

THE RELATIONSHIP
BETWEEN
GROSS TYPEWRITING RATE AND
READING RATE AND COMPREHENSION

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READING RATE AND COMPREHENSION

By

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O. L. W.

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CHAPTER I

INTRODUCTION

Since typewriting involves a certain amount of reading, the question arises as to what extent reading influences typewriting rate. In an article by Book, he says:

In typewriting all learners must do certain things to master this art. Each learner must follow his copy accurately by keeping his attention properly distributed between the task of reading his copy and the problem of initiating and controlling the machine.¹

Bernice Kirby also explains that reading plays a part in typewriting success:

Time and money spent in teaching an advanced course in typing by our present procedure is not economically justifiable. We need correlation and intensification especially when advanced typing is taught on the college level. The correlation of the fundamental processes should include the following subjects: (1) Reading, through encouraging the student to retain the content of what he read; by encouraging the student to read in phrases; by making the student reading conscience through the use of comprehension tests; by making the student analyze rote learning. . .²

White gave a battery of tests and correlated the results with gross and net typewriting speed. He concluded from his survey that intelligence, reading skill, age, and performance on serial response motor tests were significant factors in

¹ William F. Book, "How Progress in Learning To Type Should Be Measured and Why," Iowa Research Studies in Commercial Education, Vol. I, 1926, p. 68.

² Bernice Kirby, "A Correlation of Typewriting and Business Communications," Journal of Business Education, Vol. 16, Feb., 1941, pp. 23-24.

typewriting achievement.³

Bradford found low correlation between intelligence and typewriting grades and concluded that there are other factors than mental agility and motor ability in the process of learning to typewrite.⁴

Both teachers and students need to know whether or not reading affects typewriting speed because of its predictive as well as remedial values. If the relation between reading and typewriting is high, a reading test might be included as a part of a battery test for predicting typewriting success, and remedial exercises based on reading may be devised to increase typewriting skill. White made the following comments regarding this question:

The prognosis of success in the acquisition of skill in typewriting is of considerable interest both to the prospective learner and to the institution doing the teaching.

The former is interested in knowing whether or not the many advantages he will enjoy as a result of his ability to typewrite will outweigh the cost to him in time, energy, and money, of learning to typewrite.

The latter is concerned with the question of whether a given individual is able to learn typewriting rapidly enough so that his acquired skill will be worth its cost of instruction and materials.⁵

Book agrees that a test for guiding students into or

³ Bruce White, "Prediction of Typewriting Success," Journal of Business Education, Vol. 10, April, 1935, p. 20.

⁴ Lilah Bradford, "Does Typing Ability Depend upon Mentality or Dexterity?" Journal of Business Education, December, 1930, pp. 23-24.

⁵ Bruce White, op. cit., Vol. 10, April, 1935, p. 15.

away from typewriting classes could be used to good advantage:

Much social waste and personal dissatisfaction arises from the fact that "special ability" tests have not been devised and more generally used to select recruits for important lines of work. In the field of stenography and typewriting, for example, many persons are attempting to fit themselves for these lines of work who have few of the native traits required to succeed in learning these arts.

The information gathered by means of a reliable "special ability" test might, therefore, be used to good advantage in giving better vocational guidance and in expert educational direction to the young people in our schools, but the best that can be hoped for from the use of such tests at the present time is to tell the prospective learner whether or not he has the characteristics needed to succeed in preparing himself for a particular line of work.⁶

Teachers of both shorthand and typewriting have for some years been interested in determining which students had the qualifications to be successful in these subjects and which did not, with a view to advising unpromising students to choose other courses.⁷

According to Hull the best prognostic tests which we now have in typewriting never exceed thirty per cent efficiency.⁸

PURPOSE

Since speed in typewriting is such an important phase of typewriting success, it is the purpose of this study to find the relation, if any, between gross typewriting rate and

⁶ William F. Book, op. cit., Vol. I, 1926, p. 65.

⁷ E. G. Blackstone, "Proposed Battery Test for Typing," Research Studies in Commercial Education, Vol. IV, 1929, p. 7.

⁸ Clark L. Hull, "Psychological Tests and the Differentiation of Vocational Aptitudes," Iowa Research Studies in Commercial Education, Vol. I, July, 1926, pp. 24-35.

reading rate and comprehension. This study seeks to find whether or not reading rate affects or relates in any way to typewriting rate, and whether reading comprehension has any influence on typewriting speed.

LIMITATIONS

This problem deals with typewriting rate only. Ackerson found that it is best to separate speed and accuracy in testing typewriting ability.⁹ The accuracy element has not been considered at all in this study even though it is probably of equal importance and might have a definite relation to reading. Hossfield says, "The first essential in typewriting is, and rightfully should be, accuracy."¹⁰ Typewriting speed alone is no longer the one goal in typewriting classes, but it is still one of the major objectives. Cook and Appel explain the expansion and changes in the nature of the typewriting courses:

As recently as ten years ago, the ultimate goal in the high school typewriting courses was to attain a high degree of skill in the operation of the typewriter. Marks in typewriting were based upon the amount of skill attained in typewriting from straight copy material. Today the emphasis is placed not alone upon skill, but upon knowledge of proper procedure in the use of the skill.¹¹

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- ⁹ Luton Ackerson, "A Correlational Study of Proficiency in Typing," Iowa Research Studies in Commercial Education, Vol. I, July, 1926, pp. 88-95.
- ¹⁰ George L. Hossfield, "Five Essentials for Speed in Typewriting," Journal of Business Education, Vol. 16, Oct., 1940, p. 16.
- ¹¹ Walter W. Cook, and Marguerite Appel, "New Bases for Predicting Typing Success," Journal of Business Education, Vol. 16, Jan., 1941, p. 17.

Dvorak states that suitable speed is still of importance.¹² Horning concluded that the faster worker is the better worker,¹³ and O'Rourke found that 125 slow workers were thirty-eight per cent accurate, and 125 fast workers were eighty per cent accurate; and the fast workers produced five and one-half times as much as the slow workers.¹⁴ Prediction is not within the scope of this study.

PREVIOUS INVESTIGATIONS

Few studies have been made thus far on the correlation of reading and typewriting rate. White gave a battery of tests and computed correlations with both net and gross typewriting rates. He found a correlation of .41 between net typewriting scores and the Whipple Reading Test scores.¹⁵

Jones made a study of reading rate and comprehension as determining factors in the selection of pupils for junior high school typewriting classes, but the correlations found were too low to be useful for predictive or guidance purposes.¹⁶

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- 12 August Dvorak, Nellie L. Merrick, William L. Dealey, Gertrude C. Ford, Typewriting Behavior, p. 300.
- 13 S. D. Horning, "Testing Mechanical Ability by the MacQuarrie Test," Industrial Arts, Oct., 1926, pp. 348-350.
- 14 L. J. O'Rourke, "Relation Between Speed and Accuracy," Handbook of Business Administration, pp. 802-806.
- 15 Bruce White, op. cit., Vol. 10, April, 1935, pp. 15-16.
- 16 Marian B. Jones, "Reading Rate and Comprehension as Determining Factors in the Selection of Pupils for Junior High School Typewriting Classes," Masters Thesis, University of Southern California, 1932.

MATERIALS AND METHODS

The materials used in this study include five straight copy Student's Typewriting Tests published by the Typewriter Educational Research Bureau for the months of January, 1937, January, 1938, March, 1938, May, 1938, and February, 1939. It also includes Test I, Parts A and B, of the Iowa Silent Reading Test, Form Bm, New Edition, for High Schools and Colleges. Each part of Test I tested both rate and comprehension of reading. The Iowa Silent Reading Test consists of seven complete and independent tests each of which is designed to measure a specific factor in reading. Test 1 measures rate and comprehension; Test 2, directed reading; Test 3, poetry comprehension; Test 4, word meaning; Test 5, sentence meaning; Test 6, paragraph comprehension; and Test 7, location of information.) Since Test 1, parts A and B, was the only one of the seven tests applicable to this study, written permission was obtained from the publisher to reproduce it. A copy of the printed reproduction is found in the appendix.¹⁷

The students to whom these tests were administered were taken from three high schools of different sizes during the last six-weeks term of the school year of 1939-40. The different schools of various sizes were taken to eliminate as much as possible selected samples. Lawton High School with a Commercial Department of three teachers supplied 124 cases;

¹⁷ See Appendix, p. 45.

