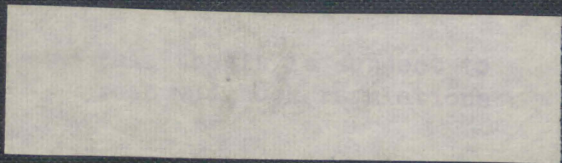


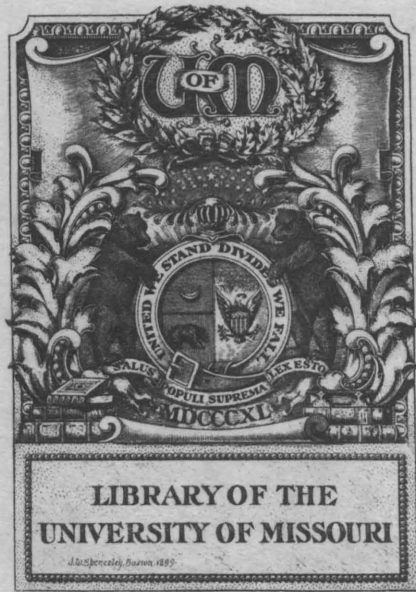
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THE MENTAL AND PHYSICAL DEVELOPMENT OF RURAL CHILDREN

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by

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### A C K N O W L E D G M E N T S

The writer is deeply indebted to Dr. W.H.Pyle, Professor of Educational Psychology in the University of Missouri for his wise counsel and his patient direction of this study. His idea of measuring the mental and physical development of urban children is applied in this experimental study of rural children. The writer, also, wishes to express his appreciation for the sympathetic co-operation given in this work by the rural school teachers of McDonald County, Missouri, whom he has had the pleasure to supervise as county superintendent of public schools during the past four years.

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THE MENTAL AND PHYSICAL DEVELOPMENT OF RURAL CHILDREN.

A. PROBLEM.

Are there any fundamental differences between rural and urban children in mental and physical growth and development? If there are differences, are they due to the inborn nature of the children, or to environment?

B. METHOD.

The problem of this investigation grew out of the writer's interest in, and a study of, the application of scientific measurements to the children of the rural schools. The chief activities in this new field, which has had a phenomenal growth in the last ten years, have been in devising tests, establishing norms, and in using these in the study of individual differences of children in the large city school systems. Such activities are no doubt the foundation stones of scientific education. The next great step in this movement will be to bring this scientific technique and data into the classroom of every American school. That is, if this wave of enthusiasm for scientific methods in education is to be of lasting value, it must work itself into the methods of teaching in our schools.

This study has consisted in making physical measurements and in testing the mental ability of 2,034 rural school children of McDonald County, Missouri---covering all of the seventy-two rural schools of this county. The method followed was the same as described in Pyle's THE EXAMINATION OF SCHOOL CHILDREN. Seven physical tests were given; namely, Standing Height, Sitting Height, Weight, Muscular Strength, Muscular Speed, Lung Capacity, and Vital Index. The Vital Index was computed by dividing the Lung Capacity in cubic centimeters by the weight in pounds. Free Association, Controlled Association, Substitution, Rote Memory, Logical Memory, and Completion were the mental tests used. The Free Association test determines the rate of the free flow of ideas. The Controlled Association test is a test in controlled thinking. The Substitution test is a test of quickness of learning, or building up new bonds. The Rote Memory test determines ability to reproduce disconnected words. Two lists were given, one being a list of concrete words; the other, of abstract words. The Logical Memory test determines ability to reproduce meaningful material immediately after it is presented. The Completion test is a test of reasoning capacity. The pupil is given a story that has certain words omitted. He must read the story, see what it is trying to say and determine what words, put into the blanks, will make the correct sense.

The examination of the rural children was made and the grading of all papers was done by the writer personally so



as to eliminate any possible error that might arise from variation of method of different examiners. The greatest of care was exercised to secure uniformity of procedure. Wherever possible the tests were illustrated with material different from that to be used, and every effort was used to make sure that the children understood exactly what to do before beginning a test. Care was taken to see that there was no copying or cheating. So far as possible the pupils were brought into proper attitude toward the tests so that each would do his best. This was never difficult as they usually considered the tests great fun.

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**INTRODUCTION**

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## II. INTRODUCTION.

Before we can deal intelligently with rural children we must have accurate information concerning their physical and mental development. We must know about their physical nature, because it has been proven beyond doubt that there is a close relation between mind and body. We now understand the child as a psychophysical being, a being of both mind and body. Mental processes are parts of this being and are determined by accompanying brain activity. This dependence of mind upon body is very evident to every one upon the most casual observation. We know the effects on the mind of disease or good health, of blindness or deafness of hunger or bodily injury. We know how dependent the mind is on the sense organs which are merely modifications of the nervous system together with certain mechanisms for enabling stimuli to act on the nerve ends. If we are born blind, we will have no visual mind; if we are born deaf, we will have no auditory mind; if we lack the taste and smell organs we will have no taste and smell minds. In a word, our knowledge of the world comes only thru the sense organs. The sharp distinction and separation of mind and body in the past has been a great



mistake. The body has been looked upon as a hindrance to the mind, and for that reason it was humiliated and degraded. We now see that this is a great error because nothing can happen in the mind which is not completely determined by accompanying brain processes. Examinations of school children have shown that if all the children of the same age in the school are studied, it is found that the heavier ones, the stronger ones, the taller ones, the ones with the quickest muscular speed, are in the upper grades. It is therefore very important that physical measurements and tests be made along with the mental tests if we are to have an accurate knowledge of the inborn nature and possibilities of rural children.

Along with this knowledge of the physical development, we must secure accurate information concerning the mental development of rural children if we are to understand their ability and rapidity of development. This brings in the mental tests as means of measuring mental ability, the object of which is to assist the teacher in obtaining a knowledge of the individual child. This is one thing the teacher very much needs to know, the child's ability. In case a pupil is doing poor work in a subject, these tests will assist her to know whether it is a lack of ability, or if it is due to the fact that the child was started

at the wrong age or to poor teaching or started wrong in the subject. In a few cases, a teacher is at a loss to know whether a child's failure in a grade is due to a lack of ability, or a lack of effort. Again these tests will prove of inestimable value in solving such problems, the right solution of which means much for the children. If the teacher finds that the child fails because of a lack of ability, it would not seem wise to promote him, but he should be put in a grade where he can do the work. If, on the other hand, she finds he fails because of a lack of effort, he should, in most instances, be promoted and an effort made to get him to do the work that he is capable of doing. Promotion of pupils should be based, by all means, on their mental ability rather than on chronological age. An accurate knowledge of the child's ability and development will not only be a help in gradation and classification, but should also help in the actual teaching. Any information that a teacher can get about the child should be a help in dealing with that child. Examinations of children indicate that there is a wide difference of ability possessed by the children in the same grade. It will usually be found that there are children in the fourth grade with as great mental ability as that of some pupils in high school. A more careful system of gradation will lead to more nearly equal ability

in the same grade and should ~~make~~ make better teaching possible. In short, the progress of children thru the grades should be in accordance with their mental ability and with the rapidity of their development. Some children develop much faster than others and can acquire the skill and knowledge of the school subjects much faster than others. The mental tests will aid in determining the development of the children and should lead to greater economy of time and effort in dealing with them.

Hence, an accurate knowledge of the physical and mental natures of each child is of inestimable value, if we are to deal intelligently with children. Such information will assist the teacher in adapting her teaching to the various types and degrees of capacity before her, and particularly she could know how to direct the study of each child. Some children are quick to learn, as shown by the substitution test; others are slow. Some are quick in doing things, as shown by the test in muscular speed; others are slow. The associative processes of some children are quick, of others, slow. Some have good memories, while the memories of others are poor and inaccurate. These differences make it necessary to teach a child to study in such a way that he will get the largest return for his efforts. There is a method of study best adapted to the various types of memory, ideation,



and imagination. The teacher must determine these specific mental characteristics and then teach the child to use the appropriate method of study. All the subnormal and backward children should be most carefully studied so that the kind of work that they are able to do and the way they should do it can be scientifically determined. Besides the subnormal and backward children, there will be found many children scattered thru the grades who, because of some minor peculiarity or defect, need special study and attention. Then there is the supernormal child, the child that is far above the average. Such children should be picked out on the basis of actual work in school and on the basis of the mental tests and physical development, and then allowed to pass thru the grades as fast as their ability and development warrant. In all this work, the mental and physical tests will be of inestimable assistance.

So far very little has been done in the way of measuring the mental and physical development of rural children. The chief activities in this new field have been in the study of individual differences of children in the large city school systems. Now what is needed for the rural schools is something like the following: When a child enters school for the first time, accurate information should be obtained concerning its home and

parents, and accurate physical and mental measurements and tests should be made, including a careful medical examination. The different forms of examination should be repeated at least every six months during the school life of the child, and all the data recorded and carefully kept as a permanent record of the child. The medical data should be obtained by a school physician, the physical and mental data can be obtained by the teacher, but the tests ought to be under the direction of a child expert who should be connected with the office of county superintendent of public schools. For this work to be most valuable the tests given should be uniform throughout the county, and should be kept in similar form so that when a child moves from one school to another his record could be mailed to his new teacher and would be perfectly intelligible. The following page illustrates one kind of form that could be used in recording the mental and physical data of children.

The gradation and classification of pupils, the nature of the curriculum and methods of teaching, are vital questions for rural education. The mental measuring rods for classification and promotion which have been universally applied in rural education are: (1) the amount assimilated of the knowledge specified in the rural school curriculum, and (2) the teacher's judgment of the child's ability. The need of a more scientific procedure has for sometime been felt by

those who are interested in the improvement of rural education. The appalling number of repeaters in the grades, year after year, in the rural schools demands that these questions cease to be mere matters of opinion, but be based upon accurate knowledge of mental abilities of rural children.

The desire to render some service to the great body of workers in the field of rural education and to prevent what is probably avoidable waste of the time of our rural boys and girls has led the writer to attempt furnishing some information upon this subject. Or in other words, Is the rural school, as now constituted, effectively meeting the new responsibility being laid upon it? To this end, this has been an experimental investigation in making a mental and physical diagnosis of rural children in comparison with their urban cousins in order to find out whether there are any fundamental differences between them in mental and physical development, and if there are differences, whether they are due to inborn nature of the children, or to environment.

(Mental and Physical Record)

Name

Grade

Years in School

Years

Age

Months

Completion

Word Building

Free Association

Opposites

Substitution

Rote Memory

Concrete

Rote Memory

Abstract

Logical Memory

Weight

Lung Capacity

Height-Standing

Height-Sitting

Grip-Right

Grip-Left

Speed-Right

Speed-Left

Sight

Hearing

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PHYSICAL MEASUREMENTS.

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### III. PHYSICAL MEASUREMENTS.

The most casual observation shows the dependence of mind upon body. We know the effect on the mind of good health or disease, of blindness or deafness, of bodily injury, and of hunger. But the part of the body to which the mind is most directly related is the nervous system. Our primary knowledge of the world comes only thru our sense organs which are merely modifications of the nervous system. We see only with our eyes, hear only with our ears, taste only by the taste organs in the mouth, and smell only with the organs of smell in the nose. Since sensations are our primary experiences out of which our mind is made, and since sight and hearing are the most important sense organs, it is very evident that our mind is dependent on these organs. If these sense organs are defective, we are unable to do our work well. This is often the case with children. Examinations\* have revealed that about forty per cent of school children have defective vision and that about twenty per cent have defective hearing; and in most of these cases proper treatment would correct these defects. So great is the importance of good vision and hearing in school work and the later work of life, that every teacher should know how to

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\*Pyle: The Examination of School Children, pages 52 and 55.



make simple tests to determine these defects. Children showing any symptoms of visual or auditory defects should be required to have these defects treated by specialists in this work.

The sharp distinction and separation of mind and body in the past has been a great mistake. The body has been looked upon as a hindrance to the mind, and for that reason it was humiliated and degraded. We now see that this is a great error because nothing can happen in the mind which is not completely determined by accompanying brain processes. In order to develop the mind properly, we must look carefully after the conditions of the body. It is therefore very important that physical measurements and tests be made along with the mental tests. Careful records of a child's physical growth and development should be kept from the time of entering school till the school work is finished. Examinations\*\* of school children have shown that if all the children of the same age in the schools are studied, it is found that the heavier ones, the stronger ones, the taller ones, the ones with the quickest muscular reaction, are in the upper grades.\*\*\*\*\*

The most significant physical measurements are the measurements of weight, height, vital capacity, muscular strength and muscular speed. These measurements have been used extensively by Pyle,\*\*\* Whipple,\*\*\*\* and other psychologists

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\*Max Myer: Relation between Mind and Body, Journal of Philosophy, Psychology and Scientific Meth. Vol. 9, Number 14.

\*Munsterberg: Psychology and the Teacher, Chaps. 13 and 14.

\*\*Pyle: A Manual for the Mental and Phy. Ex. of Sch. Chil.p 4(1916)

\*\*\*Pyle: The Examination of School Children, 1913.

\*\*\*\* Whipple: A Mannal of Mental and Physical Tests, Vol. 1.

\*\*\*\*\* See pages 45 and 46.

until now very definite norms are established for urban children for all ages. So far very little of this work has been done in the country. The Bureau of Education informed the writer that the only work of this kind done in the country was made by Clark, Collins and Tredway\* in a study of the rural children of Porter County, Indiana. This study included only two of the physical measurements, Vital Capacity and Muscular Strength.

The notion nowadays voiced by a number of the leading authorities on rural hygiene, notably Dr. Thomas D. Wood, of Columbia University, is that rural children are inferior in physical development as compared with urban children. Dr. Wood says: "It is apparent that, within the last decade, the actual and vaunted physical superiority of country people and children over those living in the cities has been reversed, and it is now confidently affirmed that, for the entire population, city dwellers are more healthy than those living in the rural districts!"

Since very little actual measurements of the physical development of rural children has been made, and since we now have very definite norms established for the physical development of urban children, a study of the physical development of rural children as compared with urban would be a very interesting and profitable investigation. To put the issue in the form of questions, it is this: Are there any fundamental differences between urban and rural children? If there are differences, are they due to environment, or to the inborn nature of children? With these questions in mind the following measurements were made: Weight, Height, Vital Capacity, Muscular Strength and Speed.

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\*Rural School Sanitation," Pub. Health Bul. #77, Bureau Education.

WEIGHT. Weight was determined by the use of platform scales. Table I and Figure I show the weights for the different ages. The growth curves for weight show the urban\* children slightly heavier than the rural, the average per cent being 103% for urban boys and 101.2% for urban girls. At 8, 16, and 18 for boys, and at 8, 12, 15, and 16 for girls, the rural children are heavier than the urban. But at all other ages the urban children excel the rural in weight. It would, of course, be a mistake to assume from this that the urban man and woman are heavier than the rural, but this indicates that the urban children mature faster than the rural children.

STANDING HEIGHT. The measurements of height were made by the use of a stadiometer and a micrometer, the heel height being subtracted from the total height. Table II and Figure II show the increase in height for ages 8 to 18. This study indicates that the rural children are slightly shorter than the urban, the average per cent being 99.4% for rural boys and 99.2% for rural girls. Again it would be a mistake to assume that the urban man and woman are taller than the rural, but this, like the curves for weight, indicates that the urban children mature faster than the rural. According to the investigations,\*\* the height of American-born children is modified by density of population, being a decrease in stature from five years of age upward. While this is not verified in the comparison of rural children with the urban studied by Pyle,\* it is verified if we compare the height of rural children with the

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\*The term "urban" used thruout in this study refers to the norms for urban children found in Pyle's Manual for the Mental and Physical Examination of Children, 1916.

\*\*Whipple: Manual of Mental and Physical Tests, Vol.I, p. 70.

TABLE I.

NORMS OF WEIGHT FOR RURAL AND URBAN CHILDREN.

Age	Boys.				Girls.			
	Number.		Weight in Lbs.		Number.		Weight in Lbs.	
8	127	64	57.6	56.1	147	63	52.9	52.0
9	108	78	61.0	62.4	115	70	58.5	61.7
10	121	76	67.3	67.5	139	83	65.9	66.7
11	105	91	72.0	75.9	106	91	73.6	76.4
12	114	82	79.2	82.1	117	91	86.1	85.0
13	74	83	85.1	92.2	116	74	94.1	96.0
14	88	81	99.0	103.7	93	91	103.8	104.7
15	51	88	113.6	121.5	79	92	117.3	113.8
16	66	47	128.0	127.5	53	43	118.6	117.4
17	44	43	130.6	139.9	62	83	115.0	122.7
18	36	38	144.0	140.6	81	43	120.4	123.1

Black figures are for rural children. Red figures are for urban children. The average per cent of the norms for rural children, in comparison with the norms for urban children, is 97.0% for rural boys and 98.8% for rural girls.

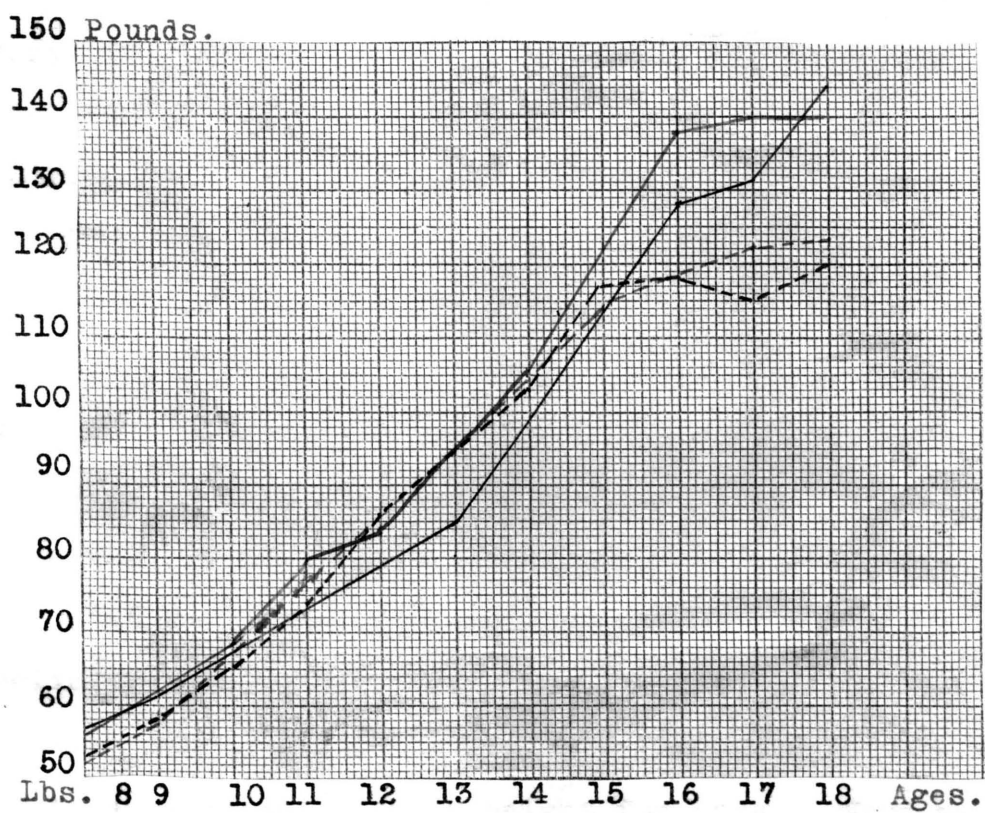


FIGURE I. WEIGHT. Black lines are for rural children. Red lines are for city children. Solid lines are for boys. Broken lines are for girls.

height of Chicago children.\* In this case we find the rural boys taller than the Chicago boys by an average of one centimeter, and the rural girls taller than the Chicago girls by an average of two centimeters. The rural boys excel the Chicago boys at every age with the exception of 16 and 17, while the rural girls excel the Chicago girls at every age with the exception of the ninth.

There is some variation in the crossing of the sexes. Rural boys continue their growth in height later than rural girls, that is, maturity in height is not reached so early. The same is true for urban children. From 8 to 10 the rural boys are taller than the rural girls. The same is true for urban children. From 10 to between 14 and 15, the rural girls are taller than the rural boys, because the prepubertal acceleration of growth occurs earlier in girls. From between 14 and 15 to 18, the rural boys are taller than the rural girls, which, as stated above, is due to a later maturity in height for boys. Very much the same is true for urban children at these ages.

SITTING HEIGHT. Table III and Figure III show the sitting height for rural and urban children. Urban children are longer in body than rural for all ages with the exception of the eighteenth year, the average per cent of the norms for rural children, in comparison with urban children, being 99.1% for boys and 98.3% for girls. If the norms for sitting height of rural children are compared with the norms of Chicago children\*, we find that the Chicago children are longer in body

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\*Whipple: Manual of Mental and Physical Tests, Vol.I, p. 67.



TABLE II.

NORMS OF STANDING HEIGHT FOR RURAL AND CITY CHILDREN.

Age.	Boys				Girls			
	Number		Height Cm.		Number		Height Cm.	
8	128	75	126.3	125.5	147	60	125.5	123.8
9	108	74	130.3	130.6	115	68	126.1	130.6
10	121	64	134.5	135.5	130	70	137.0	135.1
11	105	75	139.5	140.7	106	61	139.7	141.6
12	114	64	144.2	144.0	117	67	147.5	146.9
13	74	67	148.7	151.2	116	79	152.3	154.7
14	88	59	155.4	156.1	93	55	156.3	156.3
15	51	60	163.5	164.4	79	78	159.9	159.4
16	66	37	163.3	164.5	53	79	163.3	159.5
17	44	34	163.2	171.8	62	48	160.4	159.7
18	36	36	176.1	171.2	81	33	163.1	159.3

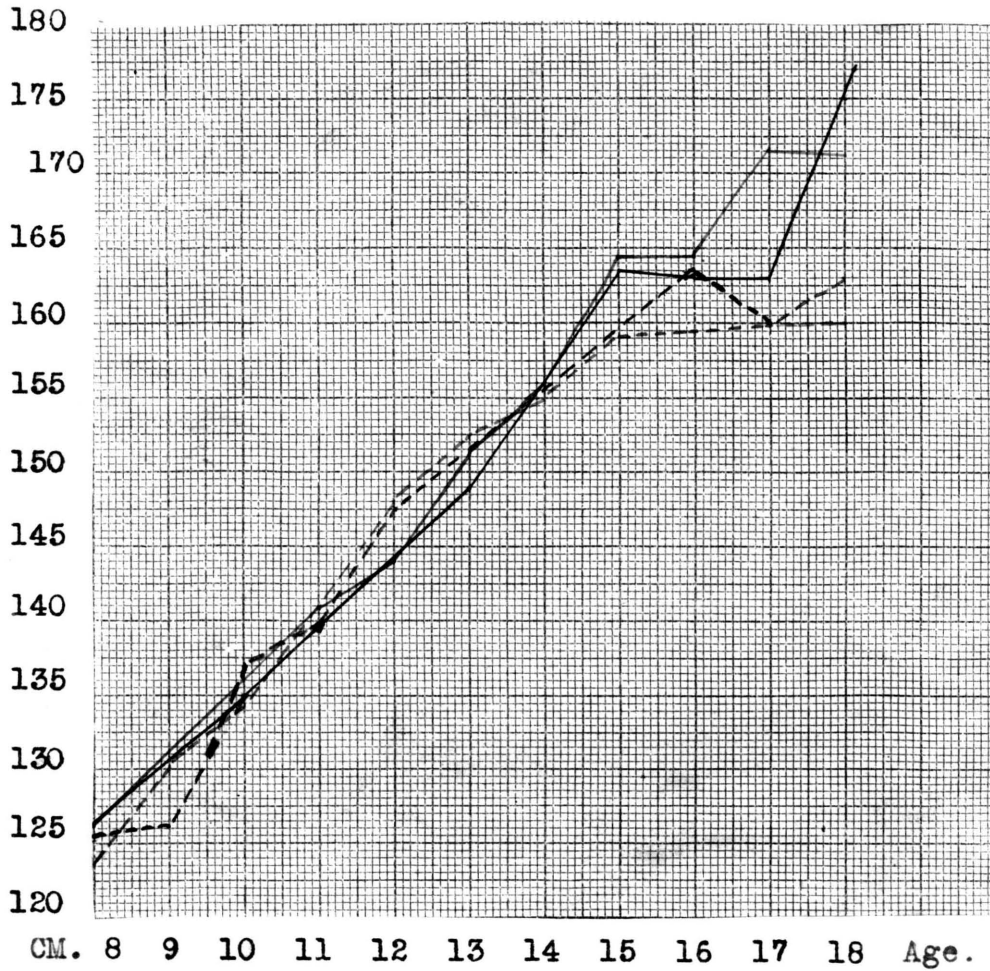
Black figures are for rural children. Red figures are for city children. The average per cent of the norms for rural children, in comparison with the norms for city children, is 99.4% for rural boys and 99.2% for rural girls.

