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A comparison of scores made by sixth and eighth grade pupils in several schools of south eastern Indiana on timed and untimed tests in reading and arithmetic

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A COMPARISON OF SCORES MADE BY SIXTH AND EIGHTH GRADE PUPILS IN SEVERAL SCHOOLS OF SOUTH EASTERN INDIANA ON TIMED AND UNTIMED TESTS IN READING AND ARITHMETIC

by

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CHAPTER I

INTRODUCTION

Since the beginning of the present century the movement toward objective testing has been so pronounced that an understanding of its measurement procedures has come to be an essential phase of the technique of scientific education and a necessary part of the teacher's professional equipment.

Cubberley[1] as early as 1916 states:

> Wholly within the past decade one of the most significant movements in all our educational history has arisen. The movement is as yet only in its infancy, but so important is it in terms of the future of administrative service that it bids fair to change, in the course of time the whole character of school administration.

In spite of the rapid growth and the general acceptance of this movement by our educational systems there are just criticisms which have been made, one of which has been, namely, the psychological effect upon children of timed tests.

Quoting from G. C. Myers:[2]

> Now anyone may learn to do more highly concentrated mental work if he sets himself against time limits, provided he sets the limits and checks the time himself. But not many of us can escape annoyance when someone else assigns the time limit and holds the watch. The less we

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[1] E. P. Cubberley, Public School Administration. (New York: Houghton Mifflin Company, 1916), p. 325.

[2] Garry Cleveland Myers, "Schoolroom Hazards to the Mental Health of Children," Mental Hygiene. 12:18-24, January, 1928.

> have to say about it the more we are annoyed. Something certainly happens to the nervous system of a good many children under such conditions which does not promote their mental and physical health.

In consideration of this criticism, a project to determine by actual experimentation the ultimate result of the element of time was considered justifiable even though this study made no attempt to determine the effects of timing except as it affected the scores made on the various tests. It was hoped that the findings might justify this experiment by giving some definite conclusions concerning the aforesaid criticisms of objective testing.

CHAPTER II

THE EXPERIMENT AND DEFINITION OF TERMS USED

I. STATEMENT OF THE EXPERIMENT

It was the purpose of this study to determine whether the element of time had any effect upon the scores made by adolescent children as measured by standardized achievement tests. At the same time to determine which sex and which level of intelligence was most affected.

II. DEFINITION OF TERMS USED

Timed test. The term timed test refers to any test that was given adhering strictly to the time as specified in the directions.

Untimed test--regular time. The term untimed test--regular time refers to any test that was given allowing twice the time specified in the directions, but using only the part of the score made during the specified time.

Untimed test--total time. The term untimed test--total time refers to any test that was given allowing twice the time specified in the directions, using the score made during the entire time.

Positive difference. The term positive difference refers to that number by which a score made by a pupil on the untimed

test--total time exceeds the score made by said pupil on the timed test, in a given subject.

Negative difference. The term negative difference refers to that number by which the score made by a pupil on the timed test exceeds the score made by said pupil on the untimed test--total time in a given subject.

Algebraic sum of the difference. The term algebraic sum of the difference refers to that number obtained by finding the algebraic sum of the positive and negative differences of all pupils under consideration.

Mental age. The term mental age refers to the age in months derived from the manual of directions according to the score made on the intelligence tests.

Chronological age. The term chronological age refers to the actual age of the pupil in months.

Chronological age divisor. The term chronological age divisor refers to that number which should be used for the various chronological age groups as designated in the manual of directions.

Intelligence quotient. The term intelligence quotient refers to that number obtained by dividing the mental age by the chronological age divisor.

Uncompleted timed test. The term uncompleted timed test refers to the timed test of pupils not completing timed test in the specified time.

CHAPTER III

SIMILAR STUDIES AND DESCRIPTION OF THE EXPERIMENT

I. SIMILAR STUDIES

There is a vast amount of material dealing with the new type tests with reference to their position and function in educational procedures, but after having made a thorough investigation of similar studies the writer was unable to find any study that deals with the new type test in the same manner as this investigation except an identical experiment made in conjunction with this study by Will K. Kinkaid.[3] Kinkaid conducted an experiment in several schools of north central Indiana using the same tests and methods as the writer of this study used. The results of his investigation were comparable to the findings of this thesis.

II. DESCRIPTION OF THE EXPERIMENT

Setting of the experiment. The data upon which the findings of this study are based were established by giving standardized tests to the pupils of grades 6B and 8B in the public schools of Greensburg, Osgood, and Milan, Indiana.

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[3] Will K. Kinkaid, "A Comparison of Scores Made by Sixth and Eighth Grade Pupils in Four Schools of North Central Indiana on Timed and Untimed Tests in Reading and Arithmetic," (Unpublished master's thesis, Indiana State Teachers College, Terre Haute, Indiana, 1939).

Method of administration. During the latter part of the first semester of the school year 1938-1939 five tests were given each of 125, 6B pupils and 125, 8B pupils at an interval not to exceed one calendar week. The Detroit Alpha Intelligence Test, Form R,[4] was first given to all. This was followed by the Public School Achievement Tests, Forms 3 and 4, both reading and arithmetic.[5]

In order to eliminate the error involved in the taking of two forms of the same test consecutively, approximately each half of both grades was given the tests in a different sequence with reference to time allotment, subject, and form as illustrated by Table I.

During the extra alloted time on the untimed tests a different colored pencil was used in writing the scores.

By having the same person administer all tests, uniform instructions were given and comparable situations for taking the tests were provided for all pupils.

Odell[6] states, "It is highly essential that new type tests be preceded by explicit directions as to just what the pupils are to do, or, in other words, as to just how they are to record their responses."

The scoring of the tests was done under the personal supervision of the writer according to specified directions.

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[4] An exact description of all tests used is given in the Appendix.

[5] See Appendix.

[6] C. W. Odell, Traditional Examinations and New Type Tests. (New York: The Century Company, 1928), p. 238.

TABLE I

SCHEDULE FOR TESTING

Grade Eight						Grade Six					
First Half			Second Half			First Half			Second Half		
Form	Subject	Time	Form	Subject	Time	Form	Subject	Time	Form	Subject	Time
3	Arithmetic	Untimed	3	Reading	Untimed	3	Reading	Timed	3	Arithmetic	Timed
4	Arithmetic	Timed	4	Reading	Timed	4	Reading	Untimed	4	Arithmetic	Untimed
3	Reading	Timed	3	Arithmetic	Timed	3	Arithmetic	Untimed	3	Reading	Untimed
4	Reading	Untimed	4	Arithmetic	Untimed	4	Arithmetic	Timed	4	Reading	Timed

The data were tabulated in the following manner for each grade: (1) Number of pupil; (2) Sex; (3) Chronological age; (4) Score on intelligence test; (5) Intelligence quotient; (6) Reading scores, a. untimed test--total time, b. untimed test--regular time, c. timed test, d. differences positive or negative; (7) Arithmetic scores, a. untimed test--total time, b. untimed test--regular time, c. timed test, d. differences positive or negative.[7]

The data of 15, 6B pupils and 23, 8B pupils were omitted because they were incomplete. The remaining 110, 6B and 102, 8B pupils were ranked according to their intelligence quotients.