Durant High School with a Department of two teachers supplied 73 cases; and Mangum High School with a Department of one teacher supplied 43 cases.

The students tested were of the usual high school age, fifteen to twenty-two years, and were in grades eleven and twelve. Each student took at least three and some as many as five straight copy, fifteen-minute, typewriting tests. They were told to write for speed and that their rate would not be penalized for errors. Not more than one typewriting test per day was administered. Each student also took both parts of the reading test according to the directions given in the Manual of Directions for the Iowa Silent Reading Tests.¹⁸ In all schools the tests were administered under as near the same conditions as possible. The teachers in the three schools were supplied with sufficient copies of all the tests for each student, together with specific instructions for administering the tests.

After the tests were administered, the reading rate was computed in terms of words per minute; the reading comprehension, in terms of per cent; and the typewriting rate in terms of gross words per minute. The gross words per minute on each timed writing for each student were computed according to the International Typewriting Contest Rules. These rates were then averaged to find the gross typewriting rate for each individual.

¹⁸ H. A. Greene, A. N. Jorgensen, V. H. Kelley, Iowa Silent Reading Tests Manual of Directions, New Edition, pp. 4-5.

The data gathered from these test scores were tabulated and correlations computed by the Pearson product-moment method between: the boys' typewriting and reading rates; the girls' typewriting and reading rates; the boys' and girls' composite typewriting and reading rates; and between: the boys' typewriting rates and reading comprehension scores; the girls' typewriting rates and reading comprehension scores; the boys' and girls' composite typewriting rates and reading comprehension scores. Then the probable error of these correlations were computed to determine their reliability. Each correlation was computed twice on separate correlation tables to make certain that no error was involved in the computations.

DEFINITION OF TERMS

The discussion throughout this problem is as non-technical as possible and no statistical knowledge on the part of the reader has been presupposed, but in order to have a unanimity of thought and understanding all the way through a few words and expressions might need a bit of explanation and definition.

In this study gross typewriting rate means gross words per minute computed according to the International Typewriting Contest Rules. The word, gross, signifies that the errors in the typewriting were neither counted nor penalized. Gross typewriting rate, typewriting speed, and typewriting rate have been used interchangeably.

Reading rate means the words read per minute measured according to the manual of instructions for the Iowa Silent

Reading Test.

Reading comprehension means the score in terms of per cent on the comprehension tests.

The coefficient of correlation might well be defined by quoting Garrett. He says it is the statistical device whereby relationship is expressed on a quantitative scale.¹⁹

Correlation expresses the ratio of the rate of change of one measurement to the rate of change of another measurement of the same individual. It shows the degree to which two measures move alike, but it does not show the cause of the relationship.

The relationship possible between two measures may range from a perfect inverse relationship expressed by a coefficient of -1.00 through a coefficient of 0.00 which expresses no relationship, to a perfect positive relationship expressed by a coefficient of 1.00 . In educational experimentation perfect correlation is almost impossible and most coefficients are found at intermediate points where their value is interpreted in a general way as "high" or "low," or "valuable" or "useless," depending upon how close they are to ± 1.00 or 0 . Garrett says that to be certain of a low degree of correlation, the coefficient should be five or six times its probable error.²⁰

¹⁹ Henry E. Garrett, Statistics in Psychology and Education, p. 149.

²⁰ Ibid., p. 170.

The formula used in computing the coefficient of correlation, r , is: ²¹

$$r = \frac{\text{Sum. } xy}{\sqrt{(\text{Sum. } x^2)(\text{Sum. } y^2)}} \quad \text{or} \quad \frac{a}{\sqrt{bc}}$$

(The probable error of the correlation, PE_r , shows the reliability of the coefficient of correlation.) In order to be of any real value as a measure of reliability, PE_r should be calculated for r 's obtained from random and reasonably large samples. The cases used in this study consist of 240 students taken from three different high schools of different sized to insure random and unselected samples. The formula used for the probable error of the correlation is: ²²

$$PE_r = \frac{.6745 \times (1 - r^2)}{\sqrt{N}}$$

The obtained r is the coefficient of correlation found or obtained in a specific study.

The true r is the range between which the coefficient of correlation of the population as a whole should fall if the sampling used was taken at random.²³

21 Ibid., pp. 151-168.

22 Ibid., pp. 170-171.

23 Ibid., p. 170.

CHAPTER II

ANALYSIS AND INTERPRETATION OF DATA

As previously stated, one of the purposes of this study is to determine what relationship, if any, exists between gross typewriting rate and reading rate. Test I, parts A and B, of the Iowa Silent Reading Tests was used to measure both the reading rate and the comprehension of 240 high school juniors and seniors from Lawton, Durant, and Mangum High Schools during the last six-weeks term of the school year of 1939-40. The average of from three to five, fifteen-minute, straight copy, Student's Typewriting Tests was used to ascertain the gross typewriting rate of each student.

The technique employed in determining the relation between typewriting rate and reading rate was that of simple correlation. The Pearson product-moment method was used.¹ Correlations were computed for the boys and the girls separately, and as a composite group. Of the 240 cases tested, 131 were girls and 109 were boys.

THE RELATIONSHIP BETWEEN BOYS' TYPEWRITING AND READING RATES

Table I on page 12 shows the coefficient of correlation between the boys' typewriting and reading rates, and the probable error of this correlation. The correlation table

¹ Henry E. Garrett, Statistics in Psychology and Education, pp. 163-170.

TABLE I
 COEFFICIENTS OF CORRELATION
 BETWEEN GROSS TYPEWRITING RATE AND READING RATE
 WITH THEIR PROBABLE ERRORS

The Relation Between:	No. :Cases:	r	: PE _r
² Boys' Reading and Typewriting Rates	: 109	: .13	: .06
³ Girls' Reading and Typewriting Rates	: 131	: .33	: .05
⁴ Composite Reading and Typewriting Rates	: 240	: .22	: .04

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- ² See Appendix, p. 28. Correlation Table for the Coefficient of Correlation between Typewriting and Reading Rate for Boys.
- ³ See Appendix, p. 29. Correlation Table for the Coefficient of Correlation between Typewriting and Reading Rate for Girls.
- ⁴ See Appendix, p. 30. Correlation Table for the Coefficient of Correlation between Typewriting and Reading Rate for Boys and Girls Combined.

for the coefficient is found in the appendix. From that table, r (the coefficient of correlation) was found to be .13 with a PE_r (probable error of the coefficient of correlation) of $\pm .06$. This means that the chances are even that the true r falls within the limits of $.13 \pm .06$, or between .07 and .19; and that the chances are 9930 in 10,000 that the true r falls within the limits of $.13 \pm (4 \times .06)$, or between negative .11 and positive .37. By true r is meant that r which should be expected between typewriting rates and reading rates in the population from which the group of 109 is a random sampling.⁸

Garrett says that in order to be reasonably sure that there is some correlation present, an obtained r should be at least four times its PE. For example, if r is exactly four times its PE (assume that $r = .16$ and $PE_r = \pm .04$) the true r will be certain to fall within the limits of $.16 \pm (4 \times .04)$ or between 0 and .32. It is customary, therefore, not to consider an r as reliable--as indicative of correlation at least better than 0--unless it is at least four times its PE. To be certain of a low degree of correlation an r should be five or six times its PE.⁹

Therefore, the results from Table I show some, but very little, correlation between the gross typewriting and reading rates of the boys tested. The best that can be said for this correlation is that it is positive. The speed with which

⁸ Ibid. p. 170

⁹ Ibid. p. 170

the boys read had little influence upon their typewriting rates. This seems to indicate that the boy who reads slowly is just as likely to succeed in typewriting as the one who reads rapidly, but it cannot be said that this statement is definitely true because so many factors enter into typewriting skill. The low correlation found is probably due in part to the size and apparent stiffness of many boys' hands and, also to a lack of muscular coordination.