TABLE III.

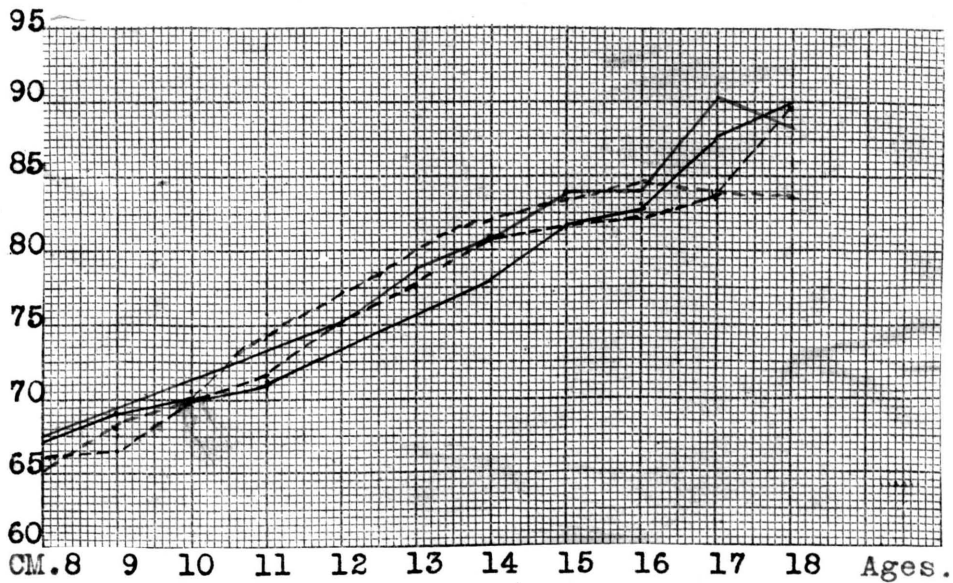
NORMS OF SITTING HEIGHT FOR RURAL AND CITY CHILDREN.

Age.	Boys				Girls.			
	Number		Height Cm.		Number		Height Cm.	
8	127	61	67.8	65.7	147	60	66.3	65.7
9	108	60	68.5	68.9	115	68	66.4	68.9
10	121	75	70.4	70.9	130	70	70.4	70.9
11	105	74	71.6	74.0	106	61	71.7	74.0
12	114	64	73.3	77.1	117	67	75.1	77.1
13	74	74	75.6	79.9	116	80	77.4	79.9
14	88	64	78.3	81.3	93	48	80.5	81.8
15	51	67	81.9	83.7	79	61	81.5	83.7
16	66	54	82.1	84.2	53	67	82.2	84.2
17	44	44	87.4	84.0	62	40	83.5	84.0
18	36	29	89.7	83.5	81	30	83.9	83.5

Black figures are for rural children. Red figures are for city children. The average per cent of norms for rural children in comparison with the norms for city children, is 99% for boys and 98% for girls.



CM. 8 9 10 11 12 13 14 15 16 17 18 Age.  
FIGURE II. STANDING HEIGHT. Black lines are for rural children. Red lines are for city children. Broken lines are for girls. Solid lines are for boys.



CM. 8 9 10 11 12 13 14 15 16 17 18 Ages.  
FIGURE III. SITTING HEIGHT. Black lines are for rural children. Red lines are for city children. Broken lines are for girls. Solid lines are for boys.

than the rural children, which is contrary to what we found in the comparison of standing height. The Chicago children\* are longer in body as compared with rural children for every age from 8 to 18. This seems to indicate that the density of population affects only the length of the legs of urban children.

Race?

The variation in the crossing of the sexes follow the variations found in standing height. From 8 to 11 the rural boy is taller than the rural girl. From 11 to 15 the rural girl is taller than the rural boy. From 15 to 18 the rural boy is taller than the rural girl. The average per cent of difference between rural boys and girls is 3.0% in favor of the rural boys, while the difference is only 1.0% in favor of urban boys as compared with urban girls.

MUSCULAR STRENGTH. The strength of grip was determined by the use of the improved form of Smedley's dynamometer. Three trials were given alternately to each hand. Table IV and V, and Figure IV and V show the muscular strength for rural and urban children. This study indicates that the rural children have a better grip than the urban children, the average grade for rural boys being 101.5% for the right hand and 102.1% for the left hand, and for rural girls 108.2% for the right hand and 106.4% for the left hand. The muscular strength of the hands of rural boys increased constantly from the eighth year to the eighteenth. A slight decline in the rate took place

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\*Whipple: Manual of Mental and Physical Tests, Vol. I, p. 67.

at the seventeenth year. In rural girls, the rate of increase was also fairly constant. A slight decline in rate took place at the fifteenth year and remained almost stationary between the fifteenth and eighteenth years, which, as noted in weight and height, is due to the fact that girls reach maturity earlier than boys. For all ages rural boys excel rural girls in muscular strength, there being a difference of 23.9% for the right hand and 22.9% for the left hand. Very much the same is true for urban children. The urban boys excel the urban girls in muscular strength by 31.1% for the right hand and 29.4% for the left.

At 8, 9, 10, 11, and 18 the rural boys excel the urban boys in muscular strength for the right hand, and at 8, 9, 10, 11, 12, 15, 16, and 18, they excel the urban in muscular strength for the left hand. For all other ages, the urban boys excel the rural boys. At 8, 9, 10, 11, 12, 14, 15, 16, 17, and 18 for the right hand and at all ages for the left hand, the rural girl excels the urban.

If the norms for muscular strength of rural children are compared with the norms of Chicago children,\* we find very much the same differences in favor of the rural boys and girls as are found in the above comparison.

This study, then, indicates that rural children are stronger than urban children, in spite of the fact that they mature later. This superiority in muscular strength of rural

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\*Whipple: Manual of Mental and Physical Tests, Vol. I, p. 102.

TABLE IV.

NORMS OF MUSCULAR STRENGTH FOR RURAL AND CITY CHILDREN.

Age.	<u>RIGHT HAND.</u>				Girls.			
	Boys		Grip Kg.		Number		Grip Kg.	
8	127	78	14.3	14.0	147	64	12.5	10.4
9	108	78	16.4	15.7	115	72	14.3	13.2
10	121	77	17.6	16.7	130	85	15.6	14.3
11	106	93	19.6	19.2	106	80	17.4	16.3
12	114	79	21.8	22.0	117	92	21.0	18.9
13	74	80	23.9	25.1	116	92	21.9	22.7
14	88	79	28.3	29.6	93	73	25.3	24.7
15	51	87	32.6	33.8	79	96	28.4	27.3
16	66	48	40.5	37.8	53	97	29.5	27.4
17	44	46	42.0	44.0	62	58	30.7	27.2
18	36	51	50.5	44.2	81	44	31.5	28.0

The black figures are for rural children. The red figures are for city children. The average per cent of the norms for rural children, in comparison with the norms of city children, is 101% for boys and 107.6% for girls.

TABLE V.

NORMS OF MUSCULAR STRENGTH FOR RURAL AND CITY CHILDREN.

Age.	<u>LEFT HAND.</u>				Girls.			
	Boys.		Grip Kg.		Number		Grip Kg.	
8	127	78	13.1	12.6	147	64	11.4	10.1
9	108	78	15.2	14.4	115	71	13.1	12.2
10	131	77	16.4	15.4	130	85	14.9	13.4
11	105	93	18.2	18.0	106	81	16.3	15.6
12	114	78	20.5	20.3	117	94	19.6	18.5
13	74	81	22.5	23.3	116	92	22.2	21.7
14	88	79	26.3	27.7	93	73	24.3	23.1
15	51	86	31.3	29.2	79	96	26.8	25.3
16	66	53	37.9	36.0	53	97	27.9	26.1
17	44	45	40.0	42.3	62	59	28.4	25.5
18	36	48	46.3	42.7	81	44	29.2	26.3

The black figures are for rural children. The red figures are for city children. The average per cent of the norms for rural children, in comparison with the norms for city children, is 101.1% for boys and 107.5% for girls.

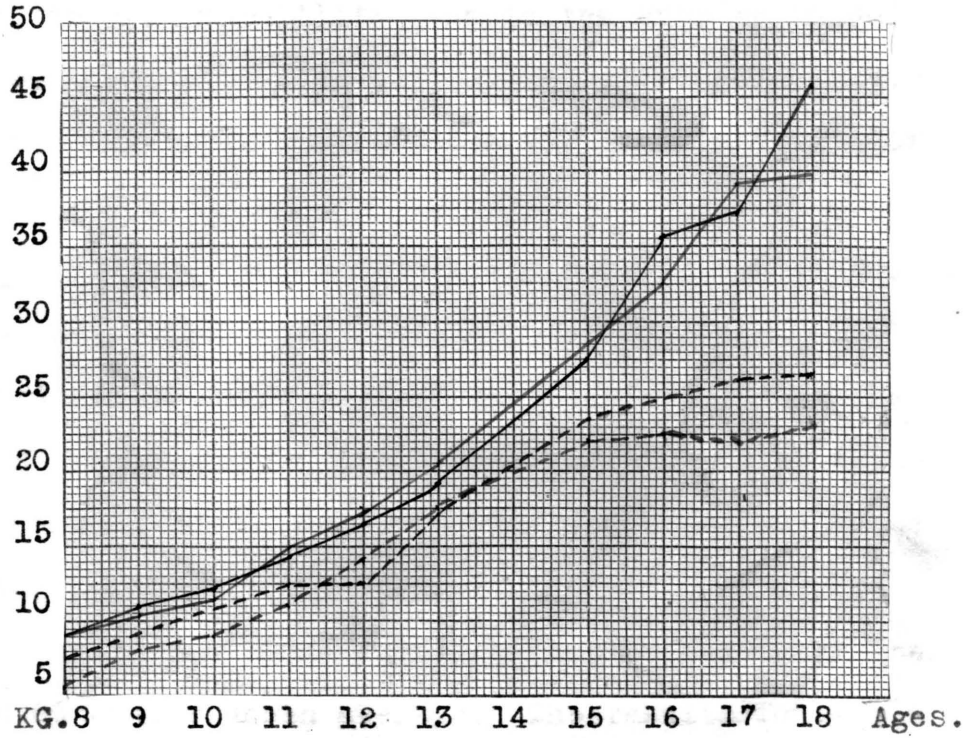


FIGURE IV. GRIP, RIGHT HAND. Black lines are for rural children. Red lines are for city children. Solid lines for boys. Broken for girls.

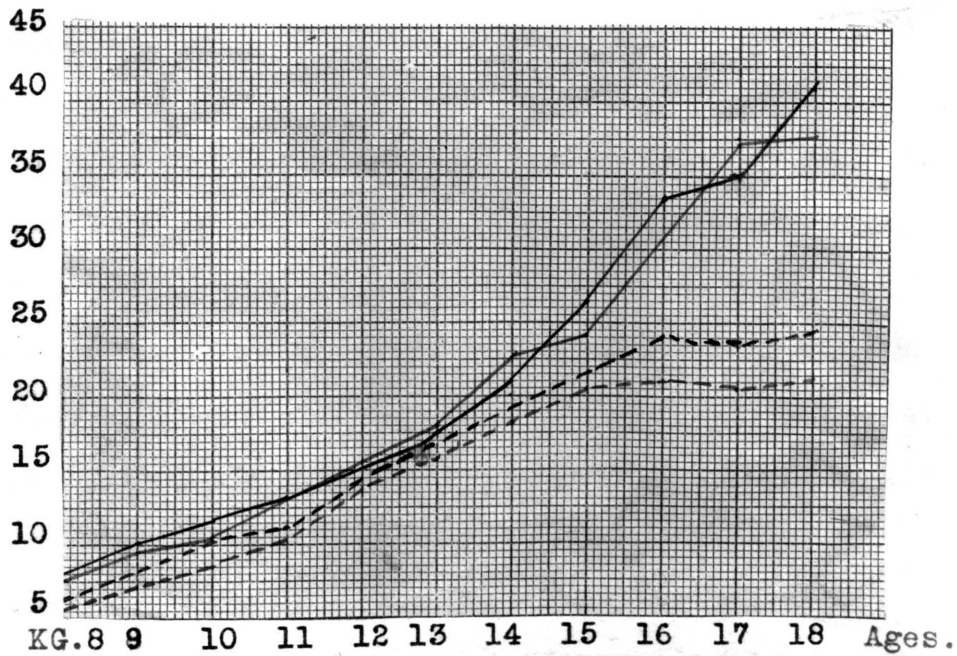


FIGURE V. GRIP, LEFT HAND. Black lines are rural children. Red lines are for city children. Solid lines are for boys. Broken are for girls.



children is, in all probability, due to the greater amount of muscular exercise that the rural children get on the farm, especially the exercises that develop the larger muscles of the body.

MUSCULAR SPEED. Tables VI and VII and Figures VI and VII show the number of taps per thirty seconds, using the tapping board and electric counter as described in Whipple's Manual.\* An examination of the tables show the relative grade of the rural boy as compared with the urban boy to be 93.9% for the right hand and 95.7% for the left hand. If we combine the grades for the separate hands, we get a combined grade of 94.8% of the urban average. The results for girls give the rural girl 95.6% for the right hand and 94.6% for the left hand as compared to the norms for urban girls. If we combine the grades for the separate hands, as we did for the boys, we get a combined grade of 95.1% of the average for urban girls.

With the exception of age eight for the right hand, the urban boys excel the rural boys in muscular speed at all ages for both right and left hands. The very same difference is to be found between rural and urban girls.

The difference between rural boys and girls in muscular speed is very slight, there being a difference of 1% for the right hand in favor of boys and 1.1% for the left hand in favor of girls. Very much the same difference exists between urban boys and girls, there being a difference of 1% for the right hand in favor of the boys and 0.5% difference for the left hand in favor of the girls. With the exception of age

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\*Whipple: Manual of Mental and Physical Tests, Vol.1, p. 130

eight, the rural boys excel the rural girls at all ages in muscular speed for the right hand. The difference, however, is very slight from 8 to 15, at which point the curve for the girl declines, while that of the boys steadily increases. This decline of the girls' curve from 15 onward, as noted in the other tests, is due to the earlier maturity of the girls. For the left hand, the rural girls make a better showing, excelling the rural boys at all ages with the exception of the eleventh year. However, the same decline is to be found from 15 onward. She increases rapidly from 8 to 15, at which point her curve gradually declines. For the rural boy, his curve increases steadily from 8 to 18, but is slightly under the curve of the girl all the way with the exception of age eleven. This superiority of the girl's left hand over that of the boy's is due, in all probability, to the fact that the girl's work necessitates her using the left hand more than the boy's work does.

If the norms of muscular speed for rural children are compared with the norms of Chicago children,\* the differences noted above between rural and urban children are still greater.

In muscular strength the rural children were above the standard for urban children, but in muscular speed they are below the standard for the urban. While the rural boy might carry a heavier load, the urban boy could travel faster and do more muscular work. These differences are, no doubt, due to the later maturity of rural children, and to the different

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\*Whipple: Manual of Mental and Physical Tests, Vol. 1, p. 139.

TABLE VI.

NORMS OF MUSCULAR SPEED FOR RURAL AND URBAN CHILDREN.

RIGHT HAND.

Age	Boys		No. Taps		Girls.		No. Taps/	
	Number				Number			
8	127	76	135.2	136	147	76	135.5	135
9	108	76	143.8	144	115	70	139.1	148
10	122	70	149.3	152	130	76	148.4	154
11	106	84	154.8	163	106	75	154.0	163
12	114	74	159.9	168	117	86	157.5	169
13	74	82	163.2	175	116	93	165.3	172
14	88	75	172.7	177	93	63	172.2	183
15	51	85	177.1	188	79	94	177.2	185
16	66	51	184.6	190	53	94	180.6	187
17	44	43	183.2	198	62	67	184.2	193
18	36	47	194.7	208	81	45	190.4	193

Black figures are for rural children. Red figures are for urban children. The average per cent of the norms for rural children, in comparison to the norms for urban, is 93% for rural boys and 95.9% for rural girls.

TABLE VII.

NORMS OF MUSCULAR SPEED FOR RURAL AND URBAN CHILDREN.

LEFT HAND.

Age	Boys		No. Taps.		Girls		No. Taps/	
	Number				Number.			
8	128	78	111.4	111	147	63	114.6	118
9	108	78	117.2	123	115	69	117.8	128
10	121	77	123.8	131	130	76	125.7	133
11	105	93	133.0	136	106	75	130.5	141
12	114	78	133.2	141	117	90	137.5	148
13	74	81	137.3	150	116	91	142.3	151
14	88	79	147.2	154	93	67	148.4	158
15	51	86	146.8	166	79	94	155.5	159
16	66	53	158.1	168	53	93	157.4	163
17	44	45	160.0	176	62	57	163.3	172
18	36	48	166.5	179	81	41	168.1	172

The black figures are for rural children. The red figures are for urban children. The average per cent of the norms of the rural children, in comparison to the norms for urban, is 95.8% for boys and 94.6% for girls.

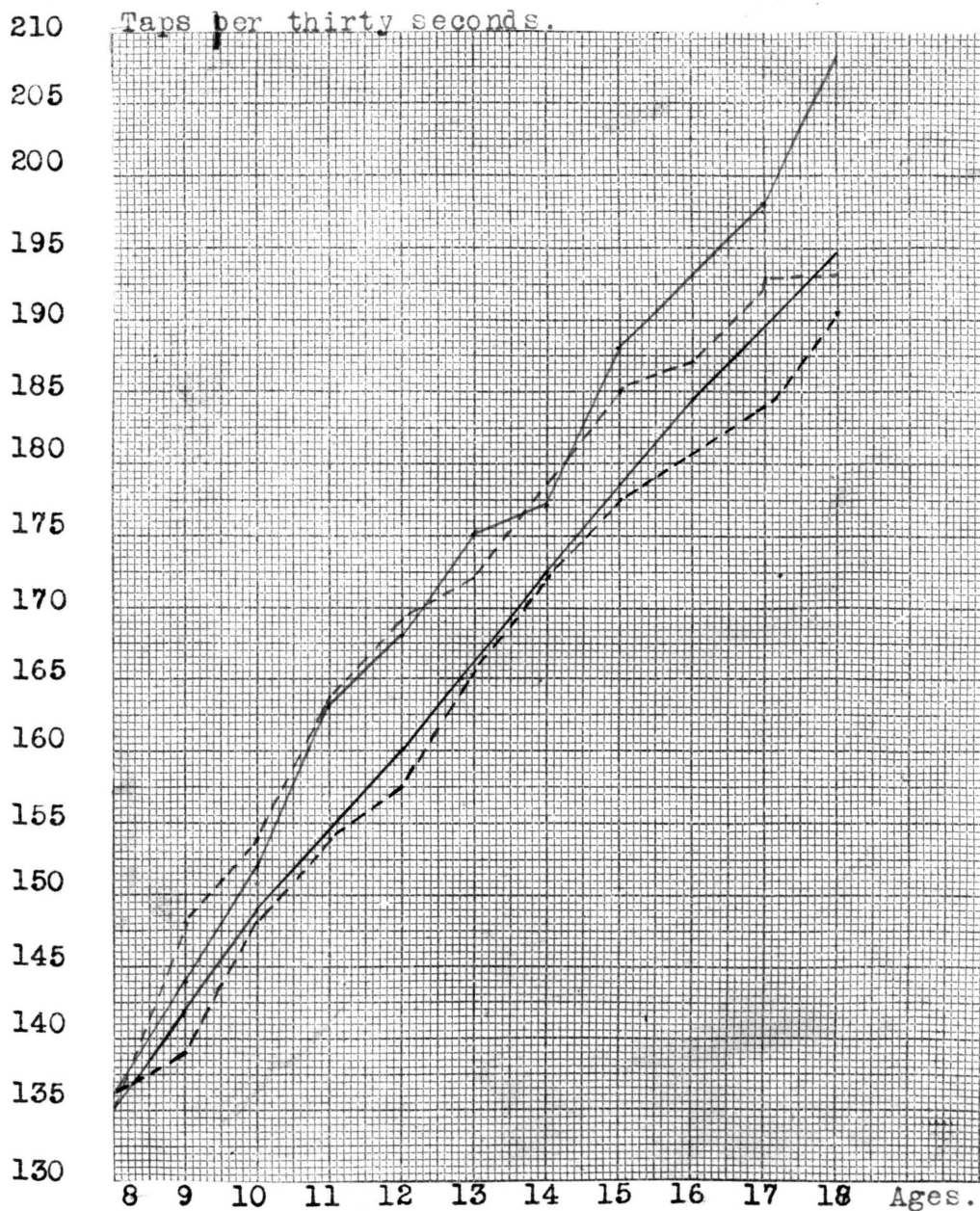


FIGURE VI. TAPPING (30")RIGHT HAND. **Black** lines are for rural children. **Red** lines are for city children. **Solid** lines are for boys. **Broken** lines are for girls.