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[7] The complete data for the study are shown in the tables in the Appendix.

CHAPTER IV

PRESENTATION OF THE DATA

The intelligence quotients of the boys and the girls and the total of each grade were compared to that of a normal curve by means of the median, the first quartile, and the third quartile to indicate central tendency and dispersion. Using an interval of ten, each group was arranged in a frequency distribution as shown in Tables II and III. These measures indicate that each group very closely resembled a normal distribution.

The scores on all the tests were condensed into eight tables (Tables IV-XI) using an interval of three, to compare the scores made by the same groups of pupils on the various tests.

The statistical procedures used to obtain the various comparisons were as follows:[8]

$$M. = G.M. + \left(\frac{\Sigma fd}{N}\right) h$$

$$S.D. = h\sqrt{\frac{\Sigma fd^2}{N} - \left(\frac{\Sigma fd}{N}\right)^2}$$

$$\sigma_M = \frac{S.D.}{\sqrt{N}}$$

$$\sigma D_M = \sqrt{(\sigma_{M_1})^2 + (\sigma_{M_2})^2}$$

$$C.R. = \frac{D}{\sigma D_M}$$

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[8] James E. Wert, Educational Statistics. (New York: McGraw Hill, 1938), pp. 43-145.

TABLE II

INTELLIGENCE QUOTIENTS OF GRADE EIGHT PUPILS

Interval	Boys		Girls		Total	
	Frequency	Cumulative Frequency	Frequency	Cumulative Frequency	Frequency	Cumulative Frequency
140-149	0	0	0	0	0	0
130-139	0	0	1	57	1	102
120-129	3	45	6	56	9	101
110-119	9	42	9	50	18	92
100-109	13	33	22	41	35	74
90- 99	8	20	15	19	23	39
80- 89	8	12	3	4	11	16
70- 79	4	4	1	1	5	5
Total	45		57		102	
Q_3	110.83		111.94		111.39	
Median	101.92		104.32		103.43	
Q_1	89.06		96.83		94.13	

TABLE III

INTELLIGENCE QUOTIENTS OF GRADE SIX PUPILS

Interval	Boys		Girls		Total	
	Frequency	Cumulative Frequency	Frequency	Cumulative Frequency	Frequency	Cumulative Frequency
140-149	1	52	1	58	2	110
130-139	1	51	3	57	4	108
120-129	4	50	9	54	13	104
110-119	5	46	12	45	17	91
100-109	14	41	13	33	27	74
90- 99	9	27	9	20	18	47
80- 89	9	18	9	11	18	29
70- 79	6	9	2	2	8	11
60- 69	3	3	0	0	3	3
Total	52		58		110	
Q_3	108.57		118.75		115.00	
Median	98.89		106.92		102.92	
Q_1	84.44		93.89		89.17	

The scores made by the eighth grade reading pupils on the timed test and the untimed test--total time are shown in Table IV. The mean of the timed test group is 48.8 and the mean of the untimed test--total time group is 50.65. The standard deviation of the timed test group is 6.65 and the standard deviation of the untimed test--total time group is 6.52. In comparing these two groups a critical ratio of 2.01 was found. According to Garrett[9] this means that there are 98 chances in 100 that the true difference between the two obtained measures is greater than zero and in favor of the untimed test--total time group. Unless the critical ratio is found to be 3, it is not considered statistically as a significant difference.

Table V gives the scores made by the eighth grade reading pupils on the timed test and the untimed test--regular time. The mean of the timed group is 48.8 and that of the untimed group is 48.26. The standard deviation of the timed group is 6.65 and that of the untimed group is 7.34. The critical ratio was found to be .55 which means that there are 71 chances in 100 that the true difference between the two measures obtained is greater than zero and in favor of the timed group.

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[9] H. E. Garrett, Statistics in Psychology and Education. (New York: Longmans, Green and Company, 1933), p. 134.

TABLE IV

THE SCORES MADE BY THE EIGHTH GRADE READING PUPILS ON THE TIMED TEST AND THE UNTIMED TEST--TOTAL TIME

Interval	Timed Test				Untimed Test (Total Time)			
	f	d	fd	fd^2	f	d	fd	fd^2
63-65	0	0	0	0	0	0	0	0
60-62	2	4	8	32	6	4	24	96
57-59	10	3	30	90	10	3	30	90
54-56	12	2	24	48	14	2	28	56
51-53	14	1	14	14	28	1	28	28
48-50	19	0	0	0	13	0	0	0
45-47	22	-1	-22	22	13	-1	-13	13
42-44	8	-2	-16	32	7	-2	-14	28
39-41	7	-3	-21	63	4	-3	-12	36
36-38	3	-4	-12	48	4	-4	-16	64
33-35	2	-5	-10	50	2	-5	-10	50
30-32	3	-6	-18	108	1	-6	- 6	36
Total	102		-23	507	102		39	497

M	48.8	50.65
S. D.	6.65	6.52
σ m	.658	.646

σD_m = .922

C. R. = 2.01

C. R. 2.01 means that there are 98 chances in 100 that the true difference is more than zero in favor of the untimed test.

TABLE V

THE SCORES MADE BY THE EIGHTH GRADE READING PUPILS ON THE TIMED TEST AND THE UNTIMED TEST--REGULAR TIME

Interval	Timed Test				Untimed Test (Regular Time)			
	f	d	fd	fd^2	f	d	fd	fd^2
63-65	0	0	0	0	0	0	0	0
60-62	2	4	8	32	6	5	30	150
57-59	10	3	30	90	5	4	20	80
54-56	12	2	24	48	12	3	36	108
51-53	14	1	14	14	18	2	36	72
48-50	19	0	0	0	9	1	9	9
45-47	22	-1	-22	22	18	0	0	0
42-44	8	-2	-16	32	16	-1	-16	16
39-41	7	-3	-21	63	9	-2	-18	36
36-38	3	-4	-12	48	5	-3	-15	45
33-35	2	-5	-10	50	1	-4	- 4	16
30-32	3	-6	-18	108	2	-5	-10	50
27-29	0	0	0	0	0	-6	0	0
24-26	0	0	0	0	0	-7	0	0
21-23	0	0	0	0	1	-8	- 8	64
Total	102		-23	507	102		60	646

M	48.8	48.26
S. D.	6.65	7.34
σ m	.658	.727

σD_m = .981

C. R. = .55

C. R. .55 means that there are 71 chances in 100 that the true difference is more than zero in favor of the timed test.

Table VI shows the comparison between the scores made by the pupils on the eighth grade arithmetic timed test and the untimed test--total time.