Dvorak says that just what factors contribute to success in typewriting are not definitely known, but some of the accepted ones are intelligence, interest, and particularly muscular control or motor ability.¹⁰

THE RELATIONSHIP BETWEEN THE TYPEWRITING AND READING RATES OF GIRLS

The relationship between gross typewriting rate and reading rate for the group of 131 girls is shown in Table I, page 12, and the correlation table for this coefficient is found in the appendix. The correlation for the girls is .33 with a probable error of $\pm .05$. This means that the chances are even that the obtained correlation does not differ from the true coefficient by more than $\pm .05$. Moreover, since 4PE includes practically all of the cases in a normal distribution, the true correlation is certain to lie within the limits of $.33 \pm (4 \times .05)$, or between .13 and .53.

¹⁰ August Dvorak, Nellie L. Merrick, William L. Dealey, Gertrude Ford, Typewriting Behavior, p. 300.

Among girls, only a low degree of correlation can be certain, but some might have a correlation as high as .53 between their reading and typewriting rates. Since this correlation is true, it seems that those girls who can read well can typewrite well. Therefore, it is probable that reading exercises could be used as one of the remedial devices for improving the typewriting of girls.

An obtained r of .33 with a PE_r of $\pm .05$ indicates at least a low positive correlation among all girls, and a substantial positive correlation among a good part of them. This means that reading rate does influence girls' typewriting rates, varying from low to valuable, and that increasing reading rate might also increase typewriting rate. It also means that reading rate might be used to a small degree as one of the factors for predicting typewriting success among girls. In evaluating this statement, it must be remembered that many factors enter into typewriting success, and that a marked deficiency in one factor might tend to lower the correlation among other factors. The coefficient of correlation for the girls tested is .20 higher than that of the boys. This helps to confirm the statement that motor skills and muscular coordination do affect typewriting speed.

White found that intelligence, reading skill, age, and performance on serial response motor tests are significant factors in typewriting achievement.¹¹

¹¹ Bruce White, "Prediction of Typewriting Success," Journal of Business Education, Apr., 1935, pp. 15-16.

THE RELATIONSHIP BETWEEN THE TYPEWRITING
AND READING RATES OF THE BOYS AND GIRLS COMBINED

The composite correlation of both boys and girls is also shown in Table I on page 12, and the correlation table for this coefficient is found in the appendix. An r of .22 with a PE of $\pm .04$ was found for these 240 students. The chances are even that the obtained r of positive .22 does not differ from the true coefficient by more than $\pm .04$; r is expressed by $.22 \pm .04$; and that the true relationship is certain to lie between the limits of $.22 \pm (4 \times .04)$, or between .06 and .38. The composite correlation of the boys and girls combined naturally falls between the r of .13 for the boys, and that of .33 for the girls, but it is not necessarily the average of the two.

The correlation between the typewriting and reading rates of the boys and girls together is low, but not too low to eliminate reading rate from the list of factors that influence typewriting rate. It is clear to see that the low correlation of the boys, due in part to the impeditive physical features of their hands that hinder typewriting speed, lowers the correlation of the combined group. This makes the improvement of reading rate as a device for increasing typewriting speed usable on individuals, but not groups.

THE RELATIONSHIP BETWEEN
TYPEWRITING RATE AND READING COMPREHENSION

The reading comprehension of the students in this study was determined in terms of per cent from Test I, parts A and B, of the Iowa Silent Reading Tests, New Edition, Form Bm,

TABLE II
 COEFFICIENTS OF CORRELATION BETWEEN
 GROSS TYPEWRITING RATE AND READING COMPREHENSION
 WITH THEIR PROBABLE ERRORS

The Relation Between:	No. :Cases:	r	: PE _r
⁵ Boys' Comprehension and Typewriting	: 109 :	.19	: .06
⁶ Girls' Comprehension and Typewriting	: 131 :	.30	: .05
⁷ Composite Comprehension and Typewriting	: 240 :	.26	: .04

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- ⁵ See Appendix, p. 31. Correlation Table for the Coefficient of Correlation between Typewriting Rate and Reading Comprehension Among Boys.
- ⁶ See Appendix, p. 32. Correlation Table for the Coefficient of Correlation between Typewriting Rate and Reading Comprehension among Girls.
- ⁷ See Appendix, p. 33. Correlation Table for the Coefficient of Correlation between Typewriting Rate and Reading Comprehension for the Boys and Girls Combined.

for High Schools and Colleges. The correlations between typewriting rate and reading comprehension were computed in exactly the same manner as those between typewriting rate and reading rate. First, the scores for the boys and girls were correlated separately, and then they were combined and correlated. Table II on page 17 shows the results of these three correlations with their probable errors, and the correlation tables for these coefficients are found in the appendix.¹²

THE RELATIONSHIP BETWEEN
BOYS' TYPEWRITING RATE AND READING COMPREHENSION

A correlation of .19 with a probable error of $\pm .06$ was found between boys' typewriting rate and reading comprehension. Interpretation of this coefficient shows that the chances are even that the obtained r of .19 does not differ from the true coefficient by more than $\pm .06$; r is expressed by $.19 \pm .06$; and that the true relationship is certain to lie between the limits of $.19 \pm (4 \times .06)$, or between negative .05 and positive .43. The correlation between the boys' reading comprehension scores and typewriting rates is .06 higher than the relation between their reading and typewriting rates, but since a coefficient of correlation should be five or six times its probable error to be certain of a low degree of correlation, an r of .19 with a PE of $\pm .06$ indicates little correlation. Here again, the physical factors found especially in boys' hands that are impeditive to typewriting

¹² See Appendix, pp. 31-33.

success may be partly responsible for this low correlation. A boy might have a high degree of comprehension in reading, but if his fingers are large and lack muscular coordination, he is not likely to attain a high rate in typewriting.

THE RELATIONSHIP BETWEEN
GIRLS' TYPEWRITING RATE AND READING COMPREHENSION

A correlation of .30 with a probable error of $\pm .05$ between the girls' typewriting rates and reading comprehension scores was found. The chances are even that the obtained r of .30 does not differ from the true coefficient by more than $\pm .05$; r is expressed by $.30 \pm .05$; and that the true relationship is certain to lie between the limits of $.30 \pm (4 \times .05)$, or between .10 and .50. The correlation among girls between reading comprehension and typewriting rate is .03 lower than that of their reading and typewriting rates, but it is still much more significant than that of the boys. The correlation is definitely not a high one, but it does show that comprehension of reading is a factor that influences the typewriting rates of most girls and that comprehension is as valuable to typewriting rate as is reading rate. This might naturally be assumed since the correlation between reading rate and comprehension is high.

O'Brien says that investigations of Quantz, Hendricks, Judd, and others have shown that, as a rule, rapid readers are superior also in comprehension to slow readers. 13

13 John Anthony O'Brien, Reading, Its Psychology and Pedagogy, pp. 249-253.

THE RELATIONSHIP BETWEEN TYPEWRITING RATES AND
READING COMPREHENSION FOR THE BOYS AND GIRLS COMBINED

The coefficient of correlation found between typewriting rate and reading comprehension for the boys and girls combined is .26 with a probable error of $\pm .04$. This means that the chances are even that the obtained r of .26 does not differ from the true coefficient by more than $\pm .04$, and that the true relationship is certain to lie between the limits of $.26 \pm (4 \times .04)$, or between .10 and .42. The correlation between typewriting rate and reading comprehension for the boys and girls together is .04 higher than that for their typewriting and reading rates. The higher correlation between boys' comprehension and typewriting caused the composite correlation to be higher. This, too, is a low correlation, but it indicates that reading comprehension does have some relation to typewriting rate, and that comprehension has as much influence on typewriting speed as does reading rate.

