronological age group in Furfey's original population. It was found that the mean developmental age scores for the 1952 population in all groups (except the oldest, the sixteen year olds) were higher than the original group's mean scores. The difference ranged from five-and-a-half points to twenty-three points. In equivalent values, this is a range from five to twenty months.

Comparison of these data from the original study and

the 1952 experimental study was made through use of a graph. A moderate similarity was noted in the rate of increase of scores as reflecting the level of maturity of interests. However, the acceleration of the present experimental group began with a group one year younger than with the original group. Also, the leveling off of the curve occurred earlier than with the Furfey population. It seems then, that the contemporary population has a similar increase in developmental age, though it is somewhat more advanced than with the earlier group. Contemporary use of the test can be made only with certain reservations. From the present data, it appears the test is applicable today only with due allowance for a more sophisticated level of interests than the original norms indicate.

The reasons for this higher developmental age in the 1952 population may be numerous. From the present work it appears probable that this difference can be explained through (1) social changes which have occurred during the elapsed time since the original norms were established, (2) increased stimulation and broader experiences made possible through the mediums of entertainment and education now current--movies, radio, and television, and (3) a limited familiarity with some of the choices in the items.

Coefficients of correlation were calculated for developmental age and each of the other factors measured, chronological age, mental age, and intelligence quotient. They were all

positive and in broad agreement with the findings of Furfey. The correlation between developmental age and chronological age was the highest:  $r = .66$  ( $P = .001$ ). The next highest coefficient was between developmental age and mental age:  $r = .55$  ( $P = .001$ ). From these data it appears that chronological age is slightly more indicative of developmental age as measured by level of interests than is mental age, though both seem to be highly related to growth and development as measured by the Furfey scale.

The coefficients of correlation for developmental age and intelligence quotient and of the partial correlation for these two factors (with chronological age constant) are evidence that maturity of interests is only slightly influenced by degree of brightness, as expressed in the Otis intelligence quotient.

From these findings, the general conclusions may be stated as follows.

The boys of the unselected population of this study appear to have a higher level of maturity of interests than the subjects of the various corresponding chronological age groups in the unselected population on which the developmental age scale was standardized.

There is a gradual increase in mean developmental age scores for the 1952 population between the ages of ten and eleven, after which there is a rapid increase to the upper limits

of the scale.

The reliability for a 1952 population of the discrimination of the scale as it approaches the upper limit is unclear from the present data.

Chronological age and mental age are apparently more significant indices of the degree of maturity of interests than is intelligence quotient. Of these two indices, chronological age is more significant than mental age.