The mean for the timed group is 52.59 and the mean for the untimed group is 54.09. The standard deviation for the timed group is 8.49 and for the untimed group it is 7.59. The critical ratio of the two groups was found to be 1.33. This means that there are 91 chances in 100 that the true difference between the two measures obtained is greater than zero in favor of the untimed group.

Table VII gives the scores made by the eighth grade pupils on the timed test and untimed test--regular time in arithmetic.

The mean for the timed group is 52.59 and the mean for the untimed group is 52.82. The standard deviation for the timed group is 8.49 and for the untimed group the standard deviation is 7.86. The critical ratio was found to be .20 which means that there are 58 chances in 100 that the true difference between the two measures obtained is greater than zero and in favor of the untimed group.

The scores made by the pupils on the timed test and the untimed test--total time in sixth grade reading are shown in Table VIII. The mean for the timed group is 40.17 and the mean for the untimed group is 43.58. The standard deviation of the timed group is 9.28 while the standard deviation for

TABLE VI

THE SCORES MADE BY THE EIGHTH GRADE ARITHMETIC PUPILS ON THE TIMED TEST AND THE UNTIMED TEST--TOTAL TIME

Interval	Timed Test				Untimed Test (Total Time)			
	f	d	fd	fd^2	f	d	fd	fd^2
69-71	1	6	6	36	1	5	5	25
66-68	3	5	15	75	2	4	8	32
63-65	9	4	36	144	7	3	21	63
60-62	9	3	27	81	16	2	32	64
57-59	8	2	16	32	10	1	10	10
54-56	15	1	15	15	22	0	0	0
51-53	16	0	0	0	13	-1	-13	13
48-50	9	-1	- 9	9	7	-2	-14	28
45-47	16	-2	-32	64	12	-3	-36	108
42-44	6	-3	-18	54	5	-4	-20	80
39-41	4	-4	-16	64	4	-5	-20	100
36-38	4	-5	-20	100	2	-6	-12	72
33-35	0	-6	0	0	0	-7	0	0
30-32	0	-7	0	0	0	-8	0	0
27-29	1	-8	- 8	64	1	-9	- 9	81
24-26	1	-9	- 9	81	0	0	0	0
Total	102		3	819	102		-48	676

M	52.59	54.09
S. D.	8.49	7.59
σm	.841	.752

$\sigma D_m = 1.129$

C. R. = 1.33

C. R. 1.33 means that there are 91 chances in 100 that the true difference is more than zero and in favor of the untimed test.

TABLE VII

THE SCORES MADE BY THE EIGHTH GRADE ARITHMETIC PUPILS ON THE TIMED TEST AND THE UNTIMED TEST--REGULAR TIME

Interval	Timed Test				Untimed Test (Regular Time)			
	f	d	fd	fd^2	f	d	fd	fd^2
69-71	1	6	6	36	0	0	0	0
66-68	3	5	15	75	2	5	10	50
63-65	9	4	36	144	7	4	28	112
60-62	9	3	27	81	10	3	30	90
57-59	8	2	16	32	15	2	30	60
54-56	15	1	15	15	16	1	16	16
51-53	16	0	0	0	12	0	0	0
48-50	9	-1	- 9	9	10	-1	-10	10
45-47	16	-2	-32	64	13	-2	-26	52
42-44	6	-3	-18	54	9	-3	-27	81
39-41	4	-4	-16	64	5	-4	-20	80
36-38	4	-5	-20	100	2	-5	-10	50
33-35	0	-6	0	0	0	-6	0	0
30-32	0	-7	0	0	0	-7	0	0
27-29	1	-8	- 8	64	0	-8	0	0
24-26	1	-9	- 9	81	0	-9	0	0
21-23	0	0	0	0	1	-10	-10	100
Total	102		3	819	102		11	701

M	52.59	52.82
S. D.	8.49	7.86
σ m	.841	.778

$\sigma D_m = 1.145$

C. R. = .20

C. R. .20 means that there are 58 chances in 100 that the true difference is more than zero and in favor of the untimed test.

TABLE VIII

THE SCORES MADE BY THE SIXTH GRADE READING PUPILS ON THE TIMED TEST AND THE UNTIMED TEST--TOTAL TIME

Interval	Timed Test				Untimed Test (Total Time)			
	f	d	fd	fd^2	f	d	fd	fd^2
60-63	0	0	0	0	0	0	0	0
57-59	2	6	12	72	3	5	15	75
54-56	7	5	35	175	11	4	44	176
51-53	5	4	20	80	10	3	30	90
48-50	5	3	15	45	16	2	32	64
45-47	15	2	30	60	12	1	12	12
42-44	18	1	18	18	11	0	0	0
39-41	14	0	0	0	17	-1	-17	17
36-38	8	-1	- 8	8	9	-2	-18	36
33-35	11	-2	-22	44	8	-3	-24	72
30-32	9	-3	-27	81	2	-4	- 8	32
27-29	4	-4	-16	64	6	-5	-30	150
24-26	6	-5	-30	150	3	-6	-18	108
21-23	4	-6	-24	144	1	-7	- 7	49
18-20	1	-7	- 7	49	1	-8	- 8	64
15-17	1	-8	- 8	64	0	0	0	0
Total	110		-12	1054	110		3	945

M	40.17	43.58
S. D.	9.28	8.8
σ m	.885	.84

$\sigma D_m = 1.22$

C. R. = 2.80

C. R. 2.80 means that there are 99.74 chances in 100 that the true difference is more than zero and in favor of the untimed test.

the untimed group is 8.8. The critical ratio between these two groups was found to be 2.80. This means that there are 99.74 chances in 100 that the true difference between the two measures obtained to be greater than zero in favor of the untimed test.

Table IX shows the comparison between the scores made by the sixth grade reading students on the timed test and the untimed test--regular time. The mean of the untimed group is 40.336 and for the timed group the mean is 40.173. The standard deviation of the untimed group is 9.23 and the standard deviation for the timed group is 9.28. The critical ratio was found to be .1306. This means that there are 56 chances in 100 that the true difference between the measures obtained is greater than zero in favor of the untimed group.

The scores made by the sixth grade arithmetic pupils on the timed test and the untimed test--total time are shown in Table X. The mean for the timed group is 39.08 while the mean for the untimed group is 40.06. The standard deviation for the timed group is 10.09 and the standard deviation for the untimed group is 8.39. The critical ratio was found to be .78. This means that there are 79 chances in 100 that the true difference between the two measures obtained is greater than zero and in favor of the untimed group.