Since there is a high correlation between reading rate and comprehension, it was concluded that the multiple correlation between reading rate and comprehension and typewriting rate would probably have no more value than the six correlations already computed. The difference of .03 between the two correlations for the girls, the difference of .06 between the correlations for the boys, and the difference of .04 between the correlations for the boys and girls taken together indicates that the multiple correlations for the same groups would likely fall somewhere between the separate correlations.

Judd expresses the correlation between rate and comprehension of reading as follows: "Good readers are usually not slow and poor readers are usually not fast. High rate and good quality are commonly related and low rate and poor quality are commonly related."¹⁴

In interpreting coefficients of correlation it must be remembered that two measures might have a high correlation, and yet a high score in one measure might not cause a high score in the other. In the case of the correlation between reading rate and comprehension, for example, fast reading in itself probably does not cause accurate comprehension, but the concentration necessary to read rapidly eliminates the infiltration of extraneous material in the mind and makes for comprehension. In this connection, O'Brien says:

It is the experience of most readers that the rapidity of reading bears a direct relation to the degree of concentration. Other things being equal, the greater the concentration the faster the reading. Because it inhibits tendencies to wool-gathering, dawdling, and day dreaming, concentration insures both a rapid and more accurate grasp of the material read.¹⁵

Likewise, the correlation between reading and typewriting might indicate that the concentration necessary for rapid and accurate reading is the reading factor that influences typewriting rate.

¹⁴ Charles Hubbard Judd, Measuring the Work of the Public Schools, pp. 154-155.

¹⁵ John Anthony O'Brien, op. cit., p. 253.

CHAPTER III

SUMMARY AND CONCLUSIONS

The purpose of this study was to determine what relation, if any, exists between gross typewriting rate and reading rate and comprehension.

Tests were administered to 240 Oklahoma high school juniors and seniors taking first-year typewriting during the last six-weeks term of the school year of 1939-40. Lawton High School supplied 124 cases; Durant High School, 73; and Mangum High School, 43.

Test I, parts A and B, of the Iowa Silent Reading Tests for High Schools and Colleges was used to measure both the reading rate and the reading comprehension. The reading rate was found in terms of words per minute, and comprehension in terms of per cent. The gross typewriting rate for each student was found by averaging the gross words per minute on from three to five, fifteen-minute, straight copy, Student's Typewriting Tests computed according to the International Typewriting Contest Rules.

By Pearson's product-moment method of correlation, the relationship between typewriting rate and reading rate was found for the boys, the girls, and the boys and girls combined. In the same way, the relationship was found between typewriting rate and reading comprehension for the boys, the girls, and the boys and girls combined. Then the probable error of each correlation was found.

^{ed}
 * The findings of this study show a higher correlation among girls between both reading rate and reading comprehension and typewriting rate than among boys. The highest correlation found was $.33 \pm .05$ between girls' typewriting rate and reading rate. The relation between girls' typewriting rate and comprehension ranked second with a correlation of $.30 \pm .05$. Among the ^{Combined} composite scores of the boys and girls, the highest correlation was $.26 \pm .04$ between typewriting and reading comprehension. The ^{Combined} composite correlation between typewriting and reading rates was $.22 \pm .04$. The correlation among the boys was considerably lower than that of the girls. Their coefficient between comprehension and typewriting was $.19 \pm .06$; and between reading rate and typewriting it was $.13 \pm .06$. *

White correlated the reading scores of 82 cases on the Whipple Reading Test with gross and net typewriting and found a correlation of $.41$.¹

Jones made a study of reading rate and comprehension as determining factors in the selection of pupils for junior high school typewriting classes, but the correlations found were too low to be useful for predictive or guidance purposes.²

¹ Bruce White, "Prediction of Typewriting Success," Journal of Business Education, Vol. 10, Apr. 1935, pp. 15-16.

² Marian B. Jones, "Reading Rate and Comprehension as Determining Factors in the Selection of Pupils for Junior High School Typewriting Classes," Master's Thesis, University of Southern California, 1932.

CONCLUSIONS

Since the obtained coefficients of correlation in this study range from $.13 \pm .06$ to $.33 \pm .05$, it must be concluded that there is some relation between typewriting rate and reading rate and comprehension, but it is low.

In the light of the studies reviewed here and the findings of this study, the following general conclusions seem justifiable:

✓ Just what factors contribute to success in typewriting are not definitely known, but there are several. Since there is a low positive relationship between reading and typewriting, it may be concluded that reading is one of these factors.

✓ The correlations between typewriting rate and reading rate and comprehension are definitely lower among boys than girls.

✓ Since there is this small positive relationship between reading and typewriting, reading exercises might be one of the remedial devices for improving the typewriting rates of girls.

✓ There is not sufficient correlation between typewriting and reading for reading to be used to any large degree as a basis for predicting typewriting success, but it might be considered one of many factors.

✓ Reading comprehension seems to influence typewriting speed to about the same degree to which reading rate does.)

x More testing and research needs to be carried on in the

field of typewriting to determine what factors make for typewriting achievement so that better vocational and educational guidance may be extended to youth.

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STRATHMORE PARCHMENT

APPENDIX

6-11-54
PARCHMENT

TABLE I
CORRELATION TABLE FOR THE COEFFICIENT OF CORRELATION BETWEEN
TYPEWRITING AND READING RATE FOR BOYS

X = Boys' Typewriting Rates

	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	F _y	Y	F _y Y	F _y Y ²
445-470																	
420-444							L (7							1	7	7	49
395-419							1 (6							1	6	6	36
370-394					2	1 (5				1 (5				4	5	20	100
345-369				1 (4	3	2 (8		1 (4						7	4	28	112
320-344				5 (15	4	2 (6	1 (3							12	3	36	108
295-319			2 (4	3 (6	6	3 (6		1 (2	1 (2					16	2	32	64
270-294				2 (2	4	4 (4	2 (2							12	1	12	12
245-269				5	5	9	4			1				24	0	0	0
220-244				3 (-3	6 (-6	2 (-2	1 (-1							12	-1	-12	12
195-219				1 (-2	6 (-6	2 (-4								9	-2	-18	36
170-194	1 (-3		1 (-3	1 (-3	3 (-3	2 (-6								8	-3	-24	72
145-169					1 (-1									1	-4	-4	16
120-144				1 (-5						1 (-5				2	-5	-10	50
F _x	1		3	22	40	27	9	4	1	2				109=N		73	667
X	-4		-2	-1	0	1	2	3	4	5						SF _y Y	SF _y Y ²
F _x X	-4		-6	-22	0	27	18	12	4	10				39	SF _x X		
F _x X ²	16		12	22	0	27	36	36	16	50				215	SF _x X ²		
SF _{xy} Y	-3		1	14	0	17	10	8	2	5							
SF _{xy} Y	12		-2	-14	0	17	20	24	8	25				90	SF _{xy} XY		

$$a = SF_{xy}XY - \frac{(SF_x X)(SF_y Y)}{N} \quad b = SF_x X^2 - \frac{(SF_x X)^2}{N} \quad c = SF_y Y^2 - \frac{(SF_y Y)^2}{N} \quad r = \frac{a}{\sqrt{bc}} \quad PE_r = .6745 \times \frac{1-r^2}{\sqrt{N}}$$

$$a = 90 - \frac{(39)(73)}{109} = 64 \quad b = 215 - \frac{(39)^2}{109} = 201 \quad c = 667 - \frac{(73)^2}{109} = 618 \quad r = \frac{64}{\sqrt{(201)(618)}} = .13 \quad PE_r = .6745 \times \frac{1 - (.13)^2}{\sqrt{109}} = \pm .06$$

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TABLE II
CORRELATION TABLE FOR THE COEFFICIENT OF CORRELATION BETWEEN
TYPEWRITING AND READING RATE FOR GIRLS