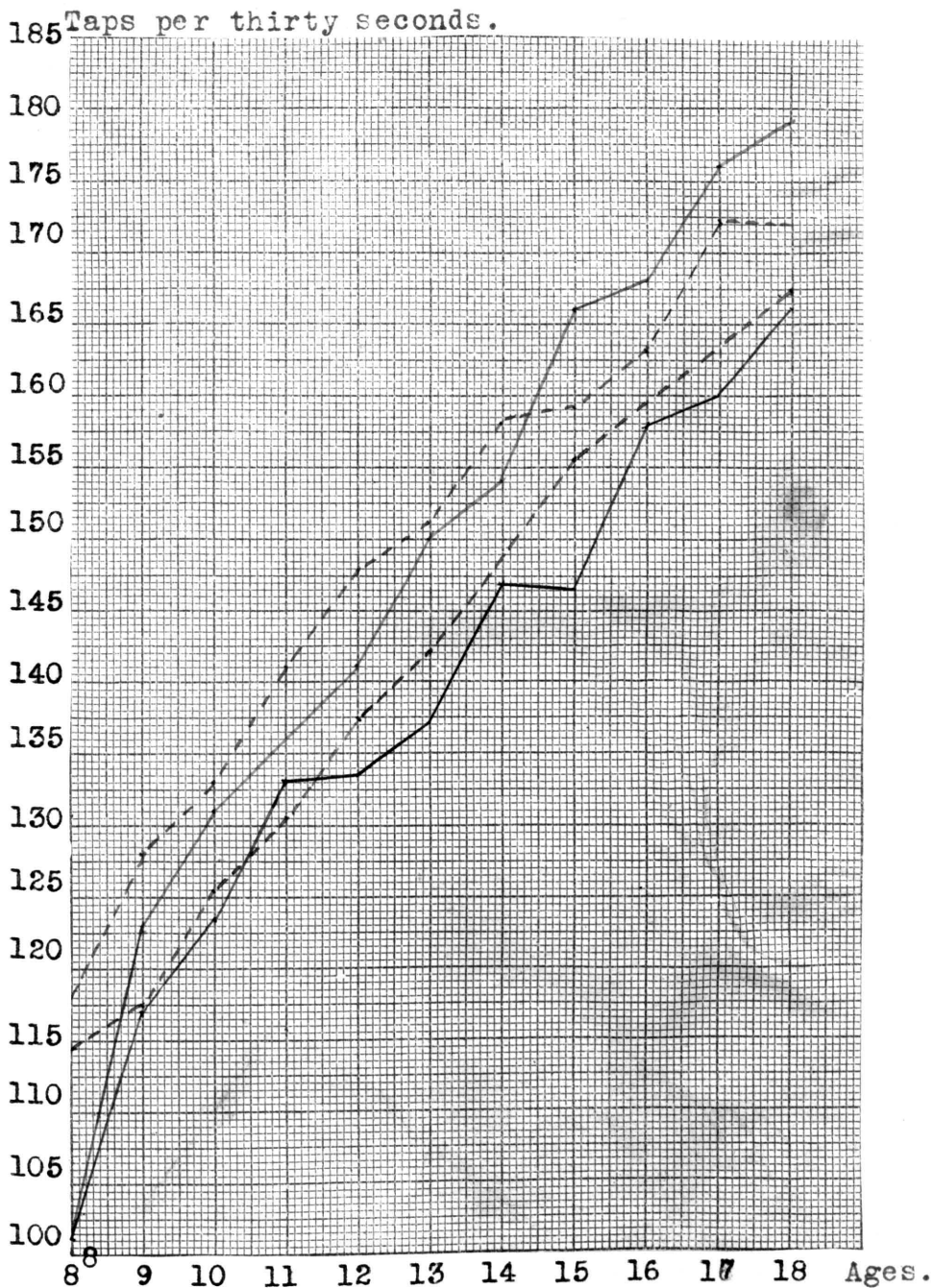


FIGURE VII. SPEED TAPPING (30") LEFT HAND. Black lines are for rural children. Red lines are for city children. Solid lines are for boys. Broken lines are for girls.

TABLE VIII.

NORMS OF LUNG CAPACITY FOR RURAL AND CITY CHILDREN.

Age	Boys				Girls.			
	Number		Capacity Cc.		Number		Capacity Cc.	
8	127	77	1438.6	1411	147	63	1274.3	1226
9	108	76	1653.9	1526	115	71	1426.6	1446
10	121	73	1780.7	1735	130	80	1617.3	1513
11	105	87	1097.3	1932	106	78	1856.3	1762
12	114	75	2105.0	2141	117	92	2001.6	1894
13	74	82	2343.9	2353	116	90	2230.8	2210
14	88	77	2718.5	2706	93	72	2477.8	2330
15	51	85	3255.3	3193	79	92	2583.2	2449
16	66	50	3257.4	3348	53	96	2788.4	2526
17	44	43	3801.1	3704	62	58	2805.1	2552
18	36	48	4495.8	3765	81	43	2833.3	2640

Black figures are for rural children. Red figures are for urban. The average per cent of the norms for rural children, in comparison with the norms for urban, is 103.4% for rural boys and 105.9% for rural girls.

TABLE IX.

NORMS OF VITAL INDEX FOR RURAL AND CITY CHILDREN.

Age	Boys.				Girls.			
	Number		Norms		Number.		Norms.	
8	126	77	25.9	25.2	147	63	24.0	23.5
9	108	76	27.3	24.4	115	71	24.3	23.4
10	121	73	26.6	25.7	130	80	24.9	22.6
11	105	87	26.4	25.4	106	78	25.6	23.1
12	114	75	26.7	26.1	117	92	23.6	22.3
13	74	82	27.6	25.5	116	90	24.1	23.0
14	88	77	27.2	26.1	93	72	23.7	22.2
15	51	85	28.6	26.2	79	92	22.5	21.4
16	66	50	26.4	26.2	53	96	23.7	21.5
17	44	43	29.0	26.4	62	58	24.5	20.8
18	36	48	31.7	26.4	81	43	23.1	21.4

Black figures are for rural children. Red figures are for urban children. The average per cent of the norms for the rural children, in comparison with the norms for the urban, is 107.5% for boys and 108.1% for girls.



modes of life. The superiority of rural children in muscular strength is due, to a great extent, to the motor tasks of the farm which have a tendency to develop the fundamental muscles at the expense of the development of the accessory muscles, while the superiority of urban children in muscular speed is due, in all likelihood, to the motor tasks of the city which have a tendency to develop the accessory muscles at the expense of the development of the fundamental.

LUNG CAPACITY. Lung capacity was determined by the use of a wet spirometer. Detachable glass mouthpieces were made use of, a special mouthpiece being furnished each child which was sterilized in every case before it was used again.

Lung capacity is influenced by a number of factors. Of these factors\* may be mentioned stature, body weight, age, sex, and modes of life. It increases with age, attaining the maximum at about thirty-fifth year, with an annual decrease of about 32cc. thereafter up to the age of sixty-five.\* Lung capacity is greater for men than women.\*

In Lung Capacity, the rural youth excels the urban. Tables VIII and Figure VIII show this very plainly. The average per cent of the rural norms, in comparison with the norms for urban children, is 102.9% for rural boys and 105.1% for rural girls.

The lung capacity of the rural and urban boy is practically the same from the eighth year to from between the fourteenth and fifteenth, after which the curve for the urban declines as compared with the rural, At this period of life the out-door activities of rural and urban boys are very much the same.

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\*Whipple: Manual of Mental and Physical Tests, Vol.1, p. 92.

After the fourteenth year, the outdoor activities of the average urban becomes lessened, due to the occupation he follows. During the day, he either attends school or follows some indoor activity, and at night, he usually is a party to some social function that is confined behind walls. On the other hand, the average rural boy works in the fields from seven in the morning until six in the evening, and at night, he hunts in the woodlands for the opossum and the raccoon.

In the case of the urban girl the increase in lung capacity is similar to that for the rural girl up to the ninth year, after which the curve for the urban girl declines as compared with the rural. At this period the activities of the urban and rural girls are very much the same. From this time on the activities of the rural girl increases outdoors while that of the urban is almost wholly confined indoors. Not only does the rural girl assist in the housework, but she milks the cows, feeds the chickens, hoes in the garden, chases the stock, and many other outdoor activities which require a greater part of her time. The life of the average urban girl is wholly different. She is taught to be more sedate. She spends a greater part of her time indoors, knitting, or entertaining some of her friends at a card party.

At the ages of 8, 9, 10, 14, 15, 17, and 18, the rural boys excel the urban boys, the per cent of difference for the respective ages being 1.9%, 8.3%, 2.7%, 0.4%, 1.9%, 2.3% and 19.5%. At all other ages, 11, 12, 13, and 16, the urban boy excels the rural, the per cent of difference for the respective ages being 1.3%, 1.2%, 0.4%, and 2.6%. The rural girls excel the urban girls at

all ages with the exception of the ninth year, the age at which the urban girl has an advantage of 1.3% over the rural. For the other ages--8, 10, 11, 12, 13, 14, 15, 16, 17, and 18, the rural girl leads the urban with the following per cent differences: 3.9%, 6.9%, 5.3%, 5.7%, 0.9%, 6.3%, 5.4%, 6.4%, 9.9%, and 7.3%.

If the norms of lung capacity for rural children are compared with the norms of Chicago children\*, we find that the rural children, boys and girls, excel the Chicago children at every age, and that the differences are much greater than found in the above study.

There are some very interesting sex differences to be found between rural boys and girls. The rise of lung capacity is constant in boys from the eighth to the eighteenth year, the curve showing a decided break between the fifteenth and sixteenth years. In the case of the girls the increase in lung capacity is similar to that for boys up to the fourteenth year, the only difference being the lesser capacity influenced by sex. At this period of life the outdoor activities of girls are very much the same as those of rural boys of the same age. After the fourteenth year, the average rural girl becomes more sedate, her outdoor activities are lessened, and she undergoes certain functional disturbances which are reflected by an obvious decline in lung capacity increase. This continues to the fifteenth year, after which there is a still more decided fall onward. This decline after the fifteenth year is similar to that found in all the other tests and, as indicated, it is due to an earlier maturity.

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\*Pyle: Examination of School Children, (1913), p. 44.

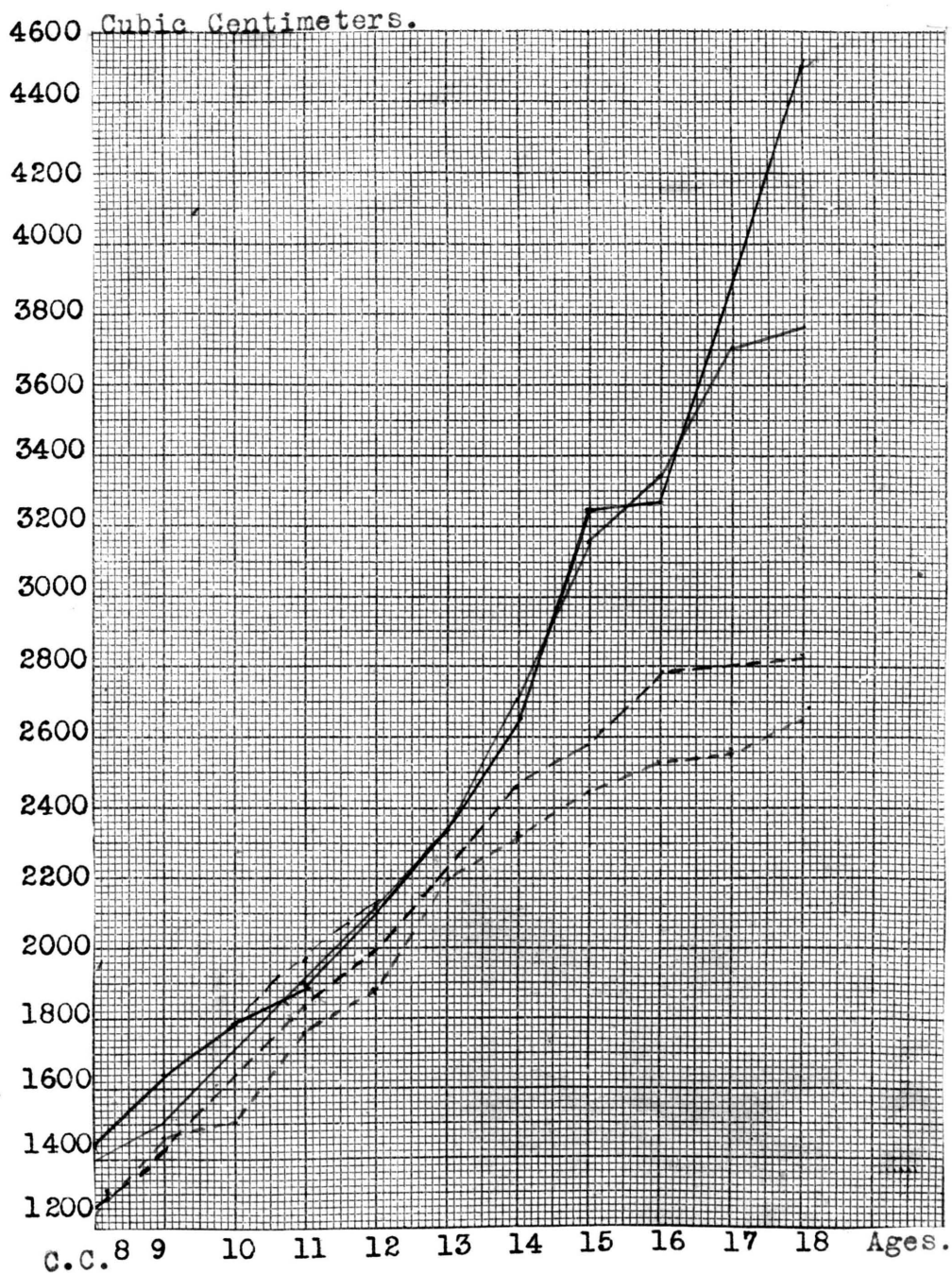


FIGURE VIII. LUNG CAPACITY. Black lines are for rural children. Red lines are for city children. Solid lines are for boys. Broken lines are for girls.

VITAL INDEX. The vital index was determined by dividing the lung capacity in cubic centimeters by the weight in pounds. This ratio shows whether the child has a lung capacity adequate for his body. Here we find that not only does the rural boy and girl breathe a large amount of air, but also that amount is greater proportionately than that of the urban boy and girl. Table IX and Figure IX show the rural children far above the urban. The average per cent of the norms for rural children, in comparison with the norms for urban, is 106.9% for rural boys and 107.7% for rural girls. The most significant fact is that the rural boys and girls excel the urban boys and girls at every age from 8 to 18.

If we compare the norms of vital index for rural children with the norms of the Chicago Children,\* we find, as was true in the lung capacity test, that the rural children, boys and girls, excel the Chicago children at every age from 8 to 18, and that the differences are much greater than found in the above study. This seems to indicate, as the greatest differences were found in all the physical tests of this study between rural children and Chicago children, that the Chicago children are representative of the type of children found in the large cities, while the children of McDonald County are representative of those found at the other extreme, the rural community. The norms of the Columbia, Mexico and Moberly children,\*\* which fall between these two extremes, are representative of the type of children found in the smaller cities.

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\*Pyle: The Examination of School Children, (1913) page 44.

\*\*Pyle: A Manual for Mental and Physical Ex. Sch. Children, (1916)

These facts tend to disprove the statement by Dr. Thomas D. Wood given at the beginning of this study that "city children are more healthy than those who dwell in the rural districts."\* The actually larger lung capacity and vital index of rural children over urban children would seem to play an important part in their resistance to disease thru a more thoro oxidation of the blood. Whipple says, "A high vital index is undoubtedly a preventive of auto-intoxidation, gives increased resistance to disease, and is the root of endurance under effort.\*\*"

Different opinions exist as to the cause of the rapid fall in the curve for the vital index of girls. Some think that physical changes in her body would account for all of it; others that enforced idleness may have had some effect, and especially that clothing worn by girls tends to assist this decline. This study indicates that this decline in the vital index for girls is not due to any of the above causes. Figure I shows that the rural and urban girls follow almost a parallel road in decline of the vital index. This study indicates that the cause of this decline is not due to the clothing worn, or to enforced idleness. The rural girl out in the little one room school in the country is perhaps the most sensibly dressed girl of any girl on earth, and there is nothing about her clothing that would retard full development of the respiratory organs.

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\*Rural School Messenger, Kirksville, Mo. Normal Sch. Vol. III, p. 45  
\*\* Whipple: Manual of Mental and Physical Tests, Vol. 1, p. 93.



Ratio of Lung Capacity to Weight of Body.

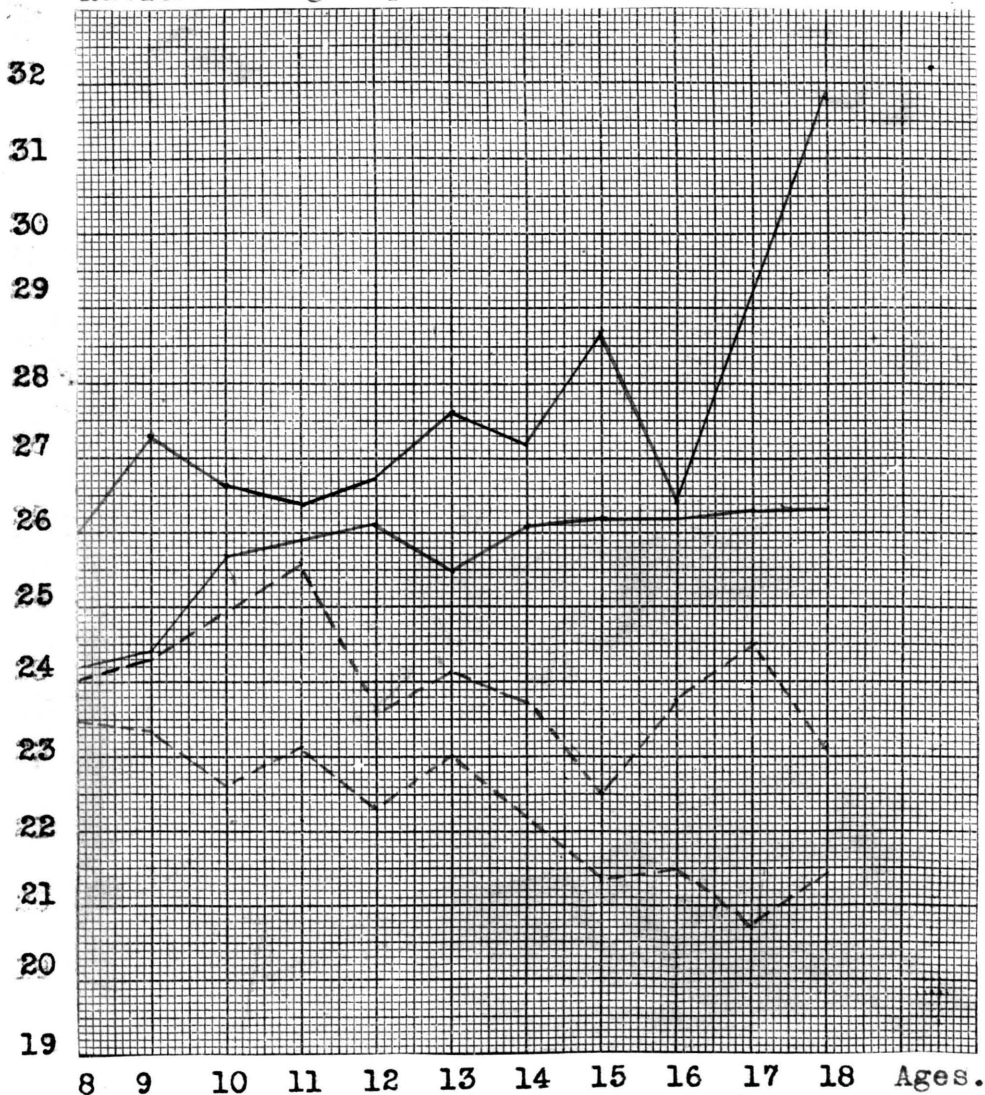


FIGURE IX. VITAL INDEX. Black lines are for rural children. Red lines are for city children. Solid lines are for boys. Broken lines are for girls.



Pyle's study of Urban children,\* Waltner's of the Negro,\*\* Creighton's of the Chinese,\*\*\* Clark, Collins, and Tredway's\*\*\*\* of the Rural children of Porter County, Indiana, and this study indicate that the decline in the curve for the vital index for girls is not due to different modes of life. The rapid fall in the curve for the vital index of girls in each of the above studies follow almost a parallel road. This would lead to the conclusion that the decline is, in all probability due to hereditary sexual differences.

SUMMARY. The evidence of this study is summarized in Tables A, B, and C. It indicates that the rural and urban children are about the same in height, being a difference of 0.6% in favor of urban boys and 0.8% difference in favor of urban girls; that the urban children are slightly heavier than the rural, there being 3% difference for urban boys and 2.2% difference for urban girls; that the rural children are somewhat stronger than the urban, there being 1.5% difference for the right hand and 2.1% for the left for rural boys, and 8.2% difference for the right hand and 6.4% for the left hand for rural girls; that the rural children have a slower reaction, there being a difference of 6.1% for the right hand and 4.3% for the left in favor of urban boys, and 4.4% for the right hand and 5.4% for the left hand in favor of urban girls; that the rural children have a greater lung

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\*Pyle: The Examination of School Children.

\*\*Waltner: The Negro Mind, M.A. Thesis, University of Mo. 1916.

\*\*\*Creighton: The Chinese Mind, Ph.D. Thesis, U. of Mo. 1917.

\*\*\*\* Clark, Collins, and Tredway: Rural School Sanitation, Porter County, Indiana, Pub. Health Bul. #77, Bureau of Education.

capacity, there being 2.9% difference in favor of rural boys and 5.1% in favor of rural girls, and that not only do the rural children breathe a larger amount of air, but also that amount is greater proportionately than that of the urban children, there being 6.9% difference in favor of rural boys and 7.7% difference in favor of rural girls.

The outstanding differences between rural and urban children in physical growth and development are in muscular speed, muscular strength, and lung capacity. The superiority of rural children in muscular strength and lung capacity is, in all probability, due to environment --different modes of life. The farm life is primarily outdoors and offers forms of physical exercise that tend to develop the fundamental muscles of the body and to induce respiration, while urban life is mostly indoors and sedentary. Whipple says that the lung capacity may be increased 300 cc. in three months by various forms of physical exercise which demand active respiration.\* The superiority of urban children in muscular speed, is due, to some extent, to the mode of life in the city and to the earlier maturity of urban children which is hereditary. The motor tasks of the city tend to develop the accessory muscles much more than the work of the country does. This might give the urban children a slight advantage over the rural children. But in all cases where muscular speed

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\*Whipple: Manual of Mental and Physical Tests, Vol.I, p. 93.

was required in this investigation, tapping, marking, and writing, the rural children were easily outclassed by the urban children. The rural children seemed to be at a disadvantage whenever speed was demanded. The most casual observation of the actions of rural and urban people leads to the same conclusion. The necessities of farm life do not require as much rapidity in doing things and in getting around as urban life does. Hence this evidence seems to lead to the conclusion that the slowness of rural children in muscular reaction is due to inborn nature, and not, to any great extent, to different modes of life.

By finding the percentage difference for each age, between rural and urban, and averaging these percentage differences for each test, and then taking the average of the percentage grades for all the tests, we find that rural boys have a grade of 99.9% as compared with urban boys, and rural girls have a grade of 101.5% as compared with urban girls.

TABLE A.

AGE COMPARISON FOR RURAL AND URBAN GIRLS.

PHYSICAL MEASUREMENTS.