The scores made by the sixth grade arithmetic pupils on the timed test and the untimed test--regular time are shown in Table XI. The mean for the timed group was found to be 39.08

TABLE IX

THE SCORES MADE BY THE SIXTH GRADE READING PUPILS ON THE TIMED TEST AND THE UNTIMED TEST--REGULAR TIME

Interval	Timed Test				Untimed Test (Regular Time)			
	f	d	fd	fd^2	f	d	fd	fd^2
60-62	0	0	0	0	0	0	0	0
57-59	2	6	12	72	2	6	12	72
54-56	7	5	35	175	8	5	40	200
51-53	5	4	20	80	5	4	20	80
48-50	5	3	15	45	13	3	39	117
45-47	15	2	30	60	8	2	16	32
42-44	18	1	18	18	12	1	12	12
39-41	14	0	0	0	11	0	0	0
36-38	8	-1	- 8	8	10	-1	-10	10
33-35	11	-2	-22	44	15	-2	-30	60
30-32	9	-3	-27	81	11	-3	-33	99
27-29	4	-4	-16	64	7	-4	-28	112
24-26	6	-5	-30	150	6	-5	-30	150
21-23	4	-6	-24	144	0	-6	0	0
18-20	1	-7	- 7	49	2	-7	-14	98
15-17	1	-8	- 8	64	0	-8	0	0
Total	110		-12	1054	110		- 6	1042

M	40.173	40.336
S. D.	9.28	9.23
σm	.885	.882

$\sigma D_m = 1.248$

C. R. = .1306

C. R. .1306 means that there are 56 chances in 100 that the true difference is more than zero and in favor of the untimed test.

TABLE X

THE SCORES MADE BY THE SIXTH GRADE ARITHMETIC PUPILS ON THE TIMED TEST AND THE UNTIMED TEST--TOTAL TIME

Interval	Timed Test				Untimed Test (Total Time)			
	f	d	fd	fd^2	f	d	fd	fd^2
63-65	1	9	9	81	0	8	0	0
60-62	1	8	8	64	1	7	7	49
57-59	2	7	14	98	0	6	0	0
54-46	4	6	24	144	4	5	20	100
51-53	6	5	30	150	4	4	16	64
48-50	7	4	28	112	10	3	30	90
45-47	6	3	18	54	14	2	28	56
42-44	11	2	22	44	15	1	15	15
39-41	19	1	19	19	12	0	0	0
36-38	16	0	0	0	16	-1	-16	16
33-35	10	-1	-10	10	14	-2	-28	56
30-32	8	-2	-16	32	7	-3	-21	63
27-29	7	-3	-21	63	3	-4	-12	48
24-26	4	-4	-16	64	6	-5	-30	150
21-23	3	-5	-15	75	3	-6	-18	108
18-20	1	-6	- 6	36	1	-7	- 7	49
15-17	3	-7	-21	147	0	-8	0	0
12-14	0	-8	0	0	0	-9	0	0
9-11	1	-9	- 9	81	0	-10	0	0
Total	110		58	1274	110		-16	864

M	39.08	40.06
S. D.	10.09	8.39
σ m	.962	.8

$\sigma D_m = 1.251$

C. R. = .78

C. R. .78 means that there are 79 chances in 100 that the true difference is more than zero and in favor of the untimed test.

TABLE XI

THE SCORES MADE BY THE SIXTH GRADE ARITHMETIC PUPILS ON THE TIMED TEST AND THE UNTIMED TEST--REGULAR TIME

Interval	Timed Test				Untimed Test (Regular Time)			
	f	d	fd	fd^2	f	d	fd	fd^2
63-65	1	9	9	81	0	8	0	0
60-62	1	8	8	64	0	7	0	0
57-59	2	7	14	98	1	6	6	36
54-56	4	6	24	144	3	5	15	75
51-53	6	5	30	150	5	4	20	80
48-50	7	4	28	112	7	3	21	63
45-47	6	3	18	54	15	2	30	60
42-44	11	2	22	44	12	1	12	12
39-41	19	1	19	19	15	0	0	0
36-38	16	0	0	0	16	-1	-16	16
33-35	10	-1	-10	10	16	-2	-35	64
30-32	8	-2	-16	32	7	-3	-21	63
27-29	7	-3	-21	63	3	-4	-12	48
24-26	4	-4	-16	64	6	-5	-30	150
21-23	3	-5	-15	75	3	-6	-18	108
18-20	1	-6	- 6	36	1	-7	- 7	49
15-17	3	-7	-21	147	0	0	0	0
12-14	0	-8	0	0	0	0	0	0
9-11	1	-9	- 9	81	0	0	0	0
Total	110		58	1274	110		-32	824

M	39.08	39.63
S. D.	10.09	8.16
σ m	.962	.778

$\sigma D_m = 1.237$

C. R. = .44

C. R. .44 means that there are 67 chances in 100 that the true difference is more than zero and in favor of the untimed test.

and the mean for the untimed group was found to be 39.63. The standard deviation for the timed group is 10.09 and for the untimed group it is 8.16. The critical ratio of these groups is .44. This means that there are 67 chances in 100 that the true difference between the two measures obtained is greater than zero and in favor of the untimed test.

As a further investigation of this experiment the scores of those students not completing the timed test during the specified time in sixth and eighth grade reading were arranged according to similar distributions. Arithmetic was omitted because the writer was not able to determine what type of problem the pupil should have been able to work.

Table XII shows the comparison between the scores made by pupils in eighth grade reading on the uncompleted timed test and the untimed test--total time. The mean for the pupils who did not complete the test is 46.364 while the mean for those taking the untimed test--total time is 50.045. The standard deviation for those pupils who did not complete the test is 5.463 while the standard deviation for those taking the untimed test--total time is 5.549. The critical ratio for these two groups of pupils was found to be 2.26. This means that there are 98.6 chances in 100 that the true difference between the two measures obtained is greater than zero and in favor of the untimed group.

Table XIII shows the comparison between the scores made by the pupils in eighth grade reading on the uncompleted

TABLE XII

THE SCORES MADE BY THE EIGHTH GRADE READING PUPILS ON THE UNCOMPLETED TIMED TEST AND THE UNTIMED TEST--TOTAL TIME

Interval	Uncompleted Timed Test				Untimed Test (Total Time)			
	f	d	fd	fd^2	f	d	fd	fd^2
57-59	0	0	0	0	2	3	6	18
54-56	1	3	3	9	1	2	2	4
51-53	3	2	6	12	8	1	8	8
48-50	4	1	4	4	6	0	0	0
45-47	9	0	0	0	2	-1	-2	2
42-44	1	-1	-1	1	2	-2	-4	8
39-41	1	-2	-2	4	0	-3	0	0
36-38	2	-3	-6	18	0	-4	0	0
33-35	0	-4	0	0	0	-5	0	0
30-32	1	-5	-5	25	1	-6	-6	36
Total	22		-1	73	22		4	76

M	46.364	50.045
S. D.	5.463	5.549
σ m	1.122	1.183

$\sigma D_m = 1.63$

C. R. = 2.26

C. R. 2.26 means that there are 98.6 chances in 100 that the true difference is more than zero in favor of the untimed test.