X = Girls' Typewriting Rates

	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	F _y	Y	F _y Y	F _y Y ²
445-470						1			1 (7)					2	7	14	98
420-444																	
395-419							1 (5)							1	5	5	25
370-394							1 (4)			1 (4)				2	4	8	32
345-369						2	2 (6)	3 (9)				1 (3)		8	3	24	72
320-344			1 (2)		3 (6)	3	2 (4)							9	2	18	36
295-319			1 (1)		3 (3)	5	4 (4)	3 (3)	2 (2)	1 (1)				19	1	19	19
270-294					2	2	3	2	2	1				12	0	0	0
245-269			1 (-1)	2 (-2)	6 (-6)	7	1 (-1)	1 (-1)	2 (-2)					20	-1	-20	20
220-244				2 (-4)	5 (-10)	5	6 (-12)	3 (-6)	1 (-2)					22	-2	-44	88
195-219				3 (-9)	8 (-24)	4	3 (-9)			1 (-3)				19	-3	-57	171
170-194			1 (-4)	4 (-16)	4 (-16)	2			1 (-4)	1 (-4)				13	-4	-52	208
145-169			1 (-5)	1 (-5)			1 (-5)							3	-5	-15	75
120-144									1 (-6)					1	-6	-6	36
F _x			5	12	31	31	24	12	10	5			1	N=131		-106	880
X			-3	-2	-1	0	1	2	3	4			7			SF _y Y	SF _y Y ²
F _x X			-15	-24	-31	0	24	24	30	20			7	35	SF _x X		
F _x X ²			45	48	31	0	24	48	90	80			49	415	SF _x X ²		
SF _{xy} Y			-7	-36	-47	0	-4	5	-5	-2			3				
SF _{xy} XY			21	72	47	0	-4	10	-15	-8			21	144	SF _{xy} XY		

$$a = \frac{SF_{xy}XY}{N} - \frac{(SF_x X)(SF_y Y)}{N} \quad b = SF_x X^2 - \frac{(SF_x X)^2}{N} \quad c = SF_y Y^2 - \frac{(SF_y Y)^2}{N} \quad r = \frac{a}{\sqrt{bc}} \quad PE_r = .6745 \times \frac{1 - r^2}{\sqrt{N}}$$

$$a = 144 - \frac{(35)(-106)}{131} = 172 \quad b = 415 - \frac{(35)^2}{131} = 405.65 \quad c = 880 - \frac{(106)^2}{131} = 794 \quad r = \frac{172}{\sqrt{(405.65)(794)}} = .33 \quad PE_r = .6745 \times \frac{1 - .33^2}{\sqrt{131}} = .405$$

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TABLE III
CORRELATION TABLE FOR THE COEFFICIENT OF CORRELATION BETWEEN
TYPEWRITING AND READING RATE FOR GIRLS AND BOYS COMBINED

X - Boys' and Girls' Typewriting Rates

	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	F _y	Y	F _y Y	F _y Y ²	
445-470						1			1 (8)					2	8	16	128	
420-444								1 (7)						1	7	7	49	
395-419							2 (12)							2	6	12	72	
370-394					2 (10)	1	1 (5)			2 (10)				6	5	30	150	
345-369				1 (4)	3 (12)	4	2 (8)	4 (16)						1 (4)	15	4	60	240
320-344			1 (3)	5 (15)	7 (21)	5	3 (9)							21	3	63	189	
295-319			3 (6)	3 (6)	9 (18)	8	4 (8)	4 (8)	3 (6)	1 (2)				35	2	70	140	
270-294				2 (2)	6 (6)	6	5 (5)	2 (2)	2 (2)	1 (1)				24	1	24	24	
245-269			1	7	11	16	5	1	2	1				44	0	0	0	
220-244				5 (-5)	11 (-11)	7	7 (-7)	3 (-3)	1 (-1)					34	-1	-34	34	
195-219				4 (-8)	14 (-28)	6	3 (-6)			1 (-2)				28	-2	-56	112	
170-194	1 (-3)		2 (-6)	5 (-15)	7 (-21)	4			1 (-3)	1 (-3)				21	-3	-63	189	
145-169			1 (-4)	1 (-4)	1 (-4)		1 (-4)							4	-4	-16	64	
120-144				1 (-5)				1 (-5)	1 (-5)					3	-5	-15	74	
F _x	1		8	34	71	58	33	16	11	7				1	N=240	38	1466	
X	-5		-3	-2	-1	0	1	2	3	4				7				
F _x X	-5		-24	-68	-71	0	33	32	33	28				7		-35	SF _x X	
F _x X ²	25		72	136	71	0	33	64	99	112				49		661	SF _x X ²	
SF _{xy} Y	-3		-1	-10	3	0	30	25	9	8				4				
XSF _{xy} Y	15		3	20	-3	0	30	50	27	32				28		202	SF _{xy} XY	

$$a = \frac{SF_{xy}XY - (SF_xX)(SF_yY)}{N} \quad b = \frac{SF_xX^2 - (SF_xX)^2}{N} \quad c = \frac{SF_yY^2 - (SF_yY)^2}{N} \quad r = \frac{a}{\sqrt{bc}} \quad PE_r = .6745 \times \frac{1-r^2}{\sqrt{N}}$$

$$a = \frac{202 - (-35)(98)}{240} = 216.3 \quad b = \frac{661 - (-35)^2}{240} = .655.9 \quad c = \frac{1466 - (93)^2}{240} = 1426 \quad r = \frac{216.3}{\sqrt{(655.9)(1426)}} = .22 \pm PE_r = .04$$

TABLE IV
CORRELATION TABLE FOR THE COEFFICIENT OF CORRELATION BETWEEN
TYPEWRITING AND COMPREHENSION FOR THE BOYS

X = Boys' Typewriting Rates

	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	F _y	Y	F _y Y	F _y ²
86-91					1									1	5	5	25
80-85					1	1 (4	1 (4			1 (4				4	4	16	64
74-79			1 (3		2	1 (3		1 (3						5	3	15	45
68-73				1 (2	6	3 (6	1 (2	1 (2						12	2	24	48
62-67				2 (2	6	6 (6								14	1	14	14
56-61				5	5	7	1		2					20	0	0	0
50-55			1 (-1	2 (-2	4	3 (-3	2 (-2							12	-1	-12	12
44-49				7 (-14	5	3 (-6	2 (-4							17	-2	-34	68
38-43	1 (-3			4 (-12	8	2 (-6	1 (-3	1 (-3						17	-3	-51	153
32-37			1 (-4	2 (-8		1 (-4								4	-4	-16	64
26-31					2		1 (-5							3	-5	-15	75
20-25																	
F _x	1		3	23	40	27	9	3	2	1				N=109		54	568
X	-4		-2	-1	0	1	2	3	4	5						SF _y Y	SF _y Y ²
F _x X	-4		-6	-23	0	27	18	9	8	5						34	SF _x X
F _x X ²	16		12	23	0	27	36	27	32	25						198	SF _x X ²
SF _{xy} Y	-3		-2	-32	0	0	-8	2	0	4							
XSF _{xy} Y	12		4	32	0	0	-16	6	0	20						58	SF _{xy} XY

$$a = SF_{xy}XY - \frac{(SF_xX)(SF_yY)}{N} \quad b = SF_xX^2 - \frac{(SF_xX)^2}{N} \quad c = SF_yY^2 - \frac{(SF_yY)^2}{N} \quad r = \frac{a}{\sqrt{bc}} \quad PER = .6745 \times \frac{1-r^2}{\sqrt{N}}$$

$$a = 58 - \frac{(34)(54)}{109} = 41 \quad b = 198 - \frac{(34)^2}{109} = 87.4 \quad c = 568 - \frac{(54)^2}{109} = 541 \quad r = \frac{41}{\sqrt{(87.4)(541)}} = .19 \quad PER = .6745 \times \frac{1-.19^2}{\sqrt{109}} = .06$$