Age:.....	8	9	10	11	12	13	14	15	16	17	18	Av.	
Stand.H.	Urban' 1.3	'3.6'	'1.3'	'1.5'	0	'	'	'	'	'	0.8	0.8	
	Rural'	1.3	'	1.4	'0.5	'	0	'0.3	2.4	'0.5'	'	'	
Sit.H.	Urban'	3.7	'0.6'	3.2	'2.6'	3.2	'1.6'	2.6	'2.4'	0.6	'	'1.7	
	Rural'	'	'	'	'	'	'	'	'	'	0.1	0.5	
Weight	Urban'	'5.4'	1.2	'3.7'	'	'5.2'	0.8	'	'	'6.7'	2.2	1.2	
	Rural'	1.8	'	'1.6'	'	'	'	'7.0	'1.1'	'	'	'	
Grip R.	Urban'	'	'	'	'	'3.6'	'	'	'	'	'	'	
	Rural'	20.1	'8.3'	9.0	'6.7'	11.1	'	'2.4'	4.0	'7.6'	12.8	12.5	8.2
Grip L.	Urban'	'	'	'	'	'	'	'	'	'	'	'	
	Rural'	12.8	'7.3'	11.1	'4.4'	5.9	'2.2'	5.1	'5.9'	6.9	'11.3'	11.0	6.4
Speed R.	Urban'	'6.4'	4.0	'5.9'	7.6	'4.3'	6.4	'4.4'	3.8	'4.9'	1.5	4.4	
	Rural'	0.3	'	'	'	'	'	'	'	'	'	'	
Speed L.	Urban'	2.6	'8.4'	5.5	'8.4'	8.0	'6.3'	6.7	'2.5'	3.8	'5.5'	2.3	5.4
	Rural'	'	'	'	'	'	'	'	'	'	'	'	
Lung C.	Urban'	'1.3'	'	'	'	'	'	'	'	'	'	'	
	Rural'	3.9	'	6.9	'5.3'	5.7	'0.9'	6.3	'5.4'	6.4	'9.9'	7.3	5.1
Vital I.	Urban'	'	'	'	'	'	'	'	'	'	'	'	
	Rural'	2.1	'3.7'	10.1	'5.8'	10.8	'4.8'	6.7	'5.1'	10.2	'17.7'	7.9	7.7
Average		4.3	0.6	3.6	0.5	3.5	1.3	0.3	2.4	2.1	5.6	3.1	

The figures in each column are the per cent of difference in favor of the urban or rural as the case may be. Red figures are averages in favor of urban children. Black figures are averages in favor of rural children.

TABLE B.

AGE COMPARISON FOR RURAL AND URBAN BOYS.

PHYSICAL MEASUREMENTS.

Age	8	9	10	11	12	13	14	15	16	17	18	Av.	
Stand. H. Urban		0.2	0.7	0.9	0	1.7	0.4	0.5	0.7	5.3		0.6	
Rural	0.6				0.2						2.8		
Sit. H. Urban		0.6	0.5	3.3	5.3	5.7	4.4	2.1	2.5			0.9	
Rural	3.1									3.9	7.0		
Weight Urban		2.2	0.3	5.4	3.7	8.1	4.7	6.9		7.1		3.0	
Rural	1.6								0.5		2.4		
Grip R. Urban					0.9	5.0	4.5	3.6		4.7			
Rural	2.1	4.4	5.5	2.0					7.1		14.2	1.5	
Grip L. Urban						3.5	5.3			5.7			
Rural	3.9	5.5	6.4	1.1	0.9			7.1	5.2		8.4	2.1	
Speed R. Urban		4.2	5.6	2.2	6.0	9.4	4.8	13.7	6.3	10.0	7.8	6.1	
Rural	10.3												
Speed L. Urban		.7	0.7	2.0	5.9	5.0	7.3	2.3	6.2	2.7	8.2	6.7	4.3
Rural													
Lung C. Urban				1.3	1.2	0.4			2.6				
Rural	1.9	8.3	2.7				0.4	1.9		2.3	19.5	2.9	
Vital In Urban													
Rural	2.7	11.8	3.5	3.9	2.3	8.2	4.2	9.1	0.7	9.8	20.0	6.9	
Average	1.4	3.0	0.5	0.5	1.6	1.2	0.2	3.1	0.2	3.4	6.2		

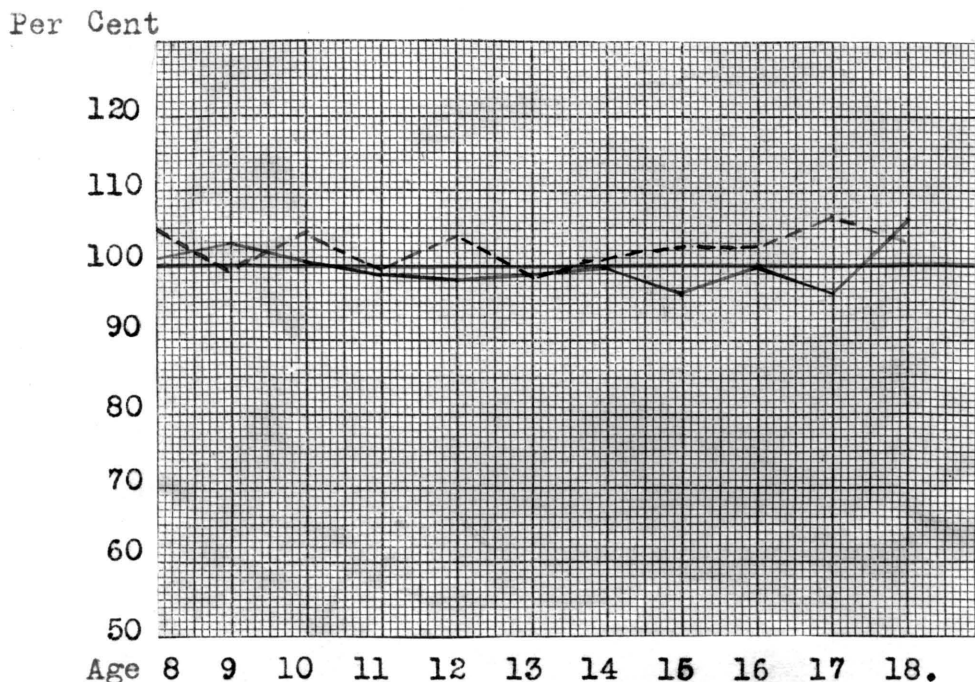
The figures in each column are the per cent of difference in favor of the urban or rural as the case may be. Red figures are averages in favor of urban children. Black figures are averages in favor of the rural children.

TABLE C.  
SUMMARY OF PHYSICAL DIFFERENCES BETWEEN RURAL AND URBAN  
CHILDREN.

	Boys		Girls		Rural		Urban	
	Rural	Urban	Rural	Urban	Boys	Girls	Boys	Girls
Weight		3.0		1.2	3.1		4.9	
Standing Height		0.6		0.8	1.0		1.8	
Sitting Height		0.9		1.7	1.0		3.0	
Muscular Strength								
1.Right Hand	1.5		8.2		23.9		31.1	
2.Left Hand	2.1		6.4		22.9		29.4	
Muscular Speed								
1.Right Hand		6.1		4.4	1.0		1.0	
2.Left Hand		4.3		5.4		1.1		0.5
Lung Capacity	2.9		5.1		20.9		23.3	
Vital Index	6.9		7.7		14.9		15.7	
Average		0.1	1.5		9.6		12.2	

The figures in each column are the per cent of difference in favor of the rural or urban, or boys or girls as the case may be.

PHYSICAL DEVELOPMENT OF RURAL AND URBAN CHILDREN.



The red straight line represents urban children. The black lines represent rural children. The solid line represents rural boys, and the broken line represents rural girls.

The above curves show the physical development of rural children when all the tests are combined as compared with urban children. These curves are constructed from Tables A and B. Rural and urban children were compared in these tables on the basis of one hundred per cent; that is, one hundred per cent represented the physical development of urban children. Using this as a base, the difference in per cent were computed between rural and urban children for each age. The average per cent difference was then computed algebraically for all the physical tests for each age, which are shown in the horizontal averages in Tables A and B.

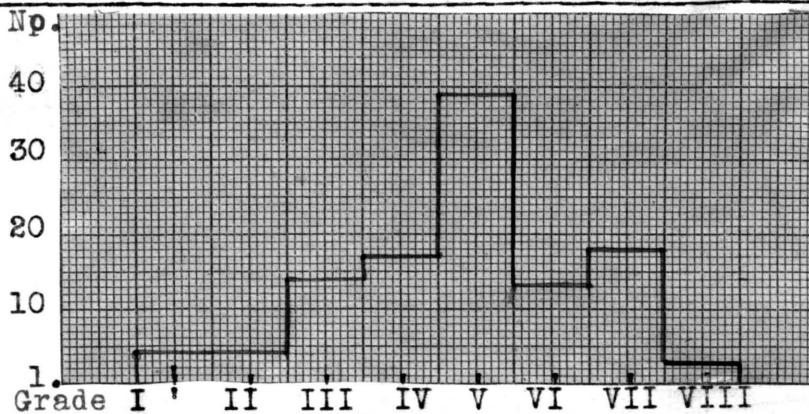


INDIVIDUAL DIFFERENCES.

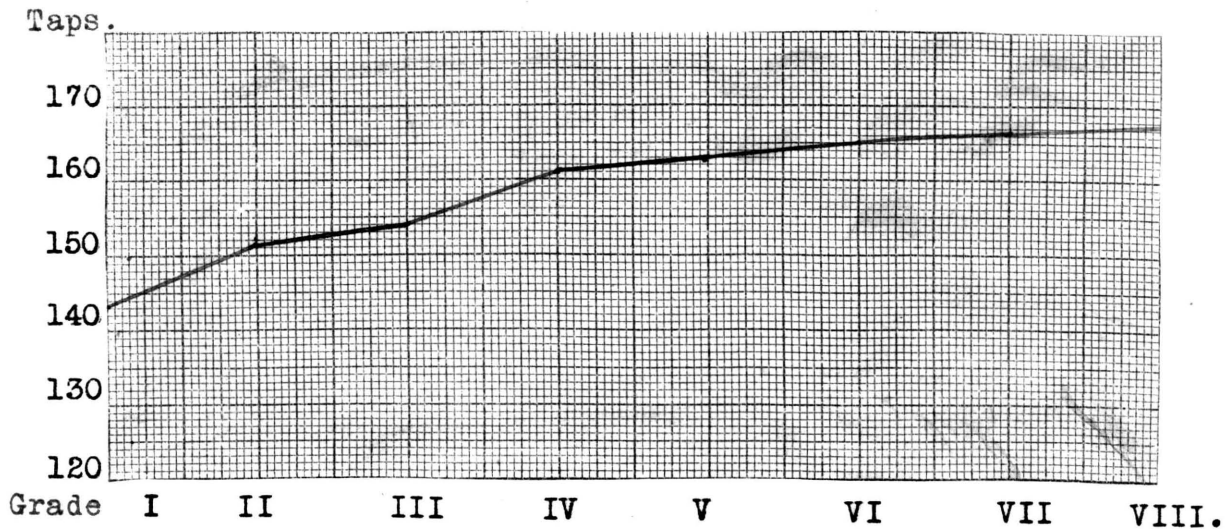
STANDING HEIGHT AND MUSCULAR SPEED FOR TWELVE YEAR OLD

BOYS IN EACH GRADE FROM I TO VIII.

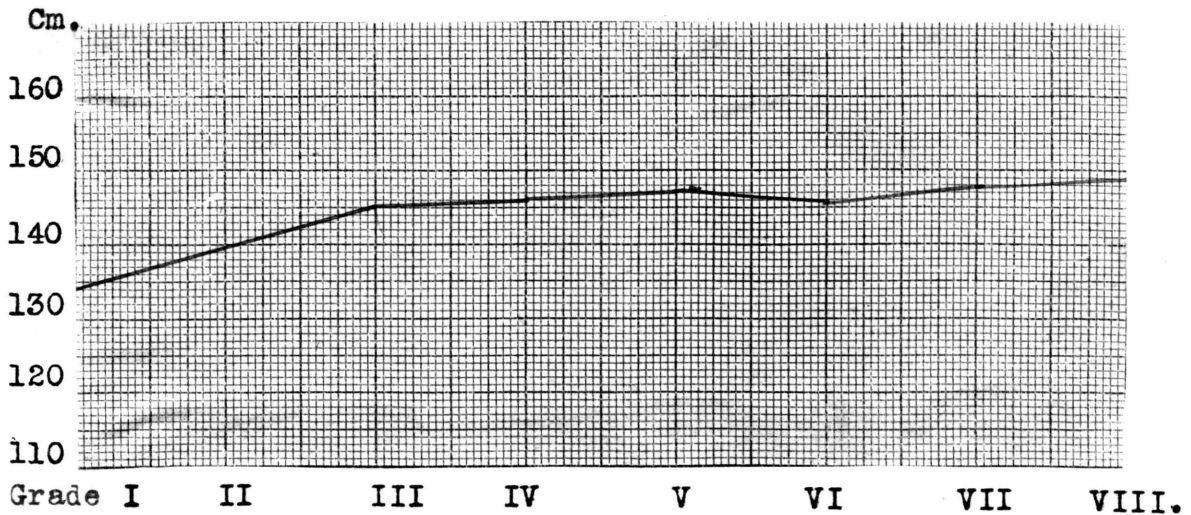
Grade	Cases	Av. Height Cm.	Av. Muscular Speed
I	4	134	143
II	4	139	151
III	14	145	154
IV	17	146	161
V	39	147	163
VI	13	146	165
VII	18	148	166
VIII	3	149	167



The above Table and Frequency Surface show the number of twelve year old boys found in each grade from the first to the eighth, and the average standing height and muscular speed for each grade. There were found 112 twelve year old rural boys in the 1000 boys examined in this investigation. These twelve year old boys, as indicated in the above table and frequency surface, ranged all the way from the first to the eighth grade. In standing height and muscular speed it was found, as indicated above, that the twelve year old boys in the second grade were taller and quicker than those in the first grade; those in the third grade were taller and quicker than those in the second; those in the fourth taller and quicker than those in the third, and so on for each advancing grade with but one exception in standing height for the sixth grade which is probably due to the fact that in the rural schools alternation of the fifth and sixth grades, that is, the fifth and sixth grades were taught together, in 1916, in the sixth grade; hence it can be easily seen how some of the children, who reported that they were in the sixth grade, were in reality only fifth grade students, that is, this being their first year in Class B.



This curve shows the average number of taps in muscular speed for the twelve year old rural boys found in the grades from I to VIII, which is constructed from the table on the preceding page. This curve shows that in each advancing grade the twelve year old boys are faster than the one preceding it. This proves without any doubt that mind and body are closely related? Muscular speed has a high correlation with mentality.?



This curve shows the average standing height for the twelve year old boys for each of the grades from I to VIII. This curve shows that for each advancing grade the twelve year old boys are taller than those in the preceding grade, with but one exception, which is in the sixth grade and is, in all probability, due to the alternation of the fifth and sixth grades in the rural schools.

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**MENTAL MEASUREMENTS**

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#### IV. MENTAL MEASUREMENTS.

Is the mental development of the rural child essentially the same as that of the urban? If it is different, in what way is it different? The object of this study is to establish age norms for the various mental abilities of rural children and to compare these norms with similar norms already established for urban children.\* In this way a definite knowledge of mental differences, and their probable causes, between rural and urban children can be obtained.

It is impossible for one to judge mentality accurately if the only measure is that of achievement as determined by outside standards. This is usually the basis on which a person is judged, but such judgment depends on many things in addition to native ability. Ideals and environment are strong for good or bad, and, so far, it has been impossible to measure the influence of nurture as opposed to nature. The only way, then, to judge mentality is to so set the stage that differences in environment will be eliminated. To do this it is necessary to use an artificial measure just as it is necessary to use the foot rule and the pound measure in the transactions of everyday life. This brings in the mental tests as a means of measuring mental ability. This method is being used in the large city school systems in the study of individual differences of urban children. Such city systems have a clinical department in charge of a child expert under whose direction urban children are examined and classified according to their needs.

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\*Pyle: The Examination of School Children, (1916)

Why not apply this scientific knowledge to rural school children? The farmer thinks more of his children than his stock, but he, too often, does not think as much about them. He applies scientific knowledge in the solution of his farm problems, such as stock breeding, seed selection, hog cholera, fruit growing, etc., but, as yet, he does not apply scientific knowledge to the problems of rearing his children, in spite of the fact that children are very much like young stock and fruit trees, in that they need close supervision during the earlier period of their growth. The time doubtless is not far off when every county will have in connection with the County Superintendent's office the service of a child expert under whose direction rural children will be examined and educated according to their needs. The tests are very simple. A progressive county superintendent with a knowledge of Educational Psychology can by practice acquire enough skill with the tests to make them of much service in the gradation and classification of children, and in answering satisfactorily the many questions coming from his teachers, "What shall I do with Johnnie Jones? He simply cannot do the work in his grade?" There are now available mental tests\* that can be applied to all the children of the school. After the tests have been given the results for each child can be compared with the norm for the child's age, which will indicate at once whether it is above or below the average. If a child is several years above or below the norms for his age, he is probably of superior or inferior mentality and should be classified accordingly.

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\*Pyle: The Examination of School Children, (1913) and (1916)  
Whipple: Manual of Mental and Physical Tests, Volume II.

The question will then be asked, "What shall we do with such children, those high in mental ability and those low, out in the little one-teacher rural school?" The answer is, they should be treated differently from the other children. If there are some children of superior ability, they should be permitted to finish the course of study earlier, possibly in six years. If there are some of inferior ability, they should be given the right kind of work as far as the teacher can provide. They should be given more time to play and less restraint should be put on them, and no one should worry about their progress and promotion.

These mental tests would not only be of much assistance to the county superintendent of schools in the supervision of his schools, but they would be of much service to the rural school teacher. They would assist her to obtain a knowledge of her pupils, which is the key to successful teaching. In case a pupil is doing poor work in a subject, these tests will assist her to know whether it is a lack of ability, or if it is due to the fact that the child was started at the wrong age, or to poor teaching, or started wrong in the subject. In a few cases, a teacher is at a loss to know whether a child's failure in a grade is due to lack of ability or a lack of effort. These mental tests will assist in solving such problems. If he fails because of lack of ability, it would not seem wise to promote him, but <sup>he</sup> should be put in a grade where he can do the work. If he fails because of a lack of effort, he should, in most instances, be promoted and an effort made to get him to do the work that he is capable of doing.

Promotion of pupils should be based, by all means, on their mental ability to do the work in a certain grade rather on chronological age. Just because a child is six years old, is no sign that he should do first grade work. The writer has seen some children five years old that could do good strong first grade work, others eight or nine that could not.

The mental tests used in this investigation were Free Association, which determines the free flow of ideas; Controlled Association, which is a test in the speed of reasoning; Substitution, which is a test in the quickness of learning, that is, building up new bonds; Rote Memory, which determines the ability to reproduce disconnected words; Logical Memory, which determines ability to reproduce meaningful material immediately after it is presented; and Completion, which is a test in reasoning ability,

The greatest of care was exercised to secure uniformity of procedure. Wherever possible the tests were illustrated with material different from that to be used, and every effort was used to make sure that the pupils understood exactly what to do before beginning a test. Care was taken to see that there was no cheating or copying done. The attitude of the teachers and pupils toward the tests was good, all seem to consider them great fun and worked hard to make a good record.



FREE ASSOCIATION. The purpose of this test is to determine the speed of the free flow of ideas. The result of the test is a criterion of the quickness of the flow of ideas when no restriction or limitation is put on the flow.

The method in this test was that the pupils were given the word "play" and told to write this word down and all the other words that came into their minds. The instructions were: "I wish to see how many words you can think of and write down in three minutes. I shall name a word, you may write it down and then all the other words that come into your mind. Do not write sentences, merely the words that come into your mind. Work as fast as you can."\*

The work of each pupil was graded by counting the number of words that had been written.

Table X and Figure X show the results of this test. The superiority of the urban children over the rural is clearly indicated. The average per cent of the norms for the rural children, in comparison to the norms for urban, is 74.8% for rural boys and 81% for rural girls. The difference between rural boys and girls is slightly less than between urban boys and girls. The difference between the rural boy and girl is 12.1% in favor of the rural girl, while the difference between the urban boy and girl is 13.2% in favor of the urban girl. The difference between the rural boys and girls is very great at 8, but this difference grows less from 8 to 12, after which there is a decline to 13 for the girls and 14 for the boys, from which the curves deviate in their rise in favor of the rural girls.

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\*Pyle: The Examination of School Children, p. 24.

TABLE X.

NORMS OF FREE ASSOCIATION FOR RURAL AND URBAN CHILDREN.

Age	Boys				Girls.			
	Number	No. Words	A.D.		Number	No. Words	A.D.	
8	151 66	16.5 22.3	7.1 5.7	152 58	21.2 24.3	9.0 7.9		
9	152 75	17.3 24.4	8.3 8.6	120 84	22.1 27.0	9.9 9.1		
10	152 93	23.6 29.4	9.2 11.7	172 76	27.1 31.0	7.7 12.5		
11	148 97	30.0 32.3	10.0 12.5	171 86	32.2 39.0	10.0 14.4		
12	120 97	38.5 37.1	12.5 14.3	164 99	36.6 41.7	12.7 14.4		
13	136 94	35.0 39.0	9.5 15.3	156 90	34.0 44.4	11.1 14.7		
14	136 62	32.8 40.9	10.7 13.9	128 74	36.4 47.8	10.3 12.7		
15	112 78	34.3 48.3	10.9 11.4	124 75	36.2 49.4	9.9 12.6		
16	84 47	36.0 47.3	11.6 12.6	64 58	46.4 49.4	15.3 13.8		
17	21 43	35.5 49.0	8.2 13.4	34 38	45.6 47.6	13.6 14.2		
18	24 24	39.9 47.1	4.8 13.4	37 30	42.9 48.9	12.4 13.6		

Black figures are for rural children. Red figures are for urban children. The average per cent of the norms of the rural children, in comparison with the norms of the urban, is 74.8% for rural boys and 81.0% for rural girls.

TABLE XI.

NORMS OF CONTROLLED ASSOCIATION FOR RURAL AND URBAN CHILDREN.

Age	<u>Opposites -- List No. 1.</u>							
	Boys			Girls				
	Number	No. Words	A.D.		Number	No. Words.	A.D.	
8	110 54	4.9 8.5	3.8 2.1	102 51	6.2 9.3	3.8 1.5		
9	98 62	6.4 8.6	4.0 2.4	122 68	6.9 10.2	3.9 2.3		
10	130 60	8.2 10.6	4.4 2.5	159 56	7.4 10.8	4.3 2.6		
11	142 38	9.9 10.9	5.0 3.1	140 28	9.0 12.4	4.2 3.0		
12	122 8	9.8 10.6	4.2 2.5	123 13	13.1 12.8	3.7 3.3		
13	140	11.0	4.0	136	12.4	4.0		
14	118	11.7	4.1	119	14.8	3.9		
15	96	12.6	3.4	85	15.0	5.5		
16	52	13.5	3.1	44	16.7	3.4		
17	30	14.9	2.9	30	16.9	3.5		
18	32	15.2	2.9	27	16.6	4.0		

Black figures are for rural children. Red figures are for urban children. The average per cent of the norms for rural children, in comparison with the norms for urban, is 66.8% for rural boys and 64% for rural girls.