TABLE XIII

THE SCORES MADE BY THE EIGHTH GRADE READING PUPILS ON THE UNCOMPLETED TIMED TEST AND THE UNTIMED TEST--REGULAR TIME

Interval	Uncompleted Timed Test				Untimed Test (Regular Time)			
	f	d	fd	fd^2	f	d	fd	fd^2
57-59	0	4	0	0	0	5	0	0
54-56	1	3	3	9	0	4	0	0
51-53	3	2	6	12	2	3	6	18
48-50	4	1	4	4	1	2	2	4
45-47	9	0	0	0	7	1	7	7
42-44	1	-1	-1	1	6	0	0	0
39-41	1	-2	-2	4	4	-1	-4	4
36-38	2	-3	-6	18	1	-2	-2	4
33-35	0	-4	0	0	0	-3	0	0
30-32	1	-5	-5	25	0	-4	0	0
27-29	0	-6	0	0	0	-5	0	0
24-26	0	-7	0	0	0	-6	0	0
21-23	0	-8	0	0	1	-7	-7	49
Total	22		-1	73	22		2	86

M	46.364	43.77
S. D.	5.463	5.925
σ m	1.122	1.263

σD_m 1.69

C. R. 1.53

C. R. 1.53 means that there are 93 chances in 100 that the true difference is more than zero in favor of the uncompleted timed test.

timed test and the untimed test--regular time. The mean for those pupils taking the uncompleted timed test is 46.364 while the mean for the pupils taking the untimed test is 43.77. The standard deviation for the first group is 5.463 and the standard deviation for the second group is 5.925. The critical ratio was found to be 1.53. This means that there are 93 chances in 100 that the true difference between the two measures obtained is greater than zero and in favor of the timed test.

Table XIV shows the comparison between the scores made by the pupils in sixth grade reading on the uncompleted timed test and the scores made by pupils taking the untimed test--total time. The mean for the pupils taking the uncompleted timed test is 35.625 while the mean for the pupils taking the untimed test is 42.75. The standard deviation for the pupils taking the uncompleted timed test is 7.297 and the standard deviation for the pupils taking the untimed test is 8.08. The critical ratio was found to be 4.53. This means that the difference is statistically significant in favor of the untimed test--total time since the critical ratio was found to be considerably larger than three.

The scores made by the sixth grade reading pupils on the uncompleted timed test and on the untimed test--regular time are shown in Table XV. The mean for those pupils taking the uncompleted timed test is 35.625 while the mean for the pupils taking the untimed test is 35.81. The standard

TABLE XIV

THE SCORES MADE BY THE SIXTH GRADE READING PUPILS ON THE UNCOMPLETED TIMED TEST AND THE UNTIMED TEST--TOTAL TIME

Interval	Uncompleted Timed Test				Untimed Test (Total Time)			
	f	d	fd	fd^2	f	d	fd	fd^2
60-62	0	9	0	0	0	0	0	0
57-59	0	8	0	0	1	5	5	25
54-56	0	7	0	0	2	4	8	32
51-53	1	6	6	36	4	3	12	36
48-50	3	5	15	75	4	2	8	16
45-47	2	4	8	32	7	1	7	7
42-44	6	3	9	54	6	0	0	0
39-41	7	2	14	28	12	-1	-12	12
36-38	4	1	4	4	3	-2	- 6	12
33-35	7	0	0	0	5	-3	-15	45
30-32	8	-1	- 8	8	1	-4	- 4	16
27-29	3	-2	- 6	12	2	-5	-10	50
24-26	5	-3	-15	45	1	-6	- 6	36
21-23	1	-4	- 4	16	0	0	0	0
18-20	1	-5	- 5	25	0	0	0	0
Total	48		18	355	48		-12	287

M	35.625	42.75
S. D.	7.297	8.08
σ m	1.053	1.166

$$\sigma D_m = 1.571$$

$$C. R. = 4.53$$

C. R. 4.53 means that the difference is statistically significant in favor of the untimed test since the critical ratio was found to be considerably larger than three.

TABLE XV

THE SCORES MADE BY THE SIXTH GRADE READING PUPILS ON THE UNCOMPLETED TIMED TEST AND THE UNTIMED TEST--REGULAR TIME

Interval	Uncompleted Timed Test				Untimed Test (Regular Time)			
	f	d	fd	fd^2	f	d	fd	fd^2
57-59	0	8	0	0	0	0	0	0
54-56	0	7	0	0	0	0	0	0
51-53	1	6	6	36	0	0	0	0
48-50	3	5	15	75	2	5	10	50
45-47	2	4	8	32	3	4	12	48
42-44	6	3	9	54	4	3	12	36
39-41	7	2	14	28	7	2	14	28
36-38	4	1	4	4	2	1	2	2
33-35	7	0	0	0	14	0	0	0
30-32	8	-1	- 8	8	9	-1	-9	9
27-29	3	-2	- 6	12	3	-2	-6	12
24-26	5	-3	-15	45	3	-3	-9	27
21-23	1	-4	- 4	16	0	-4	0	0
18-20	1	-5	- 5	25	1	-5	-5	25
Total	48		18	355	48		21	237

M	35.625	35.81
S. D.	7.297	6.536
σ_m	1.053	.943

$\sigma_{D_m} = 1.414$

C. R. = .1308

C. R. .1308 means that there are 55 chances in 100 that the true difference is more than zero and in favor of the untimed test.

deviation for the pupils taking the uncompleted timed test was found to be 7.297, while the standard deviation for the pupils taking the untimed test was found to be 6.536. The critical ratio for these groups is .1308. This means that there are 55 chances in 100 that the true difference between the two measures obtained is greater than zero and in favor of the untimed test.

In order to compare the gains made on the untimed test--total time by the boys and the girls and the total of each grade, the algebraic sum of the differences was obtained for each group. A similar comparison was made for the upper quarter and the lower quarter of each grade as shown by their intelligence quotients.

These comparisons are shown in Table XVI and Table XVII.