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APPENDIX I

GRAPHS OF DISTRIBUTIONS OF FACTORS MEASURED  
IN A STUDY WITH 424 BOYS

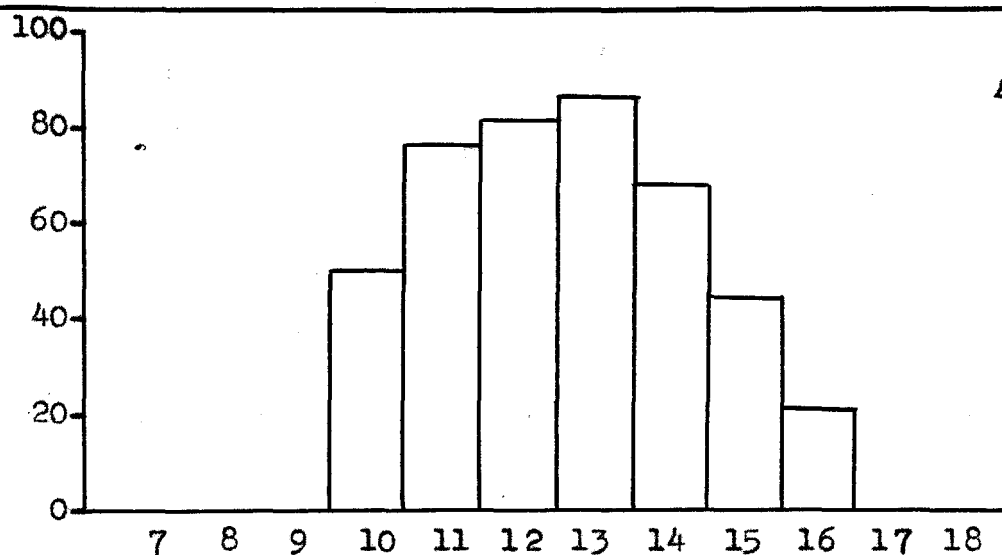


Figure 2 Chronological Ages of 424 Boys of 1952 Population

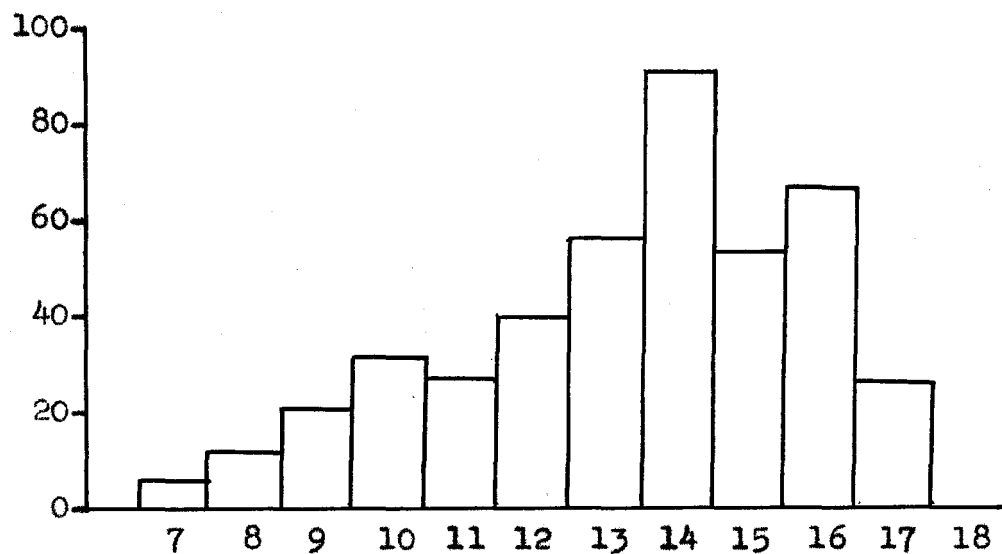


Figure 3 Developmental Ages of 424 Boys of 1952 Population

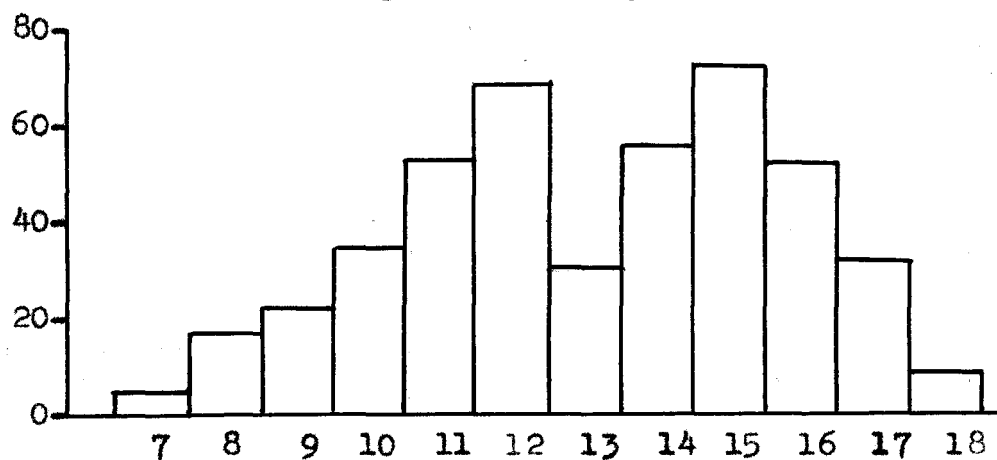


Figure 4 Mental Ages of 424 Boys of 1952 Population

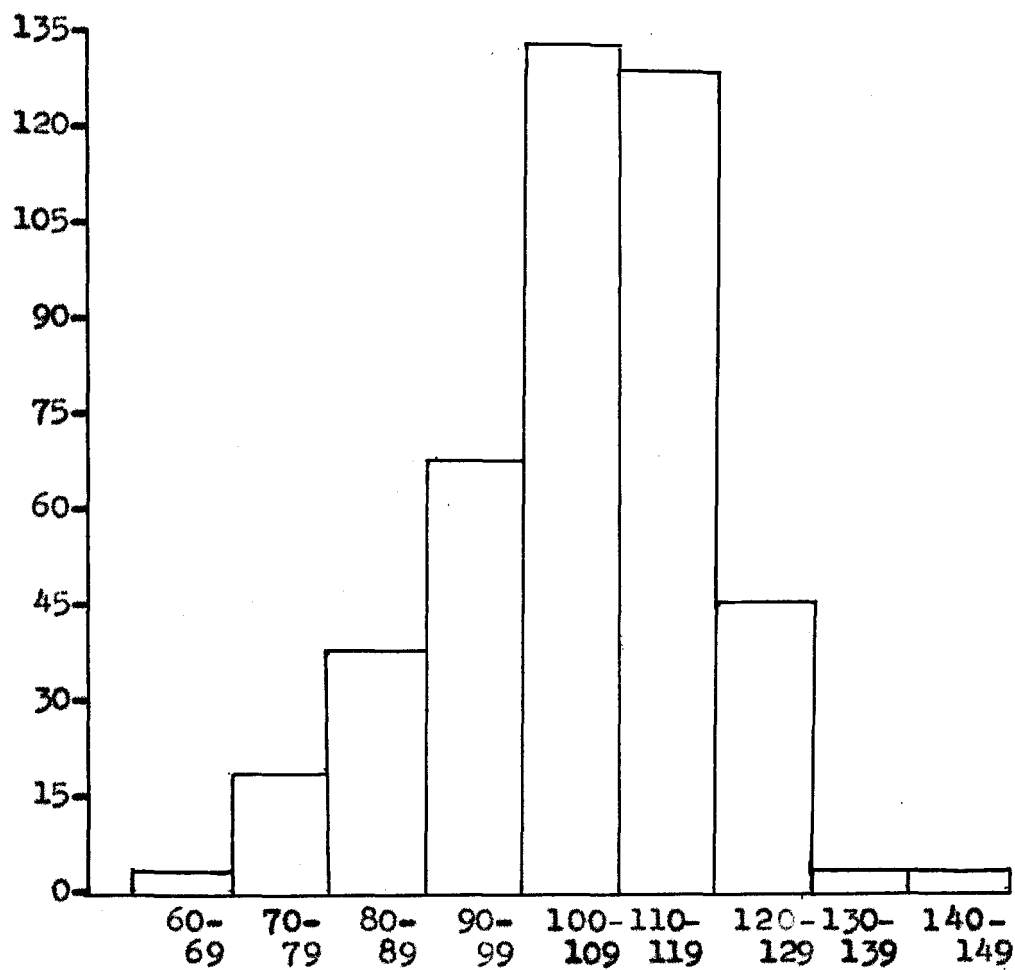


FIGURE 5

Intelligence Quotients of 424 boys of 1952 population

APPROVAL SHEET

The thesis submitted by Edward M. Flaherty has been read and approved by three members of the Department of Psychology.

The final copies have been examined by the director of the thesis and the signature which appears below verifies the fact that any necessary changes have been incorporated, and that the thesis is now given final approval with reference to content, form, and mechanical accuracy.

The thesis is therefore accepted in partial fulfillment of the requirements for the Degree of Master of Arts.

January 22, 1954  
Date

Charles I. Doyle, Jr.  
Signature of Adviser