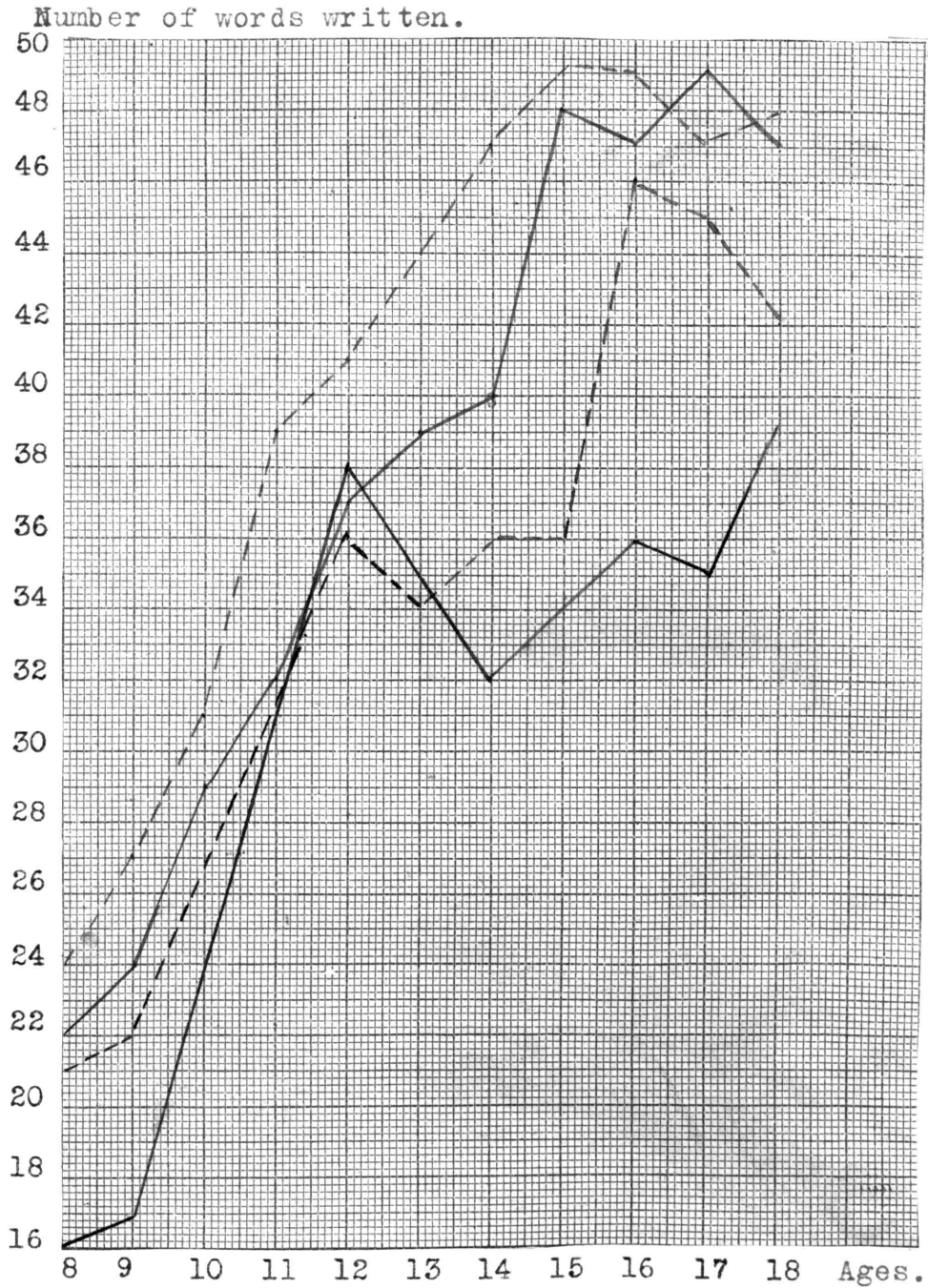


FIGURE X. FREE ASSOCIATION? Black lines are for rural children. Red lines are for city children. Solid lines are for boys. Broken lines are for girls.

CONTROLLED ASSOCIATION. This test differs from Free Association in that one must judge one's thinking. It calls for ability to appreciate relationships. "All thinking is a matter of association of ideas. Reasoning is controlled association. The test may there be taken as a measure of speed in reasoning."

Two lists of fifty words each were used, which were distributed to the pupils and placed face down on the desk. Two minutes were allowed for grades up to the fifth and one minute for grades above. The following instructions were given; "On the sheets that have been distributed to you are fifty words. After each word you are to write a word that has the opposite meaning. For example, if one word were 'far' you would write 'near'. Work as fast as you can and when I say 'stop' quit work instantly and turn your paper over."

Each pupil was graded according to the number of opposites correctly written.

"The association tests are of great significance in mental diagnosis, for they test functions that are at the basis of the reasoning process. When a person is given a problem to solve, he is given a test in controlled association. The problem starts the flow of ideas and puts the limitation upon this flow. The problem is solved only if the right ideas come. These association tests, if carefully given and especially if several tests are given, are among the most valuable of all the tests." This test has a high correlation with general intelligence. Whipple reports that all other experimenters agree in giving this test a high rank in dependence on intelligence. Simpson estimates the

Opposites -- List No. 1.

- |            |            |
|------------|------------|
| 1. good    | 26. strong |
| 2. big     | 27. dark   |
| 3. rich    | 28. dead   |
| 4. out     | 29. wide   |
| 5. sick    | 30. empty  |
| 6. hot     | 31. above  |
| 7. long    | 32. north  |
| 8. wet     | 33. laugh  |
| 9. yes     | 34. man    |
| 10. high   | 35. before |
| 11. hard   | 37. ripe   |
| 12. sweet  | 38. night  |
| 13. clean  | 39. open   |
| 14. sharp  | 40. first  |
| 15. fast   | 41. over   |
| 16. black  | 42. love   |
| 17. old    | 43. come   |
| 18. up     | 44. east   |
| 19. thick  | 45. top    |
| 20. quick  | 46. wise   |
| 21. pretty | 47. front  |
| 22. heavy  | 48. girl   |
| 23. late   | 49. sad    |
| 24. wrong  | 50. fat    |
| 25. smooth |            |

Opposites.-- List No. II.

- |             |            |
|-------------|------------|
| 1. strong   | 26. hot    |
| 2. deep     | 27. long   |
| 3. lazy     | 28. wet    |
| 4. seldom   | 29. fierce |
| 5. thin     | 30. treat  |
| 6. soft     | 31. dead   |
| 7. many     | 32. cloudy |
| 8. valuable | 33. hard   |
| 9. gloomy   | 34. bright |
| 10. rude    | 35. fine   |
| 11. dark    | 36. plain  |
| 12. rough   | 37. sharp  |
| 13. pretty  | 38. late   |
| 14. high    | 39. south  |
| 15. foolish | 40. wide   |
| 16. present | 41. drunk  |
| 17. glad    | 42. tight  |
| 18. strange | 43. empty  |
| 19. wrong   | 44. sick   |
| 20. quickly | 45. friend |
| 21. black   | 46. above  |
| 22. good    | 47. loud   |
| 23. fast    | 48. war    |
| 24. clean   | 49. in     |
| 25. tall    | 50. yes.   |

true correlation to be as high as .82 for easy words, and .96 for hard words.\*

The results of the two Opposite Tests are given in Tables XI and XII, and figures XI and XII. In these tests the urban children are very much superior to the rural. The average per cent of the norms for rural children, in comparison to the norms for urban, is 57.6% for rural boys and 63.2% for rural girls, when the two tests are combined. When the two tests are combined, the difference between rural boys and girls and between urban boys and girls is about the same, being a difference of 13.5% in favor of the rural girls, and 14.0% in favor of the urban girls. At 8 the rural children compare better with the urban in the easy list of Opposites than in the hard list, being a difference in the former of 33.2% in favor of the urban boys and 35.6% in favor of urban girls, while in the latter the urban boys are 51.6% better than the rural boys and the urban girls lead the rural girls by 38.0%. In all probability, speed in writing is one of the determining factors in these differences. The slowness in writing of country children is due, no doubt, to two factors: (1) The slowness in muscular reaction, as was noted in the muscular speed test, which seems to be due to the inborn nature<sup>2</sup> of rural children, and (2) Improper teaching methods, which are due to two things: (1) Inability

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\*Whipple: Manual of Mental and Physical Tests, Vol. II, p. 75.



on the part of teachers to teach writing, and (2) to the crowded daily program. The writer in giving these tests found scores of children 8, 9, and 10 years old that could not write, not saying anything about those 6 and 7 years old, which were not tested.

TABLE XII.

NORMS OF CONTROLLED ASSOCIATION FOR RURAL AND URBAN CHILDREN.

Opposites -- List No. II.

Age	Boys					Girls.						
	Number		No. Words	A.D.		Number		No. Words		A.D.		
8	113	34	3.8	4.1	2.2	1.2	105	10	4.4	5.0	2.1	1.7
9	129	34	3.5	4.6	2.0	3.9	81	44	5.0	5.7	3.1	2.2
10	126	60	5.1	8.4	4.0	3.3	149	55	5.4	7.4	3.5	3.1
11	140	96	5.7	9.4	3.5	2.9	130	95	5.6	9.0	3.0	3.4
12	112	117	5.6	10.2	2.8	2.9	144	125	7.2	10.4	3.2	3.3
13	146	112	6.8	10.8	5.1	4.6	112	125	7.2	11.9	3.7	3.6
14	112	70	7.1	11.2	2.8	3.4	130	91	8.8	13.2	3.7	3.5
15	86	84	7.2	13.3	3.2	2.8	82	76	10.3	14.6	4.3	3.7
16	56	43	9.8	14.0	4.0	3.4	33	57	11.6	15.0	3.8	3.7
17	30	24	10.5	14.0	2.8	3.7	30	22	12.9	16.2	3.8	3.0
18	29	23	11.0	14.4	2.6	2.3	29	21	12.5	17.1	2.4	2.9

Black figures are for rural children. Red figures are for urban. The average per cent of the norms for rural children, in comparison with the norms for urban children, is 48% for rural boys and 62% for rural girls.

TABLE XIII.

NORMS OF SUBSTITUTION FOR RURAL AND URBAN CHILDREN.

Age	Boys					Girls						
	Number		Average		A.D.		Number		Average		A.D.	
8	113	98	6.0	10.0	3.2	3.4	134	77	7.1	12.7	3.4	3.6
9	117	122	7.7	11.8	2.8	3.5	101	121	8.4	13.7	4.3	4.8
10	130	148	9.2	13.6	3.4	3.9	152	126	11.9	15.7	5.5	4.8
11	150	155	12.4	15.4	5.9	4.3	141	127	15.2	18.9	8.6	4.8
12	125	150	14.6	17.7	6.0	4.6	138	167	19.8	20.5	8.0	4.9
13	106	149	17.3	17.7	6.3	4.7	154	141	21.9	22.5	6.6	4.3
14	112	108	19.8	20.8	6.2	4.8	124	109	23.5	23.5	6.0	4.5
15	80	113	20.5	23.4	5.8	4.9	92	111	24.8	26.8	5.3	4.9
16	52	70	21.2	24.1	6.3	4.9	50	92	27.6	27.7	5.8	4.3
17	17	51	22.4	26.0	5.6	5.2	30	65	28.6	29.2	3.9	4.1
18	28	36	25.5	24.7	4.3	4.2	30	48	28.3	27.9	6.5	5.5

The black figures are for rural children. The red figures are for urban. The average per cent of the norms of the rural children, in comparison with the norms for the urban, is 76.6% for rural boys and 80.7% for rural girls.

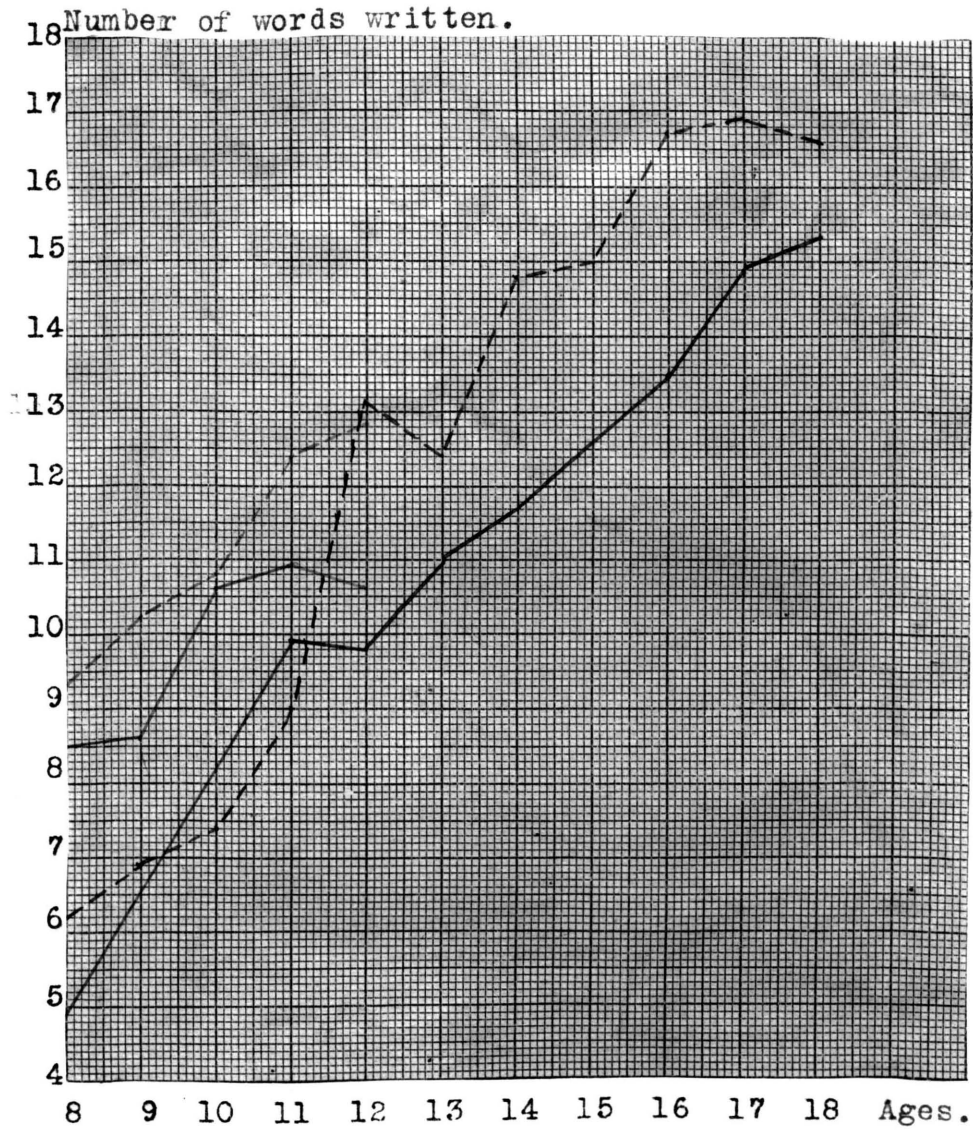


FIGURE XI. CONTROLLED ASSOCIATION LIST ONE.  
Black lines are for rural children. Red lines are for city children. Solid lines are for boys. Broken lines are for girls.

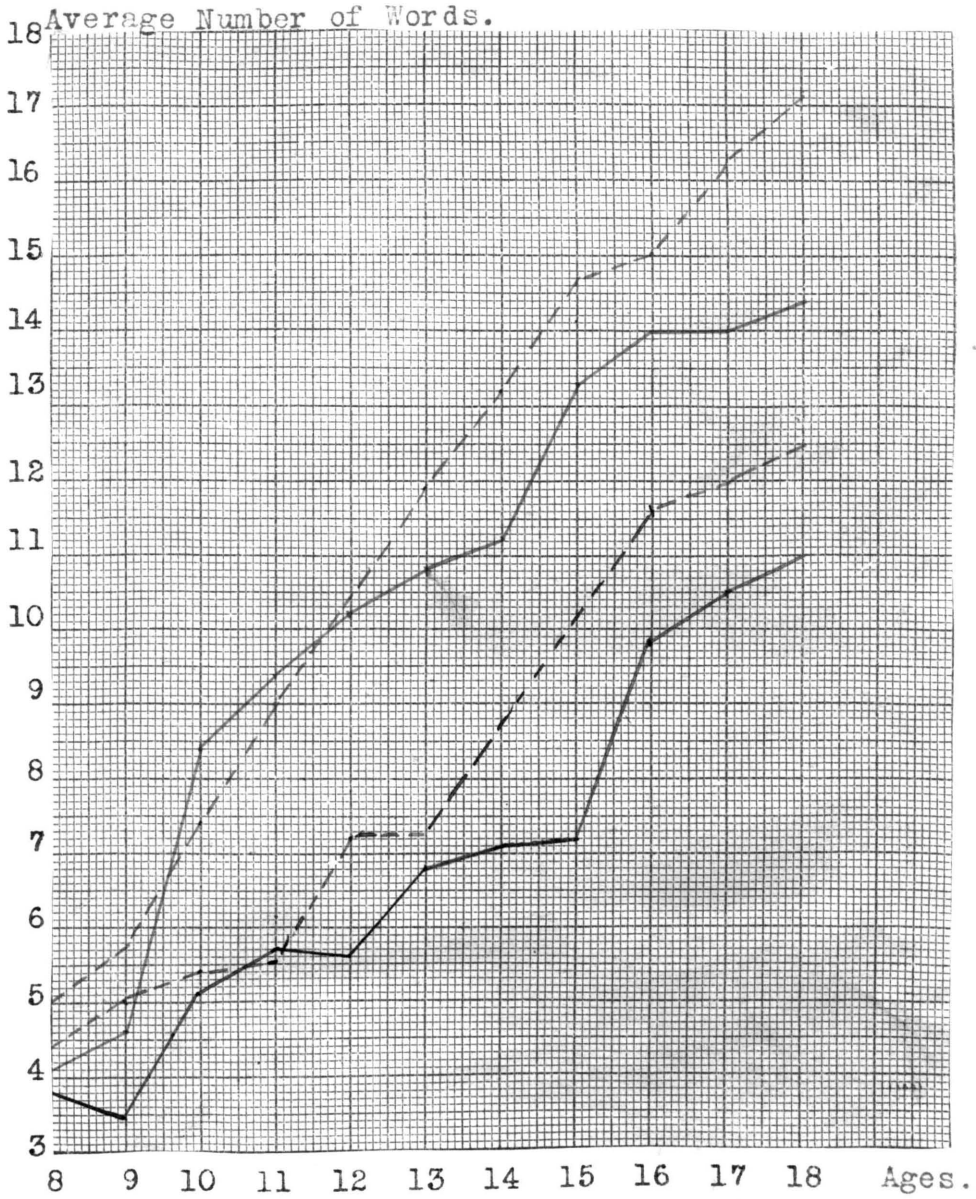


FIGURE XII. CONTROLLED ASSOCIATION LIST TWO.  
Black lines are for rural children. Red lines  
are for city children. Solid lines are for boys.  
Broken lines are for girls.

SUBSTITUTION. The aim of this test is to test the quickness in learning, that is, the quickness in building up new bonds. Pyle's averages\* show that the capacity in the substitution test improves every year, with the exception of one, from 8 to 18; and that girls make more correct substitutions than boys at every age. Whipple reports\*\* a high correlation, as determined by school standing, with intelligence. Weidensall reports\*\* a correlation with general ability of 0.48.

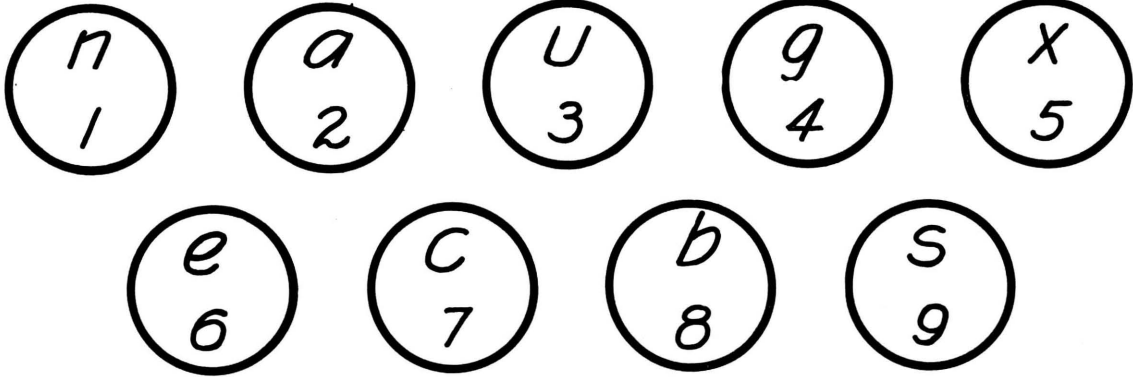
The pupils were provided with forms like <sup>those</sup> shown on the following page. They were instructed as follows: "We wish to see how fast you can learn. At the top of the sheet which has been given to you there is a key. In the nine circles are written the nine digits and for each digit there is written a letter which is to be used instead of the digit. Below the key are two columns of numbers; each number contains five digits. In the five squares which follow the number you are to write the letters which correspond to the digits. Work as fast as you can and fill as many of the squares as you can without making mistakes. When I say 'stop' quit work instantly and turn the paper over." Before beginning the test, the exact nature of it was explained on the blackboard. Eight minutes were allowed in grades up to the fifth, and five minutes for grades above the fifth.

Grading consisted in counting the squares correctly filled. No fines for mistakes were imposed. In the table the results are reduced to a one minute standard.

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\*Pyle: Manual for the Mental and Phy. Ex. Sch. Child. 1916, p.26  
\*\*Whipple: Manual of Mental and Physical Tests, Vol. II.

# Key No. 1



84,976						27,516					
79,821						33,821					
63,442						97,473					
21,629						62,978					
57,183						31,542					
32,761						17,143					
95,146						26,981					
28,349						35,724					
73,862						16,315					
91,563						14,923					
37,628						34,762					
42,916						28,543					
23,729						83,936					
85,652						75,314					
35,486						56,283					
29,635						19,175					
72,518						36,293					
24,631						85,746					
19,852						15,283					
76,431						24,976					

Average number of Substitutions.