TABLE XVI

THE GAINS MADE BY THE SIXTH AND EIGHTH GRADE BOYS AND GIRLS ON THE UNTIMED TEST--TOTAL TIME IN READING AND ARITHMETIC

Subject	Boys		Girls		Entire Grade	
	Total	Average	Total	Average	Total	Average
GRADE EIGHT						
Reading	54	1.2	117	2.05	171	1.68
Arithmetic	69	1.533	76	1.333	145	1.42
GRADE SIX						
Reading	212	4.08	195	3.36	407	3.70
Arithmetic	43	.827	69	1.19	112	1.01

TABLE XVII

THE GAINS MADE BY THE STUDENTS IN THE UPPER AND LOWER QUARTERS IN GRADES EIGHT AND SIX

Subject	Upper Quarter		Lower Quarter	
	Total	Average	Total	Average
GRADE EIGHT				
Reading	48	1.92	-24	- .96
Arithmetic	3	.12	38	1.52
GRADE SIX				
Reading	71	2.63	144	5.33
Arithmetic	- 1	-.04	58	2.14

CHAPTER V

CONCLUSIONS

The writer recognizes the fact that this study has certain deficiencies which cannot be disregarded. The giving of only one intelligence test will not definitely determine the exact intelligence quotient of any individual. The reliability of this type of experiment could have been increased if a greater number of students had been included in this investigation. Nevertheless the intelligence quotients of the pupils used in this study represented approximately a normal distribution. Since a large majority of the pupils of both grades completed the tests during the specified time limit, the question might arise as to the validity of the use of such tests for this study.

Since no completed study was found like or similar to this one the following conclusions are based upon the results set forth in this study and the experiment made in conjunction with this one whose findings make the following conclusions more valid because with different children in a different part of the state the results are practically the same.[10]

Although ordinarily one would expect any group to do more work in double time all the comparisons found between the

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[10] Will K. Kinkaid, op. cit.

different types of tests when the entire groups were considered gave a critical ratio of less than three. Therefore, the amount gained is considered statistically insignificant. However, comparisons between the timed tests and untimed tests--regular time in arithmetic grade eight, reading grade six, and arithmetic grade six gave a critical ratio in favor of the untimed tests--regular time.

In the opinion of the writer such comparisons no matter how small would be considered a significant factor in favor of these untimed tests.

On the other hand the comparisons between the timed test and the untimed test--regular time in reading grade eight gave a critical ratio in favor of the timed test. This in the opinion of the writer is considered a just argument in favor of timed tests. Since the two preceding conclusions contradict each other it is evident that there is no important difference between the two types of tests.

In comparing the scores made by those students not completing the timed test to the scores made by the same pupils taking the untimed test the critical ratio was found to be higher than the corresponding critical ratio when the entire group was being considered. This would tend to show that timed tests are detrimental to slower pupils. However, owing to the small number of cases and to the fact that a large majority of said cases were of less than average intelligence, this portion of the study was not considered of statistical importance.

The algebraic sum of the differences was too small to be considered of any importance to the study.

Since, in any testing program individual personalities must be dealt with it cannot be said that either type of test is better under all conditions.

Considering the score results of this experiment the extra allotted time given to untimed tests is in the opinion of the writer a waste of time if timed tests are properly administered.

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APPENDIX

A. TESTS USED IN THIS STUDY

The Detroit Alpha Intelligence Test, Form R for Grades 5 to 9.

Public School Achievement Tests

a. Reading Grades 3 to 8, Form 3

b. Reading Grades 3 to 8, Form 4

c. Arithmetic Computation, Grades 3 to 8, Form 3

d. Arithmetic Computation, Grades 3 to 8, Form 4

by T. L. Torgerson

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B. ABBREVIATIONS AND FORMULAS USED IN THIS STUDY

M -- Mean

G. M. -- Guessed Mean

f -- frequency

d -- deviation

Σ fd -- algebraic sum of the product of f and d

Σ fd^2 -- algebraic sum of the product of f and d^2

N -- number of cases in the distribution

S. D. -- Standard Deviation

h -- Height of the interval

σ m -- Standard error of the mean

σD_m -- Standard error of the difference of the means

D -- Difference between means

C. R. -- Critical Ratio

Q_1 -- first quartile

Q_3 -- third quartile

$$M = G.M + \left(\frac{\Sigma fd}{N}\right) h$$

$$S.D = h\sqrt{\frac{\Sigma fd^2}{N} - \left(\frac{\Sigma fd}{N}\right)^2}$$

$$\sigma_M = \frac{S.D}{\sqrt{N}}$$

$$\sigma D_M = \sqrt{(\sigma_{M_1})^2 + (\sigma_{M_2})^2}$$

$$C.R = \frac{D}{\sigma D_M}$$

C. TABULATED DATA FOR TIMED AND UNTIMED TESTS ARRANGED ACCORDING TO INTELLIGENCE QUOTIENTS

GRADE EIGHT

Student Number	Sex	Age	Intelligence Test Score	I. Q.	Reading				Arithmetic			
					Timed	Untimed--Regular	Untimed--Total	Difference	Timed	Untimed--Regular	Untimed--Total	Difference
1	G	154	189	131	53	55	55	2	60	65	65	5
2	B	153	185	129	48	51	53	5	53	45	45	-8
3	B	166	209	129	57	57	57	0	68	65	65	-3
4	G	163	202	126	56	60	60	4	61	63	64	3
5	G	145	178	125	53	50	52	-1	54	57	58	4
6	G	159	192	122	61	61	61	0	69	66	66	-3
7	G	159	190	121	49	57	57	8	46	45	45	-1
8	G	160	188	120	49	54	54	5	58	51	51	-7
9	G	165	188	120	54	56	56	2	63	61	62	-1
10	B	138	186	120	57	57	57	0	67	62	62	-5
11	G	156	182	118	57	60	60	3	58	56	56	-2
12	G	159	180	117	49	52	52	3	46	45	45	-1
13	B	157	180	117	51	60	60	9	60	62	62	2
14	B	167	180	117	53	53	53	0	56	62	62	6
15	G	162	177	115	55	52	56	1	61	60	62	1
16	G	156	174	115	55	55	55	0	50	54	55	5
17	B	166	173	114	58	60	60	2	60	57	59	-1
18	G	154	154	114	59	55	55	-4	54	50	57	3
19	G	164	174	114	56	48	51	-5	63	66	66	3
20	G	164	173	114	56	55	55	-1	63	62	62	-1
21	B	162	168	112	57	57	57	0	63	61	61	-2
22	B	165	168	112	51	56	57	6	59	58	61	2
23	B	158	167	112	59	59	58	-1	47	56	56	9
24	B	158	166	111	57	56	56	-1	46	48	49	3
25	G	155	145	111	42	49	53	11	55	47	47	-8
26	B	164	166	110	49	53	53	4	45	43	43	-2
27	B	158	164	110	50	55	55	5	62	64	64	2
28	G	157	162	110	49	47	52	3	60	63	63	3
29	G	164	159	109	44	44	44	0	47	51	51	4
30	B	167	160	109	51	47	47	-4	64	57	57	-7