TABLE V
CORRELATION TABLE FOR THE COEFFICIENT OF CORRELATION BETWEEN
TYPEWRITING AND COMPREHENSION FOR THE GIRLS

X = Girls' Typewriting Rates

Y = Girls' Reading Comprehension	X = Girls' Typewriting Rates													F _y	Y	F _y Y	F _y Y ²					
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79									
86-91					1	(6									1	6	6	36				
80-85						1	2	(10	1	(5		1	(5		5	5	25	125				
74-79						2	4	(16		2	(8				8	4	32	128				
68-73				1	(3	3	(9	5	1	(3	1	(3	2	(6		1	(3	15	3	45	135	
62-67					4	(8	7	5	(10	2	(4	4	(8		22	2	44	88				
56-61			1	(1		4	(4	7	2	(2					14	1	14	14				
50-55			1			3		3		1					9	0	0	0				
44-49			1	(-1	3	(-3	4	(-4	2	3	(-3	2	(-2	1	(-1	1	(-1		17	-1	-17	17
38-43			1	(-2	2	(-4	5	(-10	4	1	(-2	1	(-2						15	-2	-30	60
32-37			1	(-3	3	(-9	3	(-9		2	(-6	1	(-3	1	(-3				11	-3	-33	99
26-31				1	(-4	4	(-16	1		2	(-8	2	(-8						10	-4	-40	160
20-25					3	(-15				1	(-5								4	-5	-20	100
F _x				5	13	31	32	23	11	10	5				1	N=131		26	962			
X				-3	-2	-1	0	1	2	3	4				7			SF _y Y	SF _y Y ²			
F _x X				-15	-26	-31	0	23	22	30	20			7	30	SF _x X						
F _x X ²				45	52	31	0	23	44	90	80			49	414	SF _x X ²						
SF _{xy} Y				-5	-32	-12	0	17	-3	13	10			3								
XSF _{xy} Y				15	64	12	0	17	-6	39	40			21	202	SF _{xy} XY						

$$a = SF_{xy}XY - \frac{(SF_xX)(SF_yY)}{N} \quad b = SF_xX^2 - \frac{(SF_xX)^2}{N} \quad c = SF_yY^2 - \frac{(SF_yY)^2}{N} \quad r = \frac{a}{\sqrt{bc}} \quad PEr = .6745 \times \frac{1-r^2}{\sqrt{N}}$$

$$a = 202 - \frac{(30)(26)}{131} = 196 \quad b = 414 - \frac{(30)^2}{131} = 407 \quad c = 962 - \frac{(26)^2}{131} = 956.8 \quad r = \frac{196}{\sqrt{(962)(956.8)}} = .30 \quad PEr = .6745 \times \frac{1-.30^2}{\sqrt{131}} = .05$$

TABLE VI
CORRELATION TABLE FOR THE COEFFICIENT OF CORRELATION BETWEEN
TYPEWRITING AND COMPREHENSION FOR THE BOYS AND GIRLS COMBINED

X = Typewriting Rates

	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	F _y	Y	F _y Y	F _y Y ²
86-91					2 (12)									2	6	12	72
80-85					1 (5)	2 (10)	3 (15)	1 (5)		2 (10)				9	5	45	225
74-79			1 (4)		2 (8)	3	4 (16)	1 (4)	2 (8)					13	4	52	208
68-73				2 (6)	9 (37)	8	2 (6)	2 (6)	1 (3)	2 (6)			1 (3)	27	3	81	243
62-67				2 (4)	10 (20)	12	6 (12)	2 (4)	4 (8)					36	2	72	144
56-61			1 (1)	5 (5)	9 (9)	14	3 (3)		2 (2)					34	1	34	34
50-55			2	2	7	6	2	1		2				22	0	0	0
44-49			1 (-1)	10 (-10)	9 (-9)	5 (-5)	5 (-5)	2 (-2)	1 (-1)	1 (-1)				34	-1	-34	34
38-43	1 (-2)		1 (-2)	7 (-14)	12 (-24)	6	2 (-4)	2 (-4)	1 (-2)					32	-2	-64	128
32-37			2 (-6)	5 (-15)	3 (-9)	1	2 (-6)	1 (-3)	1 (-3)					15	-3	-45	135
26-31					6 (-24)	1	3 (-12)	2 (-8)						12	-4	-48	192
20-25				3 (-15)			1 (-5)							4	-5	-20	100
F _x	1		8	36	70	58	33	14	12	7			1	N=240		85	1515
F _x X	-5		-3	-2	-1	0	1	2	3	4			7			SF _y Y	SF _y Y ²
F _x X ²	-5		-24	-72	-70	0	33	28	36	28			7			-39	
SF _{xy} Y	-2		-4	-39	15	0	20	2	15	15			3				
XSF _{xy} Y	10		12	78	-15	0	20	4	45	60			21			235	

$$a = SF_{xy}XY - \frac{(SF_xX)(SF_yY)}{N} \quad b = SF_xX^2 - \frac{(SF_xX)^2}{N} \quad c = SF_yY^2 - \frac{(SF_yY)^2}{N} \quad r = \frac{a}{\sqrt{bc}} \quad PER = .6745 \times \frac{1-r^2}{\sqrt{N}}$$

$$a = 235 - \frac{(-39)(85)}{240} = 249 \quad b = 669 - \frac{(-33)^2}{240} = 662.66 \quad c = 1515 - \frac{(85)^2}{240} = 1484 \quad r = \frac{249}{\sqrt{(662.66)(1484)}} = .26 \quad PER = .6745 \times \frac{1-.26^2}{\sqrt{240}} = .04$$

Y = Boys' and Girls' Comprehension Scores

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TEST AVERAGES FOR EACH STUDENT

Durant High School

<u>Student's</u> <u>Age</u>	<u>Sex</u>	<u>Average</u> <u>Typing</u> <u>Rate</u>	<u>Average</u> <u>Reading</u> <u>Rate</u>	<u>Average</u> <u>Reading</u> <u>Rate</u>
16	F	35	182	65
17	M	31	252	43
16	M	39	229	42
19	M	19	189	38
15	F	49	225	39
18	M	36	212	43
16	F	51	222	34
18	M	32	270	45
19	M	33	248	43
18	M	42	242	76
16	F	48	351	64
17	F	33	190	42
18	F	40	288	44
16	F	40	242	72
15	F	41	315	77
16	F	44	251	54
18	F	43	214	39
18	F	33	177	37
16	F	49	295	71
17	M	38	184	28
16	M	35	301	64
17	M	26	295	54

TEST AVERAGES FOR EACH STUDENT

Durant High School, Continued

<u>Student's</u> <u>Age</u>	<u>Sex</u>	<u>Average</u> <u>Typing</u> <u>Rate</u>	<u>Average</u> <u>Reading</u> <u>Rate</u>	<u>Average</u> <u>Reading</u> <u>Comp.</u>
16	F	36	210	42
17	F	35	185	39
16	M	37	245	51
17	M	34	198	57
18	M	32	297	70
17	F	26	246	50
18	F	31	156	21
16	M	40	319	32
14	M	49	287	48
17	M	52	425	71
15	F	30	262	49
18	M	38	196	72
16	M	41	257	56
16	F	46	321	75
17	M	39	252	70
18	M	44	297	84
16	M	39	225	73
16	F	47	291	79
18	M	36	306	67
17	F	37	204	30
15	F	50	362	80
17	M	27	181	35

TEST AVERAGES FOR EACH STUDENT

Durant High School, Continued

<u>Student's</u> <u>Age</u>	<u>Sex</u>	<u>Average</u> <u>Typing</u> <u>Rate</u>	<u>Average</u> <u>Reading</u> <u>Rate</u>	<u>Average</u> <u>Reading</u> <u>Comp.</u>
15	M	41	363	64
16	M	42	190	45
18	M	32	323	35
16	F	39	343	68
18	F	35	281	33
17	M	45	225	72
16	M	38	247	73
15	M	43	255	58
18	F	37	261	73
17	F	38	244	67
16	M	40	251	42
16	M	30	291	43
17	F	40	246	63
17	F	48	230	63
16	M	34	338	54
16	F	38	237	30
17	F	38	218	59
17	M	32	214	45
16	M	44	243	62
18	M	42	290	69
19	F	33	202	25
18	F	29	172	44