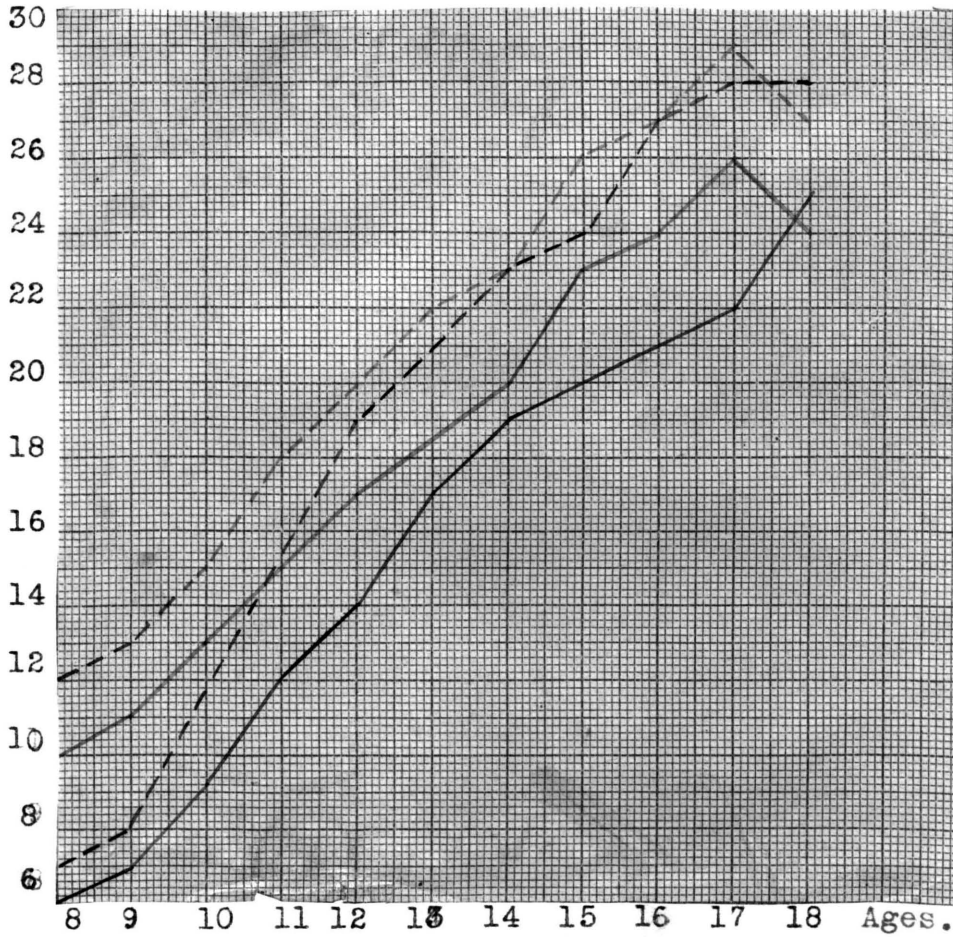


FIGURE XIII. SUBSTITUTION. DIGIT-SYMBOL. Reduced to one minute standard. Black lines are for rural children. Red lines are for city children. Broken lines are for girls. Solid lines are for boys.



Table XIII and Figure XIII give the results. It will be noted at once that urban children lead the rural at all ages except the eighteenth. Both rural and urban girls excel <sup>both</sup> rural and urban boys. Rural boys attain a grade of 76.3% in comparison with rural girls and urban boys a grade of 96.9% in comparison with urban girls. Thus it will be seen that there is a greater difference between rural boys and girls than between urban boys and girls. There is a considerable difference between rural and urban girls at 8, but this difference decreases until at fourteen they are the same. From fourteen on, the rural and urban girls are about the same. The same is true for rural and urban boys, except that there is a greater difference from fourteen on, between rural and urban boys than between rural and urban girls. This big difference, at eight, between rural and urban children and a decrease from this age until at fourteen, where they are about the same and remain about the same until the eighteenth year, is, in all probability, due to a later maturity, as was noted in the physical development, and to improper teaching the children receive from 8 to 14 in the rural schools. The average per cent of the norms for rural children, in comparison to the norms for urban, is 76.6% for rural boys and 80.7% for urban girls.

ROTE MEMORY. The aim of this test is to "determine the immediate memory of the pupil for unrelated impressions. It tests merely verbal memory, memory for discrete impressions. A high relative standing in this test probably indicates ability in studies which demand simply verbal memory; i.e. in such work as learning spelling, tables, formulas, dates and all

similar material. Much school work makes demands upon this ability. Therefore, the test is of importance."

Two lists of words were used as follows:

CONCRETE LIST.

1. street, ink, lamp.
2. spoon, horse, chair, stone.
3. ground, clock, boy, chalk, book.
4. desk, milk, hand, card, floor, cat.
5. ball, cup, glass, hat, fort, pole, cloud.
6. coat, girl, house, salt, glove, watch, box, mat.

ABSTRACT LIST.

1. time, game, scheme
2. grade, fact, work, thing
3. pluck, love, blame, fear, proof
4. space, force, pride, fright, joy, size
5. length, light, style, rate, cause, youth, hate
6. law, thought, plot, glee, life, call, price, strength.

The concrete list was given first. The first group was pronounced and the children given time to write the words. Then the second group was given, and so on till the six groups of concrete words had been pronounced. Then the abstract words were given similarly. The instructions to the children were: "We wish to see how well you can remember words. I shall pronounce first a group of three words. After I have pronounced them, you are to write them down. I shall then pronounce a group of four words, then one of five words, and so continue with a longer group each time. You must pay very close attention for I shall pronounce a group but once. You are not required to write the words in their order, but just as you recall them."

The papers were graded by determining the number of concrete words and the number of abstract words that were reproduced.

This test shows positive correlation with the better tests of intelligence and is valuable in estimating general ability.

TABLE XIV.

NORMS OF ROTE MEMORY FOR RURAL AND URBAN CHILDREN.

CONCRETE WORDS.

Age	Boys					Girls						
	Number	Average		A.D.		Number	Average		A.D.			
8	120	61	13.4	21.3	6.2	3.5	138	56	14.5	22.9	7.1	2.7
9	120	79	14.8	24.0	5.3	3.2	98	83	16.5	22.6	6.5	3.5
10	146	96	18.3	23.9	5.1	3.4	150	83	18.2	23.9	6.2	2.1
11	124	99	21.0	25.5	4.8	2.7	138	80	21.5	25.7	5.0	3.2
12	108	97	21.8	25.8	3.9	2.9	128	98	22.7	26.3	4.5	2.7
13	122	95	22.2	26.3	3.8	3.2	118	81	25.7	27.4	3.1	2.5
14	104	73	22.4	26.3	3.5	3.4	130	73	26.2	27.3	3.4	3.0
15	74	90	24.6	26.2	3.4	3.8	94	87	27.5	27.3	3.4	2.8
16	54	59	24.4	26.7	4.3	3.6	52	65	26.8	28.9	3.3	2.9
17	30	39	26.5	27.0	3.6	2.8	23	47	27.7	28.5	2.1	2.2
18	25	30	25.8	27.9	1.8	4.3	32	28	27.3	28.9	2.2	1.4

The black figures are for rural children. The red figures are for urban. The average per cent of the norms for rural children, in comparison with urban children, is 77.1% for rural boys and 83.1% for rural girls.

TABLE XV.

NORMS OF ROTE MEMORY FOR RURAL AND URBAN CHILDREN.

ABSTRACT WORDS.

Age	Boys					Girls						
	Number	Average		A.D.		Number	Average		A.D.			
8	115	60	11.2	18.2	5.1	3.6	133	60	11.5	21.0	7.0	2.6
9	120	85	11.3	21.3	10.2	2.7	94	85	13.6	21.9	9.9	3.0
10	144	97	14.3	22.2	4.8	3.4	150	97	13.9	21.9	5.6	3.0
11	124	98	17.0	23.4	5.8	3.9	138	98	17.7	24.2	5.3	3.1
12	108	96	19.0	24.0	4.7	3.1	144	96	20.5	25.2	6.1	3.3
13	122	95	19.0	24.3	5.0	3.3	120	95	22.4	26.1	3.8	3.0
14	106	73	20.6	24.7	4.6	3.1	128	73	24.1	28.2	3.1	2.8
15	76	92	22.0	25.3	3.4	3.7	94	92	23.3	25.8	3.5	3.0
16	54	59	21.2	25.7	5.1	3.2	54	59	25.6	27.9	3.6	3.5
17	30	40	24.5	27.2	3.0	3.1	23	40	27.1	27.1	2.1	3.0
18	25	30	22.9	27.6	3.8	3.3	32	30	26.5	28.9	2.4	3.0

The black figures are for rural children. The red are for the urban children. The average per cent of the norms for the rural children, in comparison with the norms for the urban children, is 64.5% for rural boys and 70.4% for rural girls.

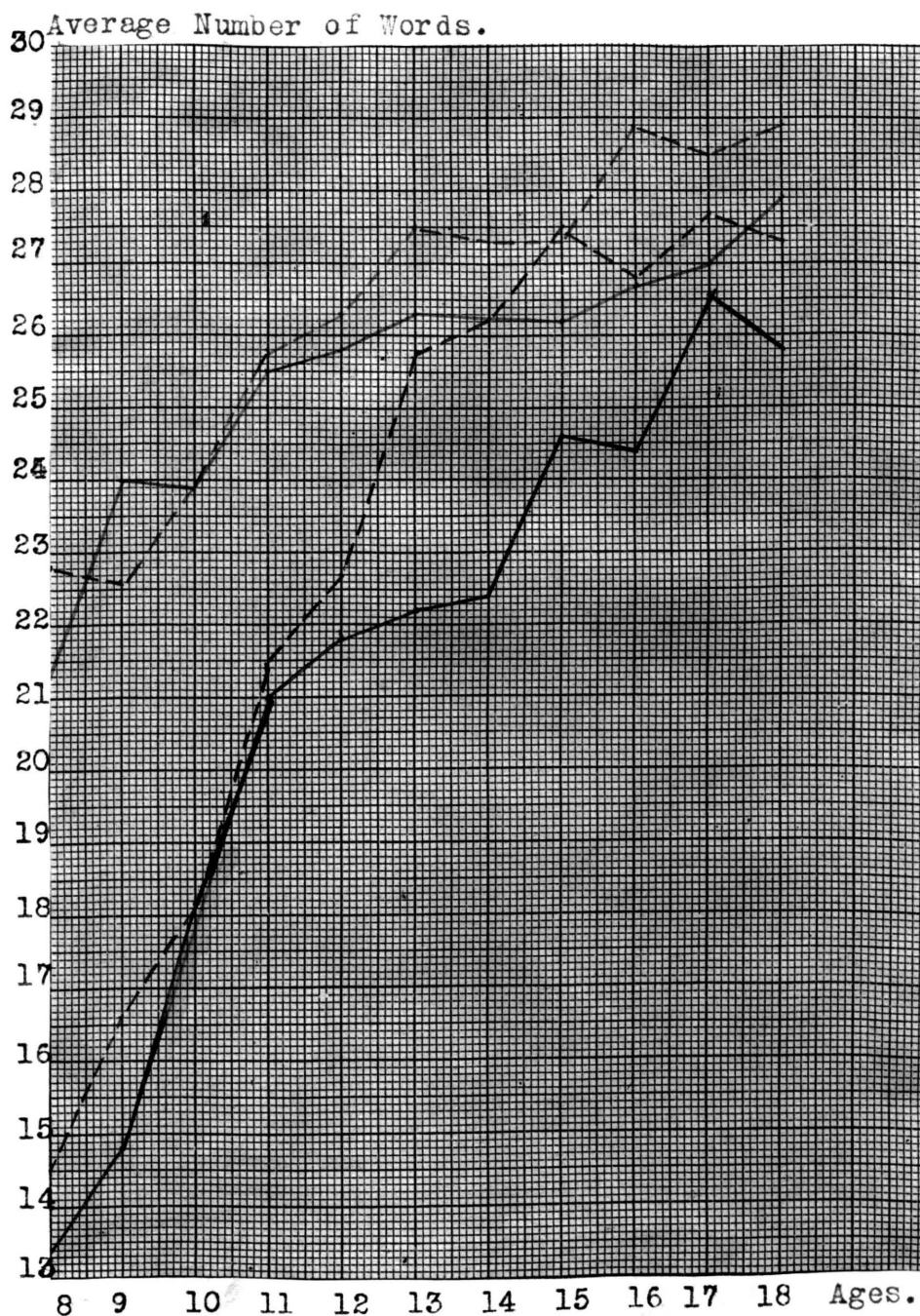


FIGURE XIV. ROTE MEMORY CONCRETE. Black lines are for rural children. Red lines are for city children. Solid lines are for boys. Broken lines are for girls.

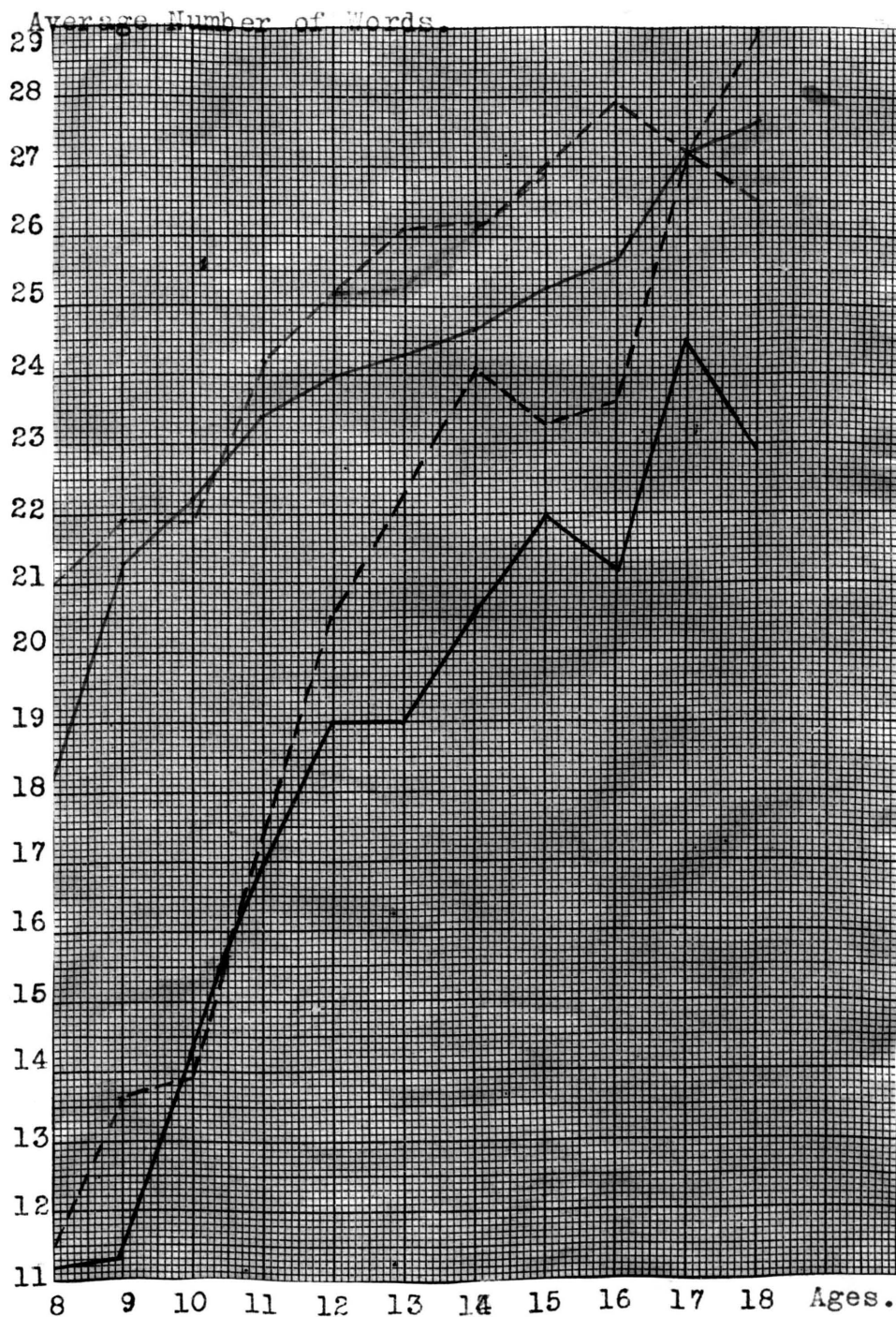


FIGURE XV. ROTE MEMORY ABSTRACT. Black lines are for rural children. Red lines are for city children. Solid lines are for boys. Broken lines are for girls.

Whipple says that "The more careful correlation of work of the past few years demonstrates at least a fairly good degree of correspondence between immediate memory and either school standing or estimated general intelligence."

Tables XIV and Figures XIV and XV show the results of this test. In rote memory for concrete words, the urban children are at first very much ahead of the rural, but at 17 for the boys and 15 for the girls the rural are about the same. In rote memory for abstract words the urban children are very much superior to rural. In memory for concrete words urban boys are superior to the rural boys by 22.9%, in memory for abstract words by 35.5 per cent. In memory for concrete words the urban girls are superior to the rural girls by 16.9 per cent, in memory for abstract words by 29.5 per cent. In memory for both concrete and abstract words there is more difference between rural boys and rural girls than between urban boys and girls. The per cent by which memory for concrete words exceeds memory for abstract words is, for rural boys 13.7 per cent, for urban boys 6.2 per cent; for rural girls 11.3 per cent, and for urban girls 4.6 per cent. In memory for concrete words the rural girls are superior to the rural boys by 8.4 per cent, for abstract words 11.4 per cent; for urban girls over urban boys, in concrete memory 4.7 per cent, and for abstract words 10 per cent.

LOGICAL MEMORY . This test differs from the rote memory test in two main points. "In the first place, connected, meaningful material is used instead of a series of disparate impressions. In the second place, the reproduction that is



demande is primarily a reproduction of ideas, not an exact, verbatim, reproduction of the original presentation. In other words, this test measures logical or substance memory, instead of rote or mechanical memory." A pupil's standing in this test may serve as an index of his ability to remember the subject matter of his school studies.

Logical memory has a very high correlation with the better of the approved mental tests. Pyle\*reports a true correlation for Logical Memory and Substitution of .63. Simpson\*reports a series of correlations as follows:--Logical Memory and Completion .71, Logical Memory and Hard Opposites .70, Logical Memory and Rote Memory .80, Logical Memory and Easy Opposites .50.

The procedure used in this test was that the story, "THE MARBLE STATUE", was read to the pupils slowly and distinctly. After it had been read, the pupils were asked to write down all of the story that they could recall. Ten minutes were allowed. The following instructions were given to the pupils: "I shall read you a story entitled "The Marble Statue". After I have read the story you are to write down all you can remember of it. You are not to use the exact words that I read unless you wish. You are to use your own words. Try to recall as much as possible and write all you recall. Try to get all the details, not merely the main facts." This story is as follows:

A young/man/worked/years/to carve/a white/marble/statue/  
of a beautiful/ girl./ She grew prettier/ day by day./ He  
began to love the statue/ so well that/ one day/ he said to it:/  
"I would give/everything/ in the world/ if you would be alive/ and  
be my wife."/ Just then/ the clock struck/ twelve,/and the cold/

\*Pyle: The Examination of School Children, page 63.

\*\*Quoted in Whipple' Manual of Mental and Physical Tests.



stone began to grow warm,/the cheeks red,/ the hair brown,/ the lips to move./ She stepped down,/ and he had his wish./ They lived happily/ together/ for years,/ and three/ beautiful/ children were born./ One day/ he was very tired,/ and grew/ so angry,/ without cause,/ that he struck her./ She wept,/ kissed/ each child/ and her husband,/ stepped back/ upon the pedestal,/ and slowly/ grew cold,/ pale,/ and stiff,/ closed her eyes,/ and when the clock/ struck/ midnight,/ she was a statue/of pure/white/marble,/as she had been/years before,/ and could not hear/the sobs/of her husband/ and children.

The grading consisted in giving one credit for each idea or unit adequately reproduced, the child's written reproduction being compared, unit by unit, with the above story.

Table XVI and Figure XVI show some very interesting facts. The first is that in the country as well as in the city, girls have a better memory for ideas than boys. Rural boys attain to only 88.6% of the excellence of their sisters, while urban boys have a grade as compared to urban girls of 89.5%. The second important fact is that urban girls excel rural girls, and urban boys excel rural boys. When we compare urban and rural boys, we find that there is a difference of 121.4% in favor of the urban boy. In like manner there is a difference of 104.6% between urban and rural girls, in favor of the urban girl. The third significant fact of this study is that with increasing age, the difference to be found between urban and rural children tends to become less.

TABLE XVI.

NORMS OF LOGICAL MEMORY FOR RURAL AND URBAN CHILDREN.

Age	Boys						Girls					
	Number		Average		A.D.		Number		Average		A.D.	
8	70	102	5.1	24.3	3.2	6.7	115	89	5.9	28.5	5.1	11.3
9	123	148	8.9	28.7	6.3	9.1	89	159	8.1	31.0	4.2	9.4
10	177	142	11.4	30.0	6.1	6.7	146	138	11.2	33.5	8.1	6.8
11	199	149	13.9	32.9	8.4	5.6	116	156	17.0	36.4	9.9	7.7
12	141	156	17.6	35.1	9.5	7.4	186	101	20.4	38.1	9.3	7.2
13	180	163	17.7	36.8	9.5	6.3	110	164	24.7	38.5	9.3	7.1
14	88	129	20.0	36.1	7.8	7.0	140	146	28.7	39.0	8.1	7.5
15	72	89	24.3	36.5	7.8	6.7	80	99	29.6	39.1	6.8	6.3
16	30	60	22.4	34.4	8.3	5.6	30	94	34.3	37.3	4.0	5.1
17	33	45	28.2	34.6	8.7	8.7	31	81	32.5	36.6	6.4	6.9
18	21	32	29.8	36.9	5.5	6.0	23	48	37.2	37.8	6.9	4.4

The black figures are for rural children. The red figures are for urban children. The per cent of difference between rural and urban boys is 121.4% in favor of the urban, while the per cent of difference between the rural and urban girls is 104.6% in favor of the urban girl.

TABLE XVII.

NORMS OF COMPLETION FOR RURAL AND URBAN CHILDREN.

Age	Boys						Girls					
	Number		Average		A.D.		Number		Average		A.D.	
8	110	1121	4.4	10.9	3.0	4.3	122	100	5.3	12.3	3.2	3.8
9	101	145	5.5	11.5	3.2	4.4	81	155	5.3	14.1	5.1	3.2
10	112	131	6.9	14.0	4.1	3.6	124	121	6.9	14.5	4.0	3.4
11	125	87	8.0	13.9	4.2	3.3	112	52	9.9	15.1	8.0	3.1
12	121	29	8.4	12.1	4.3	3.2	111	36	10.3	14.5	4.1	3.1
13	126	16	9.8	14.1	4.2	4.2	104	9	10.0	13.7	4.6	3.1
14	100	7	11.4	13.9	4.1	3.9	130	1	12.4	16.0	3.5	3.1
15	67		11.3		4.4		84		12.6		4.0	
16	52		11.9		2.4		50		14.4		2.2	
17	30		13.6		2.4		28		15.1		2.1	
18	26		15.4		2.8		29		18.2		2.2	

The black figures are for the rural children. The red figures are for the urban children. The average per cent of the norms for rural children, in comparison with the norms for urban children, is 22.5% for rural boys and 204% for rural girls.

Average Number of Words.