Student Number	Sex	Age	Intelligence Test Score	I. Q.	Reading				Arithmetic			
					Timed	Untimed--Regular	Untimed--Total	Difference	Timed	Untimed--Regular	Untimed--Total	Difference
31	G	158	159	109	55	50	53	-2	57	52	53	-4
32	B	159	158	108	52	51	51	-1	66	64	64	-2
33	G	165	154	107	46	51	51	5	50	49	49	-1
34	B	159	154	107	41	52	52	11	52	54	54	2
35	G	159	156	107	48	52	52	4	56	50	52	-4
36	G	161	156	107	46	46	53	7	49	52	52	3
37	G	161	153	106	39	48	48	9	44	38	38	-6
38	G	167	151	106	53	43	49	-4	51	46	49	-2
39	G	159	151	106	45	53	53	8	52	50	50	-2
40	G	165	153	106	47	55	55	8	48	47	47	-1
41	B	160	153	106	55	53	53	-2	47	58	58	11
42	B	160	152	106	47	45	50	3	51	53	53	2
43	B	165	152	106	44	47	49	5	53	55	55	2
44	G	157	151	106	40	39	39	-1	44	50	51	7
45	G	178	166	105	47	46	50	3	63	58	60	-3
46	B	173	166	105	60	60	60	0	47	54	55	8
47	G	153	133	105	49	47	54	5	52	57	58	6
48	G	170	164	104	47	43	51	4	61	63	63	2
49	G	174	161	103	58	52	58	0	58	58	61	3
50	B	161	147	103	47	45	45	-2	29	47	49	20
51	G	155	129	103	52	41	47	-5	57	51	55	8
52	B	166	144	102	47	52	52	5	55	43	43	-12
53	G	171	158	102	55	49	53	-2	64	57	62	-2
54	G	157	146	102	48	44	49	1	53	60	61	8
55	B	158	145	102	45	45	51	6	49	57	61	12
56	G	156	144	102	56	51	51	-5	49	55	55	6
57	G	166	142	101	33	43	43	10	46	39	39	-7
58	G	158	143	101	47	42	50	3	42	43	44	2
59	G	160	143	101	56	47	57	1	65	61	64	-1
60	B	177	155	101	52	47	49	-3	54	57	58	4

Student Number	Sex	Age	Intelligence Test Score	I. Q.	Reading				Arithmetic			
					Timed	Untimed--Regular	Untimed--Total	Difference	Timed	Untimed--Regular	Untimed--Total	Difference
61	G	159	142	101	56	40	49	-7	54	59	60	6
62	B	158	140	100	48	52	52	4	53	59	59	6
63	G	152	123	100	50	45	52	2	37	42	51	14
64	G	172	151	99	51	54	54	3	54	59	60	6
65	G	158	136	98	45	43	58	13	50	52	55	5
66	G	159	134	97	47	46	46	-1	53	46	47	-6
67	B	156	134	97	47	51	55	8	56	52	52	-4
68	G	167	133	97	44	37	37	-7	43	54	54	12
69	B	162	132	96	42	51	51	9	51	41	49	-2
70	G	163	130	96	37	41	46	9	37	43	47	10
71	G	171	143	95	45	43	57	12	55	54	56	1
72	G	176	143	95	45	36	53	8	49	44	45	-4
73	B	170	143	95	39	41	41	2	56	54	54	-2
74	G	170	140	94	40	49	52	12	47	47	55	8
75	B	166	124	93	39	35	38	-1	57	51	52	-5
76	G	163	123	93	37	42	42	5	40	40	40	0
77	B	164	123	93	49	46	46	-3	41	43	43	2
78	G	158	122	93	35	32	34	-1	47	46	47	0
79	B	169	135	92	58	56	56	-2	40	48	50	10
80	B	174	134	91	46	37	39	-7	43	53	53	10
81	B	175	133	91	44	43	46	2	65	55	55	-10
82	G	163	118	91	50	43	43	-7	45	41	41	-4
83	G	165	118	91	46	42	49	3	52	57	57	5
84	G	173	134	91	46	48	52	6	58	49	55	-3
85	G	167	117	90	36	39	42	6	57	53	54	-3
86	G	166	115	90	41	36	37	-4	37	44	45	8
87	B	189	134	89	50	49	49	-1	47	50	55	8
88	B	174	127	89	52	43	46	-6	46	54	54	8
89	B	185	129	88	47	47	47	0	44	42	42	-2
90	B	165	111	88	42	43	43	1	56	54	57	1

Student Number	Sex	Age	Intelligence Test Score	I. Q.	Reading				Arithmetic			
					Timed	Untimed--Regular	Untimed--Total	Difference	Timed	Untimed--Regular	Untimed--Total	Difference
91	B	163	108	87	53	45	45	-8	51	55	56	5
92	B	182	122	85	48	45	49	1	60	60	62	2
93	G	159	103	85	47	40	45	-2	25	23	28	3
94	G	162	97	83	49	46	50	1	53	41	41	-12
95	B	191	112	82	31	31	34	3	36	37	37	1
96	B	174	105	81	44	40	46	2	51	51	51	0
97	G	178	105	81	49	40	40	-9	41	46	47	6
98	B	169	100	79	46	42	42	-4	54	54	54	0
99	B	195	100	76	32	37	37	5	52	47	47	-5
100	B	173	90	76	52	53	53	1	49	50	56	7
101	G	161	83	75	50	43	45	-5	47	55	55	8
102	B	179	87	75	30	21	31	1	56	45	51	-5
GRADE SIX												
1	G	138	200	147	59	59	59	0	65	59	62	-3
2	B	131	185	140	56	56	55	-1	60	54	54	-6
3	G	133	172	133	51	54	54	3	50	53	55	5
4	G	139	165	130	55	56	56	1	50	46	46	-4
5	B	141	166	130	44	48	48	4	58	55	55	-3
6	G	138	166	130	48	53	53	5	45	45	46	1
7	G	139	160	128	51	54	54	3	51	48	48	-3
8	G	135	161	128	57	57	57	0	46	54	55	9
9	B	132	157	127	47	48	55	8	57	49	49	-8
10	G	138	151	124	43	47	51	8	45	44	45	0
11	G	127	135	124	33	40	51	18	43	46	46	3
12	G	137	151	124	56	47	50	-6	38	42	42	4
13	G	135	149	123	55	55	55	0	52	48	49	-3
14	G	132	151	123	46	50	50	4	55	52	52	-3
15	B	140	148	122	53	41	41	-12	55	51	51	-4