TEST AVERAGES FOR EACH STUDENT

Durant High School, Continued

<u>Student's Age</u>	<u>Sex</u>	<u>Average Typing Rate</u>	<u>Average Reading Rate</u>	<u>Average Reading Comp.</u>
16	M	40	268	57
18	M	40	272	62
17	F	39	266	44
16	F	41	355	59
17	F	40	300	51
17	M	31	93	37
18	M	43	366	73

Lawton High School

16	F	45	275	66
16	F	50	229	44
15	F	41	184	70
17	M	35	275	43
15	F	54	315	66
17	M	37	303	60
16	M	34	225	57
17	F	55	250	72
17	F	42	256	44
18	F	38	231	32
15	F	40	231	29
16	M	46	261	81
16	M	31	303	38

TEST AVERAGES FOR EACH STUDENT

Lawton High School, Continued

<u>Student's Age</u>	<u>Sex</u>	<u>Average Typing Rate</u>	<u>Average Reading Rate</u>	<u>Average Reading Comp.</u>
16	F	35	245	38
15	F	37	189	57
16	F	41	221	62
19	M	43	306	45
19	M	37	182	31
17	M	31	265	47
15	F	51	225	26
16	F	47	220	65
16	F	44	228	56
16	M	36	348	44
16	F	35	223	87
15	F	39	216	60
16	F	42	246	72
16	F	60	187	68
16	F	43	329	59
16	F	38	310	64
18	F	34	244	68
15	F	42	268	59
16	F	38	341	28
17	M	27	306	75
17	M	36	350	56
17	F	50	318	29

TEST AVERAGES FOR EACH STUDENT

Lawton High School, Continued

<u>Student's</u> <u>Age</u>	<u>Sex</u>	<u>Average</u> <u>Typing</u> <u>Rate</u>	<u>Average</u> <u>Reading</u> <u>Rate</u>	<u>Average</u> <u>Reading</u> <u>Comp.</u>
18	M	45	288	48
15	F	42	464	61
16	F	46	303	66
18	F	44	345	78
15	M	36	148	40
17	M	51	144	40
16	F	32	234	40
16	M	41	260	73
18	F	40	254	53
17	M	35	240	71
16	F	36	171	27
18	M	35	379	44
15	F	55	317	76
17	M	45	265	41
16	M	39	271	57
18	M	56	310	61
17	M	39	239	38
16	F	49	387	82
16	M	37	342	65
16	M	39	364	75
17	F	37	390	49
17	M	36	382	87

TEST AVERAGES FOR EACH STUDENT

Lawton High School, Continued

<u>Student's</u> <u>Age</u>	<u>Sex</u>	<u>Average</u> <u>Typing</u> <u>Rate</u>	<u>Average</u> <u>Reading</u> <u>Rate</u>	<u>Average</u> <u>Reading</u> <u>Comp.</u>
17	F	46	207	48
17	F	51	366	73
16	M	38	340	49
16	M	33	333	54
17	F	35	308	52
16	F	44	177	59
17	M	43	292	60
16	M	33	190	59
16	M	32	335	47
16	F	41	217	81
18	F	45	325	61
16	M	41	172	43
15	F	25	313	40
15	F	39	226	50
16	M	42	273	66
17	F	32	188	45
17	F	44	267	42
16	F	44	304	73
16	M	36	244	57
18	M	39	249	49
16	M	35	208	54
15	F	45	209	59

TEST AVERAGES FOR EACH STUDENT

Lawton High School, Continued

<u>Student's Age</u>	<u>Sex</u>	<u>Average Typing Rate</u>	<u>Average Reading Rate</u>	<u>Average Reading Comp.</u>
17	M	43	385	51
19	M	35	296	38
16	F	44	331	38
18	M	47	337	50
16	F	41	210	43
17	F	61	210	49
17	M	32	224	44
15	F	45	235	37
19	F	38	216	54
17	F	33	205	35
17	M	37	333	76
17	F	26	335	61
17	M	35	176	54
16	F	40	212	67
15	F	57	128	44
17	F	38	246	41
17	F	36	212	40
16	M	31	365	49
16	F	49	307	84
16	M	39	313	49
18	M	36	204	42
17	M	40	325	61

TEST AVERAGES FOR EACH STUDENT

Lawton High School, Continued

<u>Student's</u> <u>Age</u>	<u>Sex</u>	<u>Average</u> <u>Typing</u> <u>Rate</u>	<u>Average</u> <u>Reading</u> <u>Rate</u>	<u>Average</u> <u>Reading</u> <u>Comp.</u>
17	M	37	270	67
15	M	33	256	65
17	M	43	259	65
15	F	39	195	33
16	F	36	249	69
17	F	42	340	63
17	F	31	214	48
17	F	38	262	44
18	F	32	250	37
17	F	45	261	74
17	F	31	179	14
16	M	35	218	61
15	M	49	402	58
16	M	49	246	54
17	F	45	415	65
16	F	39	270	44
16	F	44	318	58
17	M	43	250	63
17	M	34	258	63
14	M	43	218	52
17	F	55	245	34
16	F	56	233	43

TEST AVERAGES FOR EACH STUDENT

Mangum High School

<u>Student's Age</u>	<u>Sex</u>	<u>Average Typing Rate</u>	<u>Average Reading Rate</u>	<u>Average Reading Comp.</u>
19	M	32	313	61
17	M	41	326	60
17	F	49	285	44
17	F	46	230	22
17	F	57	183	62
18	F	49	244	44
17	F	52	245	43
17	M	38	283	70
17	M	39	318	43
16	M	53	354	78
18	F	46	219	27
18	M	35	328	83
16	F	50	270	53
17	F	44	241	63
15	F	46	297	32
17	F	76	368	68
17	F	48	366	76
17	M	42	259	57
17	F	56	290	62
16	M	56	304	57
16	F	47	158	30
16	F	53	287	63

TEST AVERAGES FOR EACH STUDENT

Mangum High School, Continued

<u>Student's Age</u>	<u>Sex</u>	<u>Average Typing Rate</u>	<u>Average Reading Rate</u>	<u>Average Reading Comp.</u>
17	M	40	256	47
17	F	40	315	65
21	M	41	207	55
17	F	56	280	76
17	F	38	214	63
17	F	43	293	73
19	M	38	241	52
17	F	50	356	44
17	F	62	292	71
17	M	34	329	57
18	M	38	246	63
17	M	32	222	49
17	M	61	260	53
18	F	36	342	59
18	M	49	247	26
17	F	64	310	55
17	F	25	146	34
17	F	58	297	64
17	M	39	260	66
17	F	57	451	64
17	F	64	370	85
18	M	60	372	80

TEST 1. RATE—COMPREHENSION—PART A

DIRECTIONS. This is a test to see how well and how rapidly you can read silently. Read this story about "Rubber" very carefully so that you can answer questions about it.

At the end of one minute you will be told to mark where you are reading. When you hear the word "Mark," draw a line around the word you are reading and go right on reading until you finish the story or you are told to stop. You will have three minutes in which to read as much of the story as you can. Further directions will be given at that time. Remember, you are to answer questions about it later.

RUBBER

Rubber is a substance composed of carbon and hydrogen, obtained from a milky liquid known as latex. Latex comes from the roots, stems, branches, leaves, and fruit of a wide variety of trees. For the most part these trees grow in the tropics. The milky juice is not the true sap, but a secretion which does not seem to be essential to the life of the plant. If this liquid is allowed to stand for a few hours, the particles of rubber rise to the surface. The doughy mass thus obtained can easily be rolled into a sheet or other convenient form. When allowed to dry, it loses its doughy character and becomes the firm, elastic solid known as raw or crude rubber.