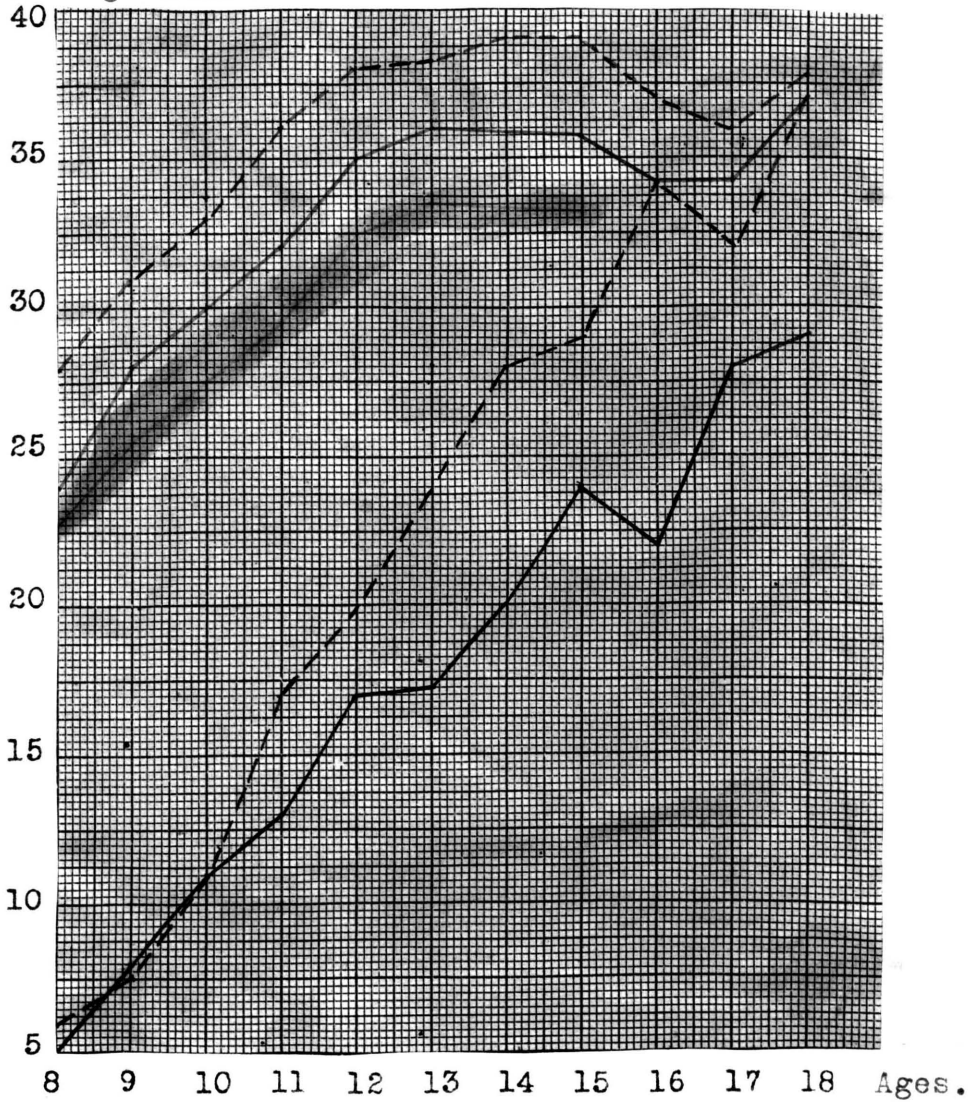


FIGURE XVI. LOGICAL MEMORY, "THE MARBLE STATUE"  
Black lines are for rural children. Red lines are for city children. Solid lines are for boys. Broken lines are for girls.

The tendency is greater in the case of girls than the boys. The rural boys and girls attain about the same standing from 8 to 10, after which the rural girls excel the rural boys at all ages.

COMPLETION TEST. "This test is a test of reasoning capacity. Of course, it is only one particular aspect of reasoning. The pupil is given a story that has certain words omitted. He must read the story, see what it is trying to say and determine what words, put into the blanks, will make the correct sense. The meaning of the word written in a particular blank must not only make the sentence read sensibly but must fit into the story as a whole. Filling in the blanks in this way demands considerable thought."

The following test-sheet of "Joe and the Fourth of July" was used:

"Joe ran errands for his mother and took care of the baby until by the Fourth of July his penny grew to be a dime. The day before the Fourth, he went down town all by himself to get his fire works. There were so many kinds he hardly knew which to buy. The clerk knew that it takes a long time to decide, for he had been a boy himself not very long ago. So he helped Joe to select the very best kinds. "When are you going to fire them off?" asked the clerk. "I will fire them very early tomorrow," said the boy. So that night Joe set the alarm clock, and the next morning got up early to fire his firecrackers."

The above test-sheet was distributed to the children. They were asked to fill in the blank spaces, the words that are typewritten in red. Ten minutes were allowed for this test. The following instructions were given: "On the sheet which has been distributed is printed a story, which has certain words omitted. You are to put in the blanks the words that are omitted. The words, which you write in, must give the proper meaning

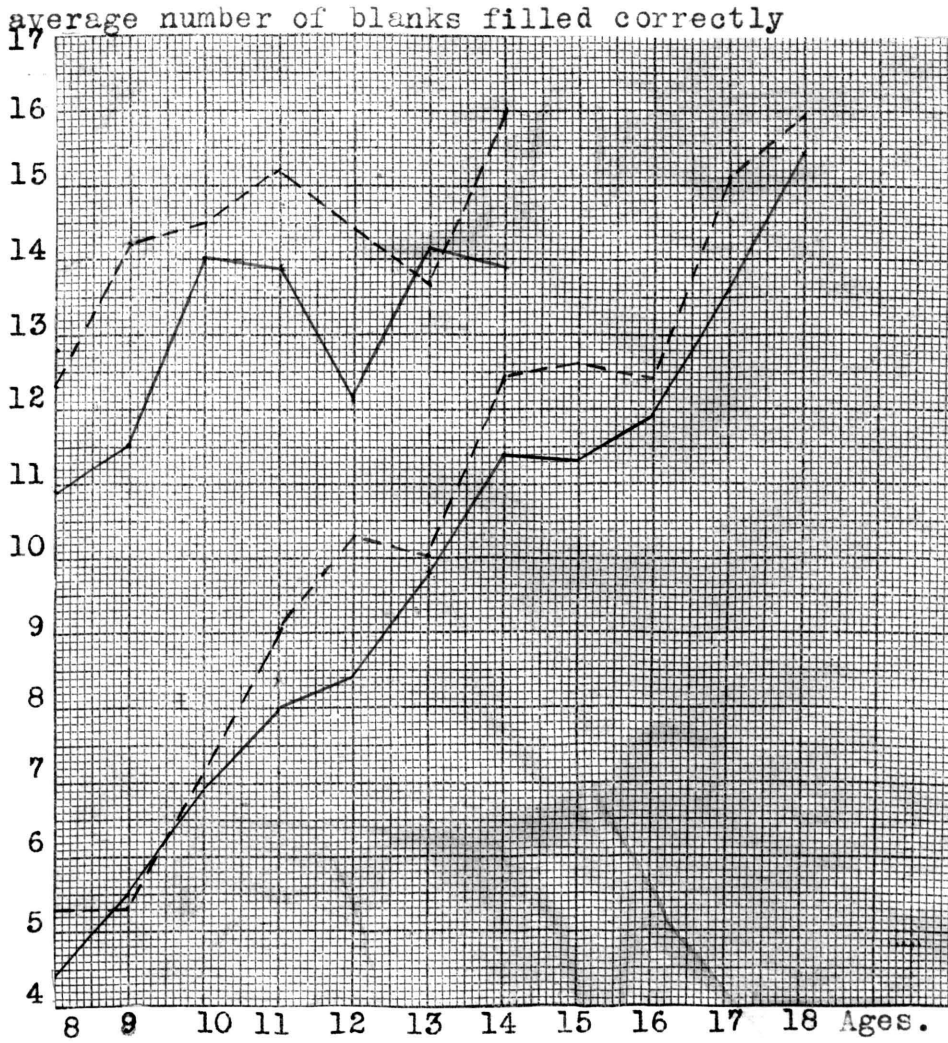


FIGURE XVII. COMPETITION TESTS. "JOB AND THE FOURTH OF JULY". Black lines are for rural children. Red lines are for city children. Solid lines are for boys, broken lines are for girls.

so that the story reads correctly. The word, which you fill in, must not only give the proper meaning to the sentence but to the story as a whole."\*

The grading of the papers consisted in giving one credit for each blank correctly filled.

The superiority of urban children over rural will be clearly seen from Table XVII and Figure XVII, the urban boy being 77.5% better than the rural, and the urban girl being 79.6% superior to her country sister. The urban girls are superior to the urban boys by 9.9% while the rural girls are 10.4% better than the rural boys.

SUMMARY. The evidence of this study in mental differences, which is summarized in Tables D, E, and F, indicate that the urban children are superior to the rural in Free Association, the per cent of difference being 25.2% for boys and 19.0% for girls; that the urban children are very much superior to the rural in the Controlled Association, there being an average difference for both lists of the Opposites of 42.4% for boys and 36.8% for girls; that in the Substitution test the urban boy outranks the rural by 23.4% and the urban girl excels the rural by 19.3%; that in Rote Memory urban children excel rural children, urban boys lead rural boys by 22.9% and urban girls lead rural girls by 16.9% in memory for concrete words, while in memory for abstract words there is a difference of 35.5% in favor of

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\*Pyle: Manual for Mental and Phy.Ex. of Sch. Child. 1916, p. 16

urban boys and 29.6% in favor of urban girls; that in Logical Memory there is to be found the greatest difference in all the tests of this investigation, between rural and urban children, the urban boy outclasses the rural boy by 121.4%, and the urban girl leads the rural girl by 104.6%, and that the same wide variation between rural and urban children found in the Logical Memory test exists in the Completion test, the difference being 77.5% in favor of the urban boy, and 79.6% in favor of the urban girl.

Thus it is seen that there is a wide difference in mentality between rural and urban children. The greatest difference is in Logical Memory and the least difference is in Rote Memory for concrete words. The rural girls are superior to the rural boys in all the tests. In general, there is more difference between urban boys and rural boys than between rural girls and urban girls; and there is slightly more difference between rural boys and girls than between urban boys and girls. With increasing age, there is a tendency for the difference between the rural and urban children to become less. This tendency is more marked between rural and urban girls than between rural and urban boys. In all probability, this is due to the selection that takes place in the rural schools. Owing to many causes, usually to the ill adapted course of study to farm needs, poor teaching, and unattractive surroundings of the rural



school, a large per cent of the rural children drop out of school at the ages of fourteen, fifteen and sixteen, not many remaining after they are seventeen. In this investigation, which covered a whole county consisting of over 4,000 school children enrolled in the seventy-two schools, the writer found less than fifty children in each of the ages, seventeen and eighteen, as is indicated in all the tables of this study.

By finding the percentage difference for each age, between rural and urban children, and averaging these percentage differences for each test, and then taking the average of the percentage grades for all the test, we find that rural boys have a grade of 55.2% as compared with urban boys, and rural girls have a grade of 57.2% as compared with urban girls. Hence, this study indicates that the marks indicating the mental ability of rural children are slightly less than three-fifths of the marks indicating the mental ability of urban children.

TABLE D.

AGE COMPARISON FOR RURAL AND URBAN GIRLS.

MENTAL MEASUREMENTS.

Age	F. Assn.	C. Assn. #1	C. Assn. #2	Subst.	R. Mem. C	R. Mem. A.	L. Mem.	Compl.
8	14.6	50.0	13.6	78.8	57.9	82.5	373.0	132.0
9	22.1	47.7	14.0	63.0	36.1	61.0	287.7	166.0
10	14.4	45.3	37.0	31.9	30.5	57.6	190.1	110.1
11	21.1	37.7	60.7	24.3	19.5	36.7	114.1	52.5
12	13.8	3.3	44.4	3.5	15.8	25.3	38.2	31.0
13	30.6		65.2	2.6	6.6	16.5	55.8	37.0
14	31.3		50.0	0.0	4.1	17.4	39.0	29.0
15	36.4		41.7	8.0	0.7	10.7	32.0	
16	6.4		29.3	0.4	7.8	9.3	8.7	
17	4.3		25.5	2.0	2.8	0.0	12.6	
18	14.0		36.8	1.1	6.2	8.9	0.1	
Av.	19.0	35.6	38.0	19.3	16.9	29.6	104.6	79.6

The black figures in each column are the per cent of difference in favor of the rural children. The red figures in each column are the per cent of difference in favor of the urban children.

TABLE E.

AGE COMPARISON FOR RURAL AND URBAN BOYS.

MENTAL MEASUREMENTS.

Age	F. Assn.	C. Assn.#1	C. Assn.#2	Subst.	R. Mem. C.	R. Mem. A.	L. Mem.	Compl.
8	35.1	83.6	7.8	66.6.	58.9	62.5	376.4	147.7
9	41.0	34.3	31.4	53.2	62.1	88.3	222.3	108.9
10	24.6	29.2	64.6	45.6	30.6	55.2	163.2	102.8
11	7.6	11.1	64.9	24.1	21.4	37.6	136.6	73.8
12	3.7	8.1	81.2	21.2	18.3	26.3	105.1	44.0
13	11.4		58.8	2.2	18.4	27.9	101.9	43.8
14	24.6		57.7	5.0	17.3	23.5	80.0	21.8
15	40.8		84.7	14.1	6.5	15.5	50.2	
16	31.4		53.0	13.6	9.4	21.2	53.5	
17	38.6		33.3	16.0	1.8	11.0	22.6	
18	25.5		30.9	3.2	8.2	20.5	23.9	
Av.	25.2	33.2	51.6	23.4	22.9	35.5	121.4	77.5

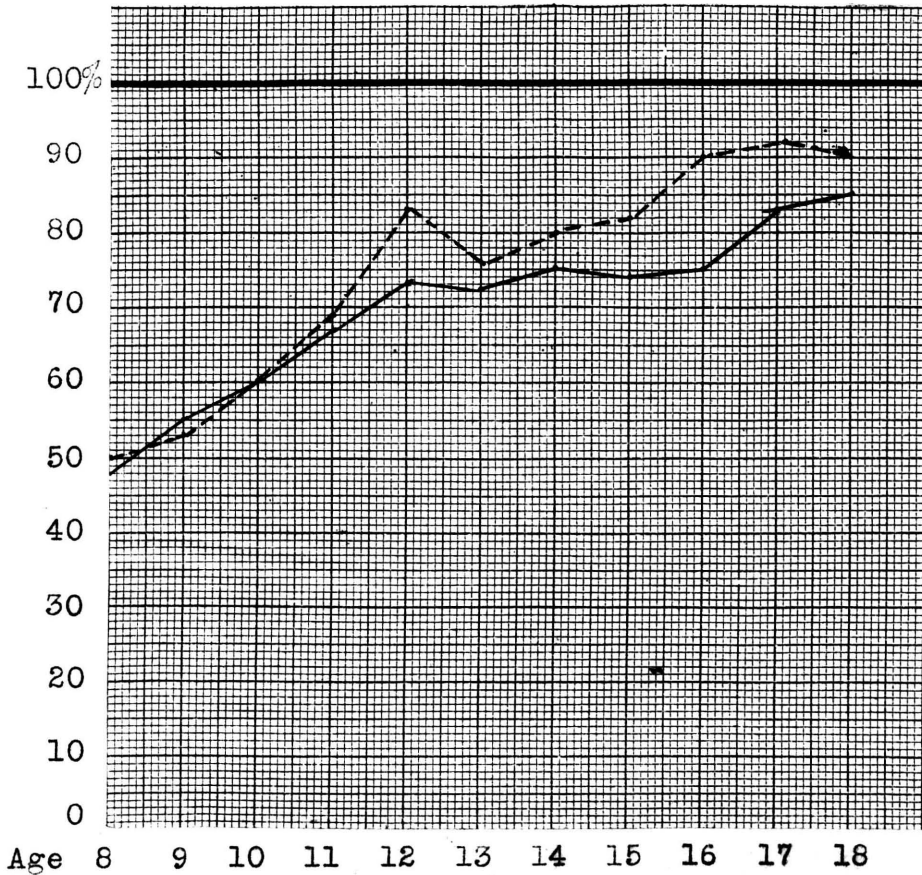
The black figures in each column are the per cent of difference in favor of the rural children. The red figures in each column are the per cent of difference in favor of the urban children.

TABLE C.  
SUMMARY OF MENTAL DIFFERENCES BETWEEN RURAL AND URBAN  
CHILDREN.

	Boys		Girls		Rural		Urban	
	Urban	Rural	Urban	Rural	Boys	Girls	Boys	Girls
Free Assn.	25.2		19.0		12.1		13.2	
Con. Assn.#1	33.2		35.6		8.9		11.5	
Con. Assn.#2	51.6		38.0		18.2		16.5	
Substitution	23.4		19.3		22.9		3.1	
Rote Mem. Con!	22.9		16.9		8.3		4.7	
Rote Mem.Abs.	35.5		29.6		11.4		10.5	
Log. Memory	121.4		104.6		9.1		11.9	
Completion	77.5		79.6		10.4		9.9	
Average	48.8		42.8		12.6		10.1	

The figures in each column are the per cent of difference in favor of the rural or urban, or boys or girls as the case may be.

MENTAL DEVELOPMENT OF RURAL AND URBAN CHILDREN.



The red straight line represents urban children. The black lines represent rural children. The solid black line represents rural boys, and the broken black line represents rural girls.

The above curves show the mental development of rural children when all the mental tests are combined as compared with urban children. These curves are constructed from Tables D and E. The lower black lines represent per centages of urban standing ~~for~~ for each year attained by the rural children.

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C O N C L U S I O N

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V. CONCLUSION.

What, then, shall we conclude in reference to our question, as to the mental and physical differences between children of a Missouri agricultural county in which social and educational conditions are not materially different from those of the state as a whole, and children of representative cities of Missouri?

PHYSICAL DIFFERENCES. This investigation indicates that the rural and urban boys are about the same in height and weight, there being a slight difference in favor of the urban; that the rural boy breathes more air both actually and in proportion to his weight; that he is somewhat stronger, and has a slower muscular reaction, so that, while he might carry a heavier load, his urban brother could get around faster and do more muscular work.

Girls differ in about the same ways that boys differ. The rural girl is very much ahead of the urban in muscular strength and lung capacity. She exhibits the same sex characteristic in the decline of her vital index from the age of puberty onward that marks the girls of the cities, and <sup>those of</sup> other races.

The only outstanding differences are <sup>in</sup> muscular strength, lung capacity, and muscular reaction, the rural children



excelling in the first two, and the urban children in the third.

By finding the percentage difference for each age, between rural and urban, and averaging these percentage differences for each test, and then taking the average of the percentage grades for all the tests, we find that rural boys have a grade of 99.9% as compared with urban boys, and rural girls have a grade of 101.5% as compared with urban girls.

MENTAL DIFFERENCES. The comparison of the physical development of rural and urban children has revealed one feature that may influence the results of some of the mental tests, especially those that require speed in writing. Rural children have a much slower muscular reaction and this is probably the reason for their slowness in turning out work in those tests that have a fixed time limit, such as Free Association, Controlled Association, and Substitution. Hall says, "the greatest number of taps that can be made in a given brief time interval is an important determination for the development of accessory muscular control. How rapidly two like, simple, volitional contractions can follow each other is perhaps the best index we have of will time, and is not much behind the rate of most rapid clear articulation of successive syllables. The maximal rate of wagging the forefinger does not vary much from that of trotting the leg, whispering the sounds 't' and 'k', or vibrating the head or lower jaw."\*

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\*G. Stanley Hall: Adolescence, Vol. 1, Chap. III, page 142.

The foregoing investigation yields some pretty definite conclusions in regard to the mental characteristics of rural children. In general, the marks indicating the mental ability of rural children are slightly less than three fifths of those of the urban children. The rural girls approach the urban girls in mental ability a little more closely than the rural boys approach the urban boys. Rural boys and rural girls are farther apart in mental ability than urban boys and urban girls, and in both rural and urban the girls are superior. The greatest difference to be found between rural and urban children is in Logical Memory, and the least difference is in Rote Memory for concrete words. With increasing age, there is a tendency for the differences between rural and urban children to become less. This tendency is more marked in the case of girls than with boys.

By finding the percentage difference for each age, between rural and urban children, and averaging these percentage differences for each test, and then taking the average of the percentage grades for all the tests, we find that rural boys have a grade of 55.2% as compared with urban boys, and rural girls have a grade of 57.2% as compared with urban girls.

WHAT ARE THE CAUSES OF THESE MENTAL AND PHYSICAL DIFFERENCES?

Perhaps this is the most important question that arises out of this study. Are the differences mainly due to the original

nature of the children, or do environmental conditions wield a more important influence?

Of the importance of the original nature, Thorndike has this to say: "For the more primitive and fundamental traits in human nature such as energy, capability, persistence, leadership, sympathy, and nobility, the whole world affords the stimulus that is present well-nigh everywhere. If a man's original nature will not respond to the need of these qualities and the rewards always ready for them it is vain to expect much from the paltry exercises of the schoolroom." The importance of environment, Thorndike points out very clearly in these words: "The channels in which human energy shall proceed, the specific intellectual and moral activities that shall profit by human capacities, are less determined by in-born traits. The schools should invest in profitable enterprises the capital nature provides. We can not create intellect, but we can prevent such a lamentable waste of it as was caused by scholasticism. We cannot double the fund of human sympathy, but we can keep it clear of sentimental charity."\*

CAUSES OF PHYSICAL DIFFERENCES. The causes of the differences in physical development of rural and urban children are, in all probability, due to both inborn nature and environmental conditions. The superiority of rural children in muscular strength and lung capacity is, no doubt, due to

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\*Thorndike: Educational Psychology, Briefer Course, p. 400.

different modes of life. Farm life is primarily outdoors and offers a variety of physical exercises that tend to induce respiration and develop the fundamental muscles of the body, while urban life is mostly indoors and sedentary. Whipple says\* that the vital capacity may be increased 300 cc. in three months by various forms of physical exercises which demand active respiration. The inferiority in muscular reaction of rural children as compared with urban seems to be due to inborn nature of rural children. This study indicates that, age for age, the rural children are slower in muscular reaction as compared with urban children. In all cases where speed was required in this study, tapping, marking, and writing, the rural children were easily outclassed by the urban children. The most casual observation of the actions of rural and urban people leads to the same conclusions. The slowness of rural children in muscular speed is due to inborn nature, and not, to any great extent, to different modes of life as was found in the case of muscular strength and lung capacity.

CAUSES OF MENTAL DIFFERENCES. Just how much is due to inborn nature, and how much is due to environmental conditions in influencing the wide difference in mentality found between rural and urban children, we cannot positively

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\*Whipple: Manual of Mental and Physical Tests, Vol.I, p. 93.

say. The question arises, Would these differences have been the same had the rural children been subject to the same environmental influences as had the urban? The writer's opinion, based on this investigation, various other Sanitary Surveys of the Rural School,\* and a close study of the rural schools for several years, is that, in all probability, the causal factors in influencing this wide difference in mentality between rural and urban children are : (1) a poorer stock of people on the farms, and (2) environmental influences.

(1) The indications of a poorer stock of people on the farms are: (1<sup>1</sup>) the decrease in rural population, the better class moving to towns and cities, which are operating as a magnet to draw them; (2<sup>1</sup>) the high rate of tenancy in the country; almost exactly fifty per cent of the farms are operated by tenants; and (3<sup>1</sup>) the high rate of illiteracy found in the rural communities, which is due to poor educational facilities in most instances. Thus heredity, no doubt, is a very important factor in this wide difference in mentality found between rural and urban children. In all probability, rural children are by inborn nature slightly inferior to urban children.

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\*A Study of the Rural Schools of Saline County, Mo. by Prof. J.D. Elliff and Prof. Abner Jones, Bul. U. of Mo. Vol. 17, No. 22.

\*Rural School Sanitation by Clark, Collins, and Tredway, Porter County, Indiana, Bul. 77, Bureau of Education.