Student Number	Sex	Age	Intelligence Test Score	I. Q.	Reading				Arithmetic			
					Timed	Untimed--Regular	Untimed--Total	Difference	Timed	Untimed--Regular	Untimed--Total	Difference
16	G	142	148	122	39	42	57	8	37	46	48	11
17	B	139	145	120	41	50	50	9	40	35	35	-5
18	B	128	127	120	47	51	51	4	41	37	37	-4
19	G	132	145	120	44	50	50	6	55	47	47	-8
20	G	131	132	119	43	48	48	5	39	32	32	-7
21	G	141	140	117	42	36	36	-6	42	47	47	5
22	G	136	140	117	45	41	41	-4	40	45	45	5
23	G	141	139	117	54	42	42	-12	49	46	46	-3
24	B	139	137	116	56	55	55	-1	29	38	40	11
25	G	135	135	115	42	48	48	6	39	42	42	3
26	B	130	122	115	35	32	41	6	43	51	51	8
27	G	140	135	114	43	47	48	5	52	49	50	-2
28	G	138	133	114	39	47	48	9	46	45	45	-1
29	G	145	152	114	45	48	48	3	39	43	43	4
30	G	129	116	113	39	35	35	-4	48	37	37	-11
31	B	142	130	112	43	52	52	9	55	46	46	-9
32	B	135	128	112	41	35	55	14	46	43	43	-3
33	G	137	128	112	42	43	46	4	49	48	48	-1
34	G	130	114	111	30	34	41	11	33	42	42	9
35	B	128	108	110	39	38	38	-1	23	41	42	19
36	G	141	126	110	46	51	51	5	50	51	52	2
37	G	137	121	108	47	40	46	-1	39	41	42	3
38	B	138	141	108	39	31	42	3	41	45	48	7
39	B	141	118	107	56	56	56	0	36	43	43	7
40	G	131	109	108	44	31	37	-7	39	44	44	5
41	G	142	118	107	48	43	43	-5	34	38	38	4
42	B	137	119	107	43	48	48	5	30	39	39	9
43	G	131	106	107	40	34	47	7	53	43	43	-10
44	B	133	118	107	47	48	48	1	52	37	37	-15
45	G	141	116	106	46	44	47	1	36	33	33	-3

Student Number	Sex	Age	Intelligence Test Score	I. Q.	Reading				Arithmetic			
					Timed	Untimed--Regular	Untimed--Total	Difference	Timed	Untimed--Regular	Untimed--Total	Difference
46	B	137	117	106	45	39	39	-6	40	39	39	-1
47	G	138	116	106	39	46	46	7	37	38	38	1
48	B	131	105	106	51	55	55	4	44	32	32	-12
49	G	147	135	105	52	46	46	-6	30	35	35	5
50	G	138	115	105	30	30	35	5	44	46	46	2
51	G	126	94	105	32	30	39	7	16	23	23	7
52	B	134	115	105	45	50	50	5	31	24	24	-7
53	B	143	115	105	33	26	33	0	29	26	26	-3
54	B	139	112	104	42	37	50	8	45	41	41	-4
55	B	138	110	103	36	40	40	4	30	25	25	-5
56	G	136	109	103	42	43	56	14	40	36	37	-3
57	G	139	108	102	45	49	53	8	35	32	32	-3
58	G	139	108	102	33	42	42	9	37	33	33	-4
59	B	143	107	102	48	33	35	-13	28	43	43	15
60	G	140	105	101	48	45	46	-2	39	42	43	4
61	B	137	104	101	23	32	26	3	36	37	38	2
62	B	144	123	100	42	51	51	9	42	43	43	1
63	G	139	102	100	43	38	38	-5	17	28	28	11
64	B	136	101	99	39	35	47	8	40	39	41	1
65	G	148	120	99	44	43	43	-1	42	41	42	0
66	B	128	80	98	36	44	51	15	24	30	30	6
67	B	143	97	97	41	49	49	8	48	48	48	0
68	B	132	95	96	26	29	29	3	23	27	28	5
69	G	136	97	96	33	33	46	13	44	36	37	-7
70	G	137	95	96	34	32	46	12	33	37	37	4
71	B	137	95	96	30	35	44	14	36	35	36	0
72	G	138	93	96	31	25	41	10	35	38	38	3
73	B	139	92	96	42	41	41	-1	35	39	39	4
74	G	138	91	95	43	36	36	-7	30	35	35	5
75	G	134	90	95	46	44	44	-2	37	45	45	8

Student Number	Sex	Age	Intelligence Test Score	I. Q.	Reading				Arithmetic			
					Timed	Untimed--Regular	Untimed--Total	Difference	Timed	Untimed--Regular	Untimed--Total	Difference
76	G	131	89	94	40	35	41	1	36	33	33	-3
77	B	132	87	93	26	33	33	7	40	40	40	0
78	B	146	103	92	39	39	39	0	41	33	33	-8
79	G	141	79	91	26	24	32	6	42	34	35	-7
80	B	140	79	91	45	36	36	-9	26	33	33	7
81	G	135	78	91	48	32	42	-6	35	39	39	4
82	B	142	74	89	30	40	41	11	29	31	31	2
83	B	143	74	89	33	30	37	4	38	37	37	-1
84	G	146	96	89	37	33	42	5	36	34	34	-2
85	G	141	72	88	30	26	36	6	30	34	35	5
86	G	152	88	87	37	32	35	-2	37	39	39	2
87	B	143	68	87	21	38	23	2	35	36	36	1
88	G	155	88	87	35	33	40	5	37	39	39	2
89	B	138	67	86	34	43	43	9	19	22	22	3
90	G	155	85	85	38	40	46	8	41	38	38	-3
91	B	166	102	85	36	27	27	-9	34	26	26	-8
92	G	155	83	85	24	34	34	10	40	45	46	6
93	G	153	81	84	38	28	28	-10	36	32	32	-4
94	G	142	61	84	23	31	35	12	40	36	37	-3
95	B	166	96	83	32	38	38	6	43	35	35	-8
96	B	156	95	82	25	27	29	4	29	35	39	10
97	G	141	55	82	34	37	39	5	26	33	33	7
98	B	149	73	81	21	27	27	6	31	26	26	-5
99	B	149	72	81	29	39	39	10	25	33	33	6
100	G	154	61	79	30	33	41	11	36	41	42	6
101	G	173	99	78	45	47	49	4	39	40	40	1
102	B	162	83	78	28	37	51	23	53	46	49	-4
103	B	167	78	77	29	34	44	15	42	49	49	7
104	B	154	55	75	25	29	40	15	33	40	45	12
105	B	136	29	75	28	25	25	-3	32	36	36	4

Student Number	Sex	Age	Intelligence Test Score	I. Q.	Reading				Arithmetic			
					Timed	Untimed--Regular	Untimed--Total	Difference	Timed	Untimed--Regular	Untimed--Total	Difference
106	B	153	45	73	33	27	32	-1	28	27	27	-1
107	B	173	77	72	38	44	47	9	21	25	26	5
108	B	158	50	69	16	18	18	2	16	19	19	3
109	B	159	36	66	40	25	27	-13	27	31	31	4
110	B	180	44	63	20	20	26	6	10	22	22	12