In whatever form the crude rubber comes to the factory, the first thing that must be done is to clean it thoroughly and test it, as rubber varies greatly in composition. Until it is used it is stored in a cool, dark place, usually underground. When a load is brought to the manufacturing plant, the first step is to steam it into a soft, plastic mass. It is then thoroughly washed by being passed through heavy rollers while water is sprinkled on from above. Finally it comes out looking like a

thin piece of sheet sponge. Vacuum driers take this spongy sheet and extract every particle of moisture.

Next it is put into mills which rub and crush it until it loses its elasticity and becomes soft and plastic like putty. In this form it is ready for the mixing room, where sulphur and other ingredients are added to it. Each rubber product has a special requirement which must be taken into account in the preparation. For some articles the substance must be hard, for others soft; some must stand abrasion, others heat. Some will come in contact with acid, others must stand continuous pounding, and still others a steady pressure. Each ingredient is weighed with painstaking care. Then the mixture is rolled between hot rollers, from which it emerges a sheet of prepared rubber about a quarter of an inch in thickness.

The rubber is then ready for the products factory. After the articles have been fashioned, they are vulcanized. That is, the rubber is cured by the use of heat. The hardness of the article is determined by the amount of heat and the length of time it is applied.

Wait for further directions.

Do not answer any of the questions until you are told to do so.

- 10. When ready for the mixing room, the rubber is in the form of—
1 an elastic solid 2 a soft, plastic mass 3 sheet sponge
- 9. What determines the kind and amount of the ingredients which are added to the rubber in the mixing room?
1 ultimate use of article 2 moisture content 3 purity of sample
- 8. Manufactured rubber articles are first fashioned in the—
1 mixing room 2 rubber mill 3 products factory
- 7. What name is given to the elastic substance when it first comes to the factory?
1 dough 2 crude rubber 3 elastic
- 6. Special chemicals are added to the rubber in the mixing room—
1 to dry it 2 to purify it 3 to vary the quality
- 5. What is used to cleanse the rubber at the factory?
1 hot oil 2 fresh water 3 strong acid
- 4. The rubber is tested when it first comes to the factory to determine its—
1 composition 2 moisture content 3 elasticity
- 3. How are the particles of rubber separated from the liquid?
1 by allowing it to stand 2 by stirring it 3 by heating it
- 2. What is the name of the liquid from which rubber is made?
1 sap 2 latex 3 secretion
- 1. What is meant by the vulcanization process?
1 adding chemicals 2 purifying the rubber 3 curing by heat

SAMPLE. How is rubber obtained?
1 from a mine 2 from a tree 3 from a chemical laboratory

DIRECTIONS. Without looking at the article, answer these questions about the story of "Rubber." You will have two minutes for this work.

Read each question and the answers given below. Select the correct answer. Notice the number of this correct answer. In the answer spaces at the right fill the space under this number. The sample is answered correctly.

TEST 1. RATE-COMPREHENSION—PART B

DIRECTIONS. Read this story carefully so that you can answer questions about it. When you hear the word "Mark," draw a line around the word you are reading and go right on reading until you finish the story or you are told to stop. You will have **three minutes** in which to read as much of this story as you can. Remember, you are to answer questions about it later.

THE INFLUENCE OF THE PRESS

The policy of the government in a democracy is decided in the long run by public opinion. The government sometimes takes a position that is unpopular, but it must justify its course in order to hold the support of the majority of the people. If the party in power fails to do this, it will eventually be voted out of office and a party more to the liking of the majority will be set up in its place. The people are the masters, and the greatest problem that confronts the United States is that of making the people fit to exercise their sovereignty.

One of the most important instruments in the formation and expression of public opinion is the printing press. The freedom of the press from interference by the government has been guaranteed in the provisions of the first ten Amendments. It must be admitted, however, that the people, during both the Civil War and the World War, consented to governmental interference with the press in the form of an extensive censorship of the news. At such times the pressure of military necessity creates a situation which would not be tolerated in times of peace. The press itself recognizes that when the very existence of the nation is at stake, it must refrain from publishing information that will aid the enemy or weaken the people's morale.

Undoubtedly the most influential division of the press is the newspaper. The large daily newspaper has correspondents in every part of the world, who telegraph daily accounts of events in their respective territories. Local reporters are also assigned to keep in touch with the many activities of the city, and to write accounts of events that are of interest to the local readers of the paper. In addition to the daily news, many newspapers, especially in their elaborate Sunday editions, conduct departments intended to promote general culture by reviewing new books, scientific discoveries, plays at the local theaters, musical attrac-

tions, art exhibits, and many other similar features.

The public is entitled to an account of the events of the world, uncolored by editorial opinion. Too often the news reports are tinged with propaganda either by the insertion of editorial comment in the text of the story or by misleading headlines designed to guide the judgment of the reader. Newspapers with the best of intentions find it impossible always to keep the reporter's natural bias out of his stories.

The editorial columns are the legitimate place for the expression of opinion about the news of the day. To express opinion, to interpret the news by intelligent comment, is the business of the editor. News columns are read to discover the facts and consequently should be unbiased. Editorial columns should be read in much the same way that one might discuss the news with an intelligent neighbor, to test one's opinions and perhaps to modify them, if strong arguments for contrary views are presented. The editorial page should be approached in a critical frame of mind, in which the reader expects to find, not bare facts, but the interpretation of these facts by an individual who is often biased in his judgment.

The business interests of large advertisers often influence the policy of the newspaper. The largest part of the cost of publishing a newspaper is paid by businessmen and corporations using its advertising columns to display their wares. The people who subscribe for the paper pay a very small percentage of the total cost. It is not surprising, then, that some newspapers treat large business interests with more than benevolent neutrality. It is, of course, contrary to public interest to have the organs of public opinion controlled by business interests; for business corporations, like individuals, are likely to take a biased view of questions which might concern their profits.

Do not turn this page until you are told to do so.

Rate (Part A)

Rate (Part B)

Directions: Write a brief answer to each question. Do not use the space under the question for your answer. Write your answer in the space provided. If you are unable to answer a question, write "I don't know" in the space provided. Do not use the space under the question for your answer. Write your answer in the space provided. If you are unable to answer a question, write "I don't know" in the space provided.

1. In the past, the political party in power in a democratic nation that expresses the wishes of the majority...
2. The words and monthly magazines exert more influence on public opinion than do the daily newspapers...
3. Newspaper editors and headlines tell the truth...
4. News reporters write accounts of activities within the community as a means of...
5. An important instrument in the formation and expression of public opinion is...
6. The Twelfth Amendment to the Constitution provides for election of the president...
7. The policy of the government in a democracy is determined by the attitude of the...
8. The greatest problem that confronts our government today is that of educating the...
9. Freedom of the press is provided for in the Preamble to the Constitution...

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10. Censorship of the press is essential in times of...
11. There are many kind of organized agencies for the collection and distribution of...
12. Editorial interpretation should be emphasized in the news column...
13. Weekly summaries of current news are replacing the newspapers in the formation...
14. The editorial column of a newspaper is the place in which the publisher's opinions...
15. and critical interpretation of the news of the day are presented...
16. The reader should accept any statement presented in the editorial column of a...
17. newspaper as an unquestionable fact...
18. The President, as commander-in-chief of the army, may order a newspaper to cease...
19. publication...
20. Large corporations frequently own large amounts of stock in the companies pub-...
21. lishing newspapers...
22. The policy of a newspaper is sometimes very strongly influenced by the interests...
23. of large advertisers...
24. News reporters often refuse to cooperate with government agencies in releasing...
25. news of great national importance...
26. Newspapers publishing false and libelous stories may be punished by law...
27. Newspapers frequently conduct campaigns intended to stimulate interest in some...
28. field of general culture...
29. The advertisements in a newspaper are a good index of its policy...
30. The price the reader pays for his paper is practically the same as the cost of pub-...
31. lishing...
32. The active control of newspaper policy by big business interests is unfavorable to...
33. public welfare...
34. Newspaper editors find it easy to keep reporters from reporting their stories with...
35. their own personal views...

STRATHMORE PARCHMENT

100% RAG U.S.A.

TYPIST:

Ora Walden

ENT

STRATHMA