\*A Sanitary Survey of the Rural Schools of N.E. Mo. by the Kirksville Mo. Normal School, Bulletin #2.

(2) The part that the environmental influences of the country play in this wide difference in mentality between rural and urban children is to be found in the practice of education in the execution of the ideal of education, as defined by society, thru the agencies of the type of school administration, pupils, and teachers, working together with the course of study and school equipments. Under this practice of education are involved all questions of school hygiene, incentives, work, play, offence, discipline, punishment, and the improvement of teacher. "In no particular has American education been weaker than in these matters, and no educational sign today carries more hope with it that the widely growing recognition of their importance."\* Possibly the facts regarding the type of school administration, equipment, course of study, and teachers of McDonald County will throw some light on the cause of a greater part of the wide variation in mentality found between rural and urban children. Here are the facts of the condition of the schools in this county as they exist at the present time.\*\*

(1) The Type of school administration. The system of administration is of the decentralized or democratic type. Whether there is a good rural school or none in the community depends primarily not upon the state, but upon the people in the district. Because of such a permissive

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\*Horne: Philosophy of Education, page 11.

\*\* Report of the Public Schools of McDonald County, Mo. 1917.

system as this, the rural schools show comparatively little progress. Where the schools of one little county are placed in the hands of over three hundred incompetent school board members, it is impossible to locate responsibility. So long as the rural voters are permitted to say each year at the annual school meeting who shall run the schools, vote money for new buildings and equipments, and whether the schools shall be consolidated into larger units of taxation and administration, the establishment of modern rural schools that will meet the present day demands of the rural children will be absolutely impossible. The fruits of the present day administration of the rural schools are to be found in the unequal educational opportunities in the county, such as the following:\*

Assessed Val. Dist.	highest \$65,000	lowest \$12,000
Enumeration in Dist.	highest 110	lowest 17
Total Tax Levy	highest 92¢	lowest 40¢
Annual salary teacher	highest \$560.00	lowest \$240.00
Value Sch. building	highest \$1200.00	lowest \$250.00
Length of sch. term	highest 160 days	lowest 80 days.

It is very evident from such a situation as this that we need a new unit of school administration for the rural schools, and that little progress can be made toward giving the rural boy and girl an equal opportunity with their city cousins until a new school unit is established that will wipe out the unequal educational opportunities found in the county.

(2) The buildings and equipments.\* The average school

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\*Report of the Public Schools of McDonald County, Mo. 1917.



building of this county is worth about \$400.00. It is the usual box-car type of construction, warmed by a wood stove placed near the center of the room. There is no means of ventilation, except the windows and doors. The illumination is deficient. The floors are of pine, never oiled, swept daily, in most cases by the teacher, and are usually scrubbed once a year. The water-closets are earth privies without urinal, screens, or boxes for excreta. They are never scrubbed, never cleaned out underneath, and are badly marked and cut. The drinking water is usually obtained from a well on the play ground, which has not been cleaned for a long time. The water fountain consists of the ordinary zinc or tin bucket and two dippers. The school grounds are usually rectangular in form, consisting of about one half acre and in no cases are they fenced. The children are not taught to play. There is no playground apparatus and the children usually play "fox", "drop the handkerchief," "dare base", "black man", and "town ball". The school equipment of the average rural school consists of a library of about fifty books, worth in the neighborhood of \$18.00 and is in most instances in a poor state of repair. In most instances these books are selected by the teacher and are paid for with the receipts from box, or pie suppers. The blackboard in almost all the schools is fairly serviceable, but it is too high for the smaller children. The non-adjustable desks are found in all the schools. Only in a few of the schools do you see

window shades and pictures. There is no equipment for teaching manual training, agriculture, cooking, or sewing. The discomfort experienced in buildings of this type produces a hampering effect on the mental concentration necessary for educational purposes, and added to the unattractive, uninteresting surroundings of the rural school, cause many a rural boy to drop out of school before he reaches the sixth grade. Dr. Thomas D. Wood of Columbia University has this to say regarding the rural equipment: "The rural school from the standpoint of health and general fitness for its important use, is the worst type of building in the whole country, including not only all types of buildings used for human beings, but also those used for live stock and all domestic animals. Rural schools are, on the average, less adequate for their use than prisons, asylums, almshouses, stables, dairy barns, pig pens, chicken houses, and dog kennels are for their use."\* In general, this statement just about describes the rural school situation.

(3) The Rural Course of Study.\*\* The Rural School Course of Study presents material stretching back indefinitely in time, and extending outward indefinitely in space. It divides and fractionizes the world. Arithmetic selects, abstracts, and analyzes one set of facts, geography another, formal grammar another, history another, government another, physiology another, and so on thru the long list of studies in the rural school curriculum. From the time the child enters

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\*Rural School Messenger, Vol.VII.#2, page 47.

\*\*State Course of Study for Public Schools of Missouri (1916).

school until he graduates, he is taught to spell orally, in most instances, from a spelling text that has 15,000 different words, a large per cent of which are useless and will never function in life. These studies, as classified, are the product of the science of the ages, not of the experience of the child. "The Child is taken out of his familiar physical environment, hardly more than a square mile or so in area, into the wide world--yes even to the bounds of the solar system. His little span of personal memory and traditions is overlaid with the long centuries of the history of all peoples.\* In stead of the Rural Course of Study giving meaning and understanding to the activities of rural life, it has become an end in itself. This emphasis on subject matter has brought into our rural schools the worst sort of formal training to be found in the history of education. No doubt, many a rural boy has concluded that education is useless, because the things taught in the schools were of no value to him in his present day life. The training that he gets in school fails to make him more efficient in the things that he wants to do, and for this reason the school becomes uninteresting and something to be avoided if possible. Hence, the subject matter taught in the rural schools should be an outgrowth of the forces operating in the child's life; contain the steps that intervene between the child's present experiences and their richer

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\*Dewey: The Child and the Curriculum, page 9.

maturity; and suit the nature and needs of the rural community. This means that the child who never saw a paved street and the child who never saw a green meadow cannot be educated after a uniform pattern. The education of the boy cannot be the education of the girl, the education of the intelligent and talented child must differ from that of the slow-minded, ungifted child. With such a new course of instruction, education will become a felt need of the children. Without this felt need on the part of them, teaching and learning are mechanical; with it, they are vital. "The child is born into a system of social relationships, just as he is born into a certain quality of air. As he grows in body by breathing the one, so he grows in mind by absorbing the other."\* In short, the rural course of study should teach the child to know the world in which HE LIVES and how to act in it. It should be realized in the experience of the children, and should help them solve their present day problems better than they could by not attending school.

(4) The Rural Teacher.\*\* Forty-five per cent of the teachers in the rural schools of McDonald County have had no teaching experience; fifty-five per cent of them have had no high school training--children who have just graduated from the eighth grade; seventy-five per cent have had no normal training; seventy-eight per cent are in their position for the first year; sixty-three per cent are female teachers; six per

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\*Baldwin: Social and Ethical Interpretation, page 12.

\*\*Report of the Public Schools, McDonald County, Mo. (1917)

cent hold first grade certificates; thirty-eight per cent hold second grade certificates; fifty-five per cent hold third grade certificates, which grade requires only the common branches taught in the eighth grade; and last, but not least, the average annual salary of these teachers is \$284.00. These facts indicate that the greater per cent of the rural teachers of this county do not know what to teach, nor how to teach it, which involves understanding the child and all the factors which come in question when the child is dealt with.

Hence the rural teacher not only needs an understanding of the ideals prescribed by society, which are the purposes and aims of education, and an enthusiastic devotion to these ideals; but she needs a thoro understanding of all the ways in which the mind of the rural child can be influenced and developed. This will necessitate her having a thoro general education in some normal school or university and in addition to this she must have the clearest understanding of the child's inborn nature, his possibilities, and the mental and physiological laws and sociological conditions. The rural school teachers have imposed upon them a great responsibility, no small part of which is the molding of character. Education is something more than imparting instruction. Those who are true teachers spend their lives in a belief in the ideal values of their work.

\*"To them children are like beautiful marble from which they have to shape ideal forms. With love and sympathy, they live for the children whose happy souls have been intrusted to their devoted work, and in every lesson, in every work, and every glance they express that enthusiasm for the ideal which gives

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\*Musterberg: Psychology and the Teacher, page 75.

meaning to their great task." If the teacher proves unequal to her job, the habits, knowledge, and ideals that the school hopes to have the child acquire will prove to be valueless, which will place the rural child under a handicap for life. Young people who adopt teaching as a temporary avocation, which is so often true in the country, do not meet with the same success in training children, in adjustment, as do those who make this profession a life work. The training of rural teachers, therefore, and their selection, warrants the most careful consideration, because in addition to technical training, the successful teacher must be adaptable to rural school conditions and have the ability to broaden the children's outlook upon life. The function of the teacher was rightly stated by President Garfield when he said, "With a Mark Hopkins on one end of a log and a receptive child on the other, there you have a school!" Whether the child acquires the habits, knowledge, and ideals, that will best adapt him to his surroundings depends upon the proper conception of the function and relation of the educational forces--the child, the course of study which embodies the standards prescribed by present day society, and THE TEACHER.

If the facts given above, relating to the inefficient type of the rural school administration, the box-car type <sup>of</sup> school building with poor equipment, the traditional school curriculum, and the poorly trained and <sup>poorly</sup> paid rural teachers, are compared with the urban type of school administration, the modern, well equipped school buildings, the school curriculum which is flexible and functional, and the normal- and university-trained

teachers, there will be found a wide variation in efficiency in favor of the urban school, which, no doubt, will explain the greater part of the wide difference in mentality found between rural and urban children in this investigation.

### S U M M A R Y .

Problem Are there any fundamental differences between rural and urban children in mental and physical development? If there are differences, are they due to the inborn nature of the children, or to environment?

#### THE FACTS:

(1) Physical Differences. This investigation indicates that rural and urban children are about the same in physical growth and development. The only outstanding differences are muscular strength, lung capacity, and muscular reaction. The rural children excel in the first two, and the urban in the third. By finding the percentage difference for each age, between rural and urban children, and averaging these percentage differences for each test, and then taking the average of the percentage grades for all the tests, we find that rural boys have a grade of 99.9% as compared with urban boys, and rural girls have a grade of 101.5% as compared with urban girls.

(2) Mental Differences. This study indicates that there is a wide variation between rural and urban children in mentality. The urban children excel the rural in every test. The greatest difference is in Logical Memory and the least difference is in Rote Memory for concrete words. In general, the marks indicating the mental ability of rural children are slightly less than three fifths of those of the urban children.



With increasing age, there is a tendency for the differences between rural and urban children to become less. This tendency is more marked in the case of girls than with boys. By finding the percentage difference for each age, between rural and urban children, and averaging these percentage differences for each test, and then taking the average of the percentage grades for each test, and then taking the average of the percentage grades for all the tests, we find that rural boys have a grade of 55.2% as compared with urban boys, and rural girls have a grade of 57.2% as compared with urban girls.

CONCLUSION:

(1) Physical Differences. The causes of the differences in physical development of rural and urban children are, in all probability, due to both inborn nature and environmental conditions. The superiority of rural children in muscular strength and lung capacity is, no doubt, due to different modes of life. Farm life is primarily outdoors and offers a variety of physical exercises that tend to induce respiration and develop the fundamental muscles of the body, while urban life is mostly indoors and sedentary. The inferiority in muscular reaction of rural children as compared with urban is probably due to inborn nature of rural children. This study shows that, age for age, the rural children are slower in muscular reaction as compared with urban children. In all the tests, which were not affected by different modes of life, such as standing height, sitting height, weight, and muscular speed, it was found that the rural children mature later as

compared with urban children, which is an inborn trait of rural children. This later maturity will account for most of the slowness of rural children in muscular speed.

(2) Mental Differences. In all probability the causal factors in making the wide difference in mentality found between rural and urban children are (1) a poorer stock of people on the farms, and (2) environmental influences.

(1) The indications of a poorer stock of people on the farms are (1) the decrease in rural population, the better class moving to towns and cities, which are operating as a magnet in drawing the better class of people; (2) the high rate of tenancy in the country; and (3) the high rate of illiteracy found in the rural communities. In all probability rural children are by inborn nature slightly inferior to urban children.

(2) The part that the environmental influences of the country play in this wide difference in mentality between rural and urban children is to be found in (1) poverty stricken conditions due to the large number of rural districts with low assessed valuations; (2) inefficient school administration--management of the rural schools by the rural people who lack educational insight in most all instances; (3) inadequate buildings and equipment; (4) poor supervision of instruction because of the limited powers, low qualifications and compensation, and method of electing the county superintendent of public schools; (5) a traditional rural course of study

that has no connection whatever with rural life; and (6) poorly trained and paid rural teachers. All of these inefficiencies rob the rural boy and girl of an education, which is readily proven when the rural children have to compete with their urban cousins.

The rural problem, stated in simplest terms, is that of holding a good people upon our farms. But this cannot be done unless country life is attractive and satisfying, an end to be attained only thru the upbuilding of the local country community. Country community-building, however, requires leadership and co-operation, both of which are matters of education. The whole issue, therefore, reverts back to the question of proper education, and in its local aspects becomes a problem for the country school. But the country school itself, as shown in this investigation, is at present inefficient and must undergo a redirection before it can effectively meet the new responsibility being laid upon it. This redirection calls insistently for a modernized system of administration, or consolidation; but, more than all else, it calls for a new race of rural teachers, who, serving in offices of local leadership, shall not only remake the school but vitalize and stimulate the whole community life. Hence, if rural Missouri is to be a satisfactory nursery for human life, it must provide conditions favorable for the cultivation of the best. This means the establishment of a new Rural Community School, which will provide for both elementary and high

school training. The management of these Rural Community Schools will be by a County Board of Education which will legislate for all the schools of the county, select the county superintendent of public schools from the county at large, and hold him responsible for the determining and carrying out of a school policy; <sup>it will</sup> employ all the teachers of the county upon the nomination by the county superintendent of public schools; prepare the annual school budget; and superintend the construction and equipping of new school buildings. This will necessitate a County Board of Education to be composed of not more than five members of successful business ability, men of vision and educational insight. Such a board should receive only compensation for traveling expenses, and should be elected by the people of the county for a term of five years, one member being elected each year at the Annual School Meeting, from the county at large, provided that not more than one member shall be elected from any township in the county. The primary function of the board should be legislative, all executive duties should be delegated to the county superintendent of public schools who should be the executive head of the board.

Such a new Rural Community School will have for its purpose the training for citizenship. It will accomplish this by serving the needs of the children and the rural community at large. The needs of the children will be looked after by giving them a course of instruction that will unfold to

them their various relations of life, and will develop their powers of clear thinking and right action. The child's life is new and the world is new, and he wishes to go forth and try the new life in the great new world, which is the only way that he can get acquainted and adapted to his surroundings. Such a course of instruction, then, will have for its foundation the inborn nature of children, from which the "structure" that will conform to the ideal prescribed by democracy will be builded. That is, the child possesses only the natural resources--reflexes, instincts, and capacities--from which growth and development proceed. Rural education should begin its work by utilizing the individual, social, environmental, and adaptative instincts of children, which are the pillars of modern civilization. To illustrate what is meant by such a course of instruction, take, for instance, the utilization of the activity of the collecting instinct.\* This instinct is no more evident in children than the instincts of play, fighting, gang, migratory, and imitation. Children from a very early age show a disposition to lay their hands on everything that attracts their attention and to take it home, such things as pebbles, sticks, leaves, acorns, colored paper, and anything else that is of a bright color. Up to the age of eight the impulse is crude and groping, undirected by any motive, but from the age of eight on, the tendency develops into a genuine

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\*Pyle: The Outlines of Educational Psychology, Chapter VII.

interest. Hence, early childhood is the time to send children forth to the fields and woods, to study what they can find there and to gather specimens. This can be best done by the children forming clubs for the purpose of studying the natural environment. Such study would embrace the rocks, soils, plants, flowers, fruits, and specimens of wood of various trees. Birds and insects can be studied and collections made of each species. The work of such a club would have a twofold value: (1) The study and collecting acquaint the children with their natural environment, and in doing it, afford a sphere for the activity of many aspects of their nature. Such a study takes them out-of-doors and affords an opportunity for the exploring of natural environment. This work could be made to appeal to the group instinct by meetings<sup>and</sup> held by the children, in which the specimens are exhibited and studied. (2) The specimens thus collected by the children should be put into the School Museum. The aim of this museum should be to represent completely the local environment, the natural and physical environment, and also the industrial, civil and social environment of the rural children. Such a museum, therefore, would be educative in its making, and when it is made it would be of much value to the community,-not only to the children, but to all the people of the community. In such a museum should be found the minerals, rocks, soils, insects, birds, and all specimens of the wild animals of the community. There should, also, be specimens showing industrial evolution, the stages of manufacture of the raw material of the community, specimens of local historical interest, pictures, documents, and books.

The museum and a small workshop should be the most important parts of the rural school building. Hence, it is very evident that if proper appeal is made to the natural desire of rural children to make collections, this instinct would soon be made of service in producing a very valuable collection.

The other instincts of the children can be utilized to as much advantage as the instinct for collecting if proper appeal is made to these inborn resources. These are the uninvested capital, upon which depend the active growth and development of children; they are the starting points from which the rural school must begin its work. The behavior of man in the family, in business, in the state, in religion, and in every other affair of life is rooted in his unlearned, inborn equipment of instincts and capacities. The aim of rural education should be to perpetuate some of them to eliminate some, and to modify or redirect others, and, in so doing, train the child, by building up in him habits and ideals that will be suitable for the life in present day society, by subduing and controlling his inborn impulses. In short, the rural schools should invest in profitable enterprises the capital which nature provides.

This new Rural Community School will serve the needs of the community by being the center of interest and activity for all the rural people. It should operate as a magnet to draw all the rural people to it. The present day life in the country is too serious. The farmer looks upon manual



labor as the only thing worth doing. Life in the country is just one thing over and over again, which tends to make life a drudgery. This new rural school should show the farmer that there are other things as valuable as daily labor.

When we add to the museum, collected by the children, a library, not only for the children, but for the old people as well, we will have what should be in the rural school. The school should stand for the interests of the community and should by all means represent them. It could be made of such a nature that the parents would go there nearly as often as do the children. The people of the community should meet at least once a week at the school building and participate in games, debating, singing, instrumental music, moving pictures, plays; reading of books and current literature on farming and domestic science; demonstrating farm problems; looking over the work of the children; discussing means of community improvement such as road building, establishing of new mail routes and telephones, improving soil fertility, home conveniences, market problems; securing farm lectures; taking dinner with the domestic science class, talking over with the teacher the needs of the children and the community; and many other things, all of which would tend to solidify rural people. This will bring about a new country life, which will be a spirit of true everyday co-operation. It will make it possible for the realization of all the ideals of rural

life thru the bringing of the Kingdom of Love for Neighbors into country communities. Hence, it is seen that the school should be for the instruction of all the people of the community. It should be the experiment station, the library, the debating club, the art gallery, for the whole community; and should crystallize and unify the life of the community. The man or woman who runs such a school, the teacher, should know and represent the community life; he should be a man capable of giving advice to the people of the community concerning the things that they must do and the life that they must live. He should know more about farming than any one else in the community, and by all means should be able to tell the people in an intelligent manner how farm life may be improved, so that it will make for better living. Such a man should be paid not less than one hundred dollars per month and should have in addition a home well furnished, and plenty of land for agricultural purposes. Thus it is very evident that the door thru which all forms of advancement may most quickly enter is the school. It is the home of the children. It is the home where the boys and girls of the district spend a great part of their life. And it is in the idea of the school as a social center that the whole modern evolution in rural education finds its conception. The school building becomes not merely a place for educating the young, it is the place where the whole community educates itself, adults as well as children.

In summarizing, we may say that when the country gets this new Rural Community School, we will be justified in believing that the wide difference in mentality found between rural and urban children in this investigation will be greatly reduced, for urban school surveys have shown that, in those schools which have a modern and functional course of study, well trained and paid teachers, and a system of school administration that is wide awake to the needs of the people it serves, the mental ability of the children is greatly accelerated over those children from schools of inferior teaching, traditional courses of study, and short-sighted school administration. Possibly the comparison in mentality between rural and urban children with this new Rural School will then be about the same as the comparison now found between them in muscular reaction. It is impossible for the rural school to account for all the difference in mentality, because, as noted elsewhere in this study, the inborn nature of children is the great determining factor in this matter. "How many and how hard things a child may learn to do are largely decided by inborn nature, but, within these limits, what he learns or does is largely a matter of what he is stimulated to do and rewarded for doing."\*

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\*Thorndike: Educational Psychology, Vol. III, Chap. XIII.

This latter point, what the child learns or does, is determined, nowadays, largely by the schools, which should invest in profitable enterprises the capital which nature provides. While the rural life and the rural school child have every natural advantage as is indicated in this study by the rural children excelling the urban by 0.7% in physical development, yet it is an absolute fact that the rural child is surrounded by conditions which place him under a handicap for life, his mental ability being only 56.2% as compared with urban children. It is an impossibility for the rural schools to create intellect, but they can prevent such a lamentable waste of it as is caused by the inefficient system of rural education of today.

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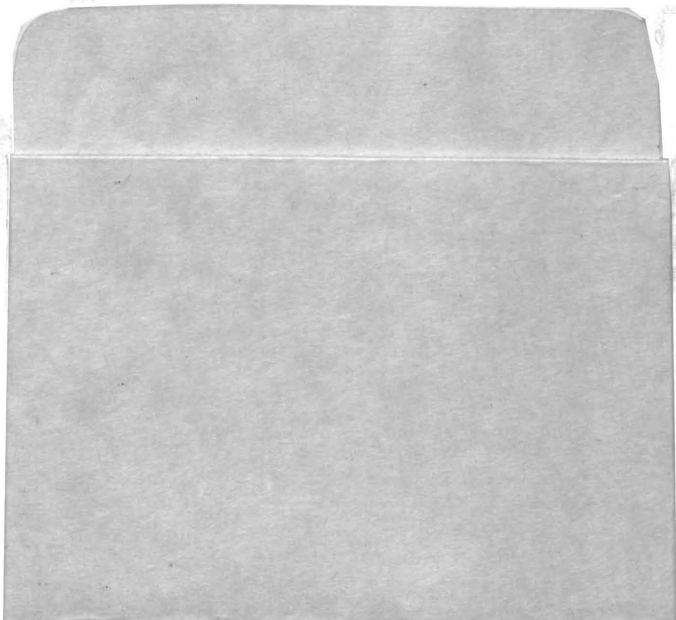




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Format	book
Source ID	010-300155481
Notes	Inside front cover has label pasted in. Signature on blank page preceding title page. Title page has perforated property stamp. Some pages have handwritten corrections. Graphs are pasted in throughout book. Pages 5, 21, 99, and 109 have what appear to be editorial comments. Purple ink property stamp on page 99. Date due stamp pasted in at end. Inside back cover has pocket, barcode, and call number.

Derivatives - Access copy

Compression	Tiff: compression: 1
Editing software	Adobe Photoshop CS5
Editing characteristics	Pages cropped and resized.
Resolution	400 dpi
Color	gray scale / color
File types	pdf
Notes	Pages typed single-sided. Blank pages removed from access copy.