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Comparisons of the factors related to oral and written recall

Elliott, Vera Wise

Boston University

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Boston University
PROBLEMS CONFRONTED AND METHODS USED BY CITIZEN COMMISSION INTERESTED IN EDUC...
Boston University
School of Education

Thesis

COMPARISONS OF THE FACTORS
RELATED TO ORAL AND WRITTEN RECALL

Submitted by
Vera Wise Elliott
(A.B. in Educ., San Francisco State College, 1935)

In Partial Fulfillment of the Requirements for the
Degree of Master of Education
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First Reader: Donald D. Durrell, Professor of Education
Second Reader: Edward J. Eaton, Professor of Education
Third Reader: W. Linwood Chase, Professor of Education
Acknowledgments

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CHAPTER I

INTRODUCTION AND THE PROBLEM

Introduction:

Today, leaders in American Education are searching for ways of teaching the higher thought processes to school children. Beginning in the elementary grades, the quest is to stimulate the abilities to analyze, make selections, generalize, outline, organize, do additive and creative thinking. In short, to make the teaching of how to think an actual part of the school curriculum.

The ability to recall past experiences, as a phase of memory, is a crucial aspect of the processes involved in thinking. This study on "Comparisons of the Factors Related to Oral and Written Recall" seeks to augment the research being carried on in this modern approach to the development of the human mind.

The new emphasis on teaching the higher mental processes traces to the analysis, in 1910, by John Dewey\(^1\) of five major steps in thinking. Educators have made great use of his five steps on how to think, namely (1) feel a need to do something; (2) understand the possibilities of the problem; (3) see alternative ways of accomplishment; (4) develop inferences; (5) obtain verification through observation.

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\(^1\)Dewey, John, How We Think, D. C. Heath and Company, Boston, 1910, pp. 68-78.
Percival M. Symonds\textsuperscript{2}, in 1936, analyzed the stages of thinking in seven operations. The first of these operations he classified as Fundamental Psychological Processes. Under this heading he placed recall as a stage of memory. Emphasizing the importance of recall, he wrote\textsuperscript{3}, "The process of recall is one that comes in again and again in a consideration of the higher thought processes. Much thinking depends on ability to recall promising associations at strategic points in the solution of a problem." In his chapter on "What Education Can Do to Improve Thinking," he stated\textsuperscript{4} that the language skills and study are of great importance in effective thinking. "First of these is the ability to read. This ability to get meaning from the printed page is crucial in the whole art of thinking." Comprehension and recall are interpreted as part of the ability to obtain meaning from reading.

"Some psychologists who have studied the effect of recall estimate that as much as three-fourths of a student's time in study should be spent upon recall," wrote Ernest Horn.\textsuperscript{5}

\begin{flushleft}

\textsuperscript{3}Symonds, op. cit., p. 185.

\textsuperscript{4}Symonds, op. cit., p. 230.

\end{flushleft}
The importance of recall in reading was further emphasized by Germane and Germane\(^6\): "It is the ability to retain and recall the main points of material read which make the acquisition and application of knowledge possible. Time and effort spent in developing skill in rapid reading and in organization are wasted unless the essential ideas are retained."

The purpose of this thesis is to find out the importance of mental age, spelling, speed of handwriting, reading capacity and reading achievement to oral and written recall, and to note the comparisons between major and minor ideas remembered and the number of items expressed in the first and last parts of paragraphs read. The assumption was that if high correlations were found between these factors and ability or fluency of oral and written recall, then emphasis should be placed upon the particular skills, subjects or abilities which contribute most to developing recall as a part of memory and thinking.

This study continues the research of Margaret E. Bucknam\(^7\) in her thesis, "Comparison of the Fluency of Unaided Oral Recall with Written Recall in Silent Reading in Geography in


\(^7\)Bucknam, Margaret E., "Comparison of the Fluency of Oral Recall with Written Recall in Silent Reading in Geography in Grade Five", Unpublished Ed.M. Thesis, Boston University, Boston, 1941.
Grade Five. All the testing material used is the exact data compiled by Miss Bucknam. From this material the following additional comparisons have been ascertained.

**The Problem**

The purposes of this study are:

1. To indicate the reliability of
   
   (a) Oral Recall
   (b) Written Recall

2. To determine what relationships, if any, exist between the following:

   (a) Oral and Written Recall
   (b) Mental Age and Oral Recall
   (c) Mental Age and Written Recall
   (d) Speed of Handwriting and Written Recall
   (e) Spelling and Written Recall
   (f) Reading Capacity and Oral Recall
   (g) Reading Capacity and Written Recall
   (h) Reading Achievement and Oral Recall
   (i) Reading Achievement and Written Recall

3. To note the comparisons between:

   (a) The percent of major ideas and the percent of minor ideas expressed in Oral Recall.

   (b) The percent of major ideas and the percent of minor ideas expressed in Written Recall.

   (c) The number of items remembered in the first parts of selections and those of last parts of selections in Oral Recall.

   (d) The number of items remembered in the first parts of selections and those in last parts of selections in Written Recall.
CHAPTER II
PREVIOUS RESEARCH

In 1920, A. W. Kallom\(^1\) conducted a study testing the ability of children to recall in grades four to eight after a single reading of paragraphs containing one hundred to one hundred and fifty words. He concluded, "This interpretation of words, phrases, sentences and paragraphs depends on at least two things: (a) the pupil's experience; (b) his ability to recall experiences and to apply it to the case at hand."

Grover H. Alderman\(^2\) made an experiment in Indiana using three types of exercises. They were vocabulary, organization and retention. Three thousand two hundred one pupils from grades four through eight were tested. This study was conducted over a two-year period. Alderman proved that comprehension ability as measured by the Thorndike-McCall Reading Scale may be improved to a degree equivalent to two semesters by careful systematic drill work, covering a period of one semester provided thirty minutes each day are devoted to the work. At the conclusion of his study he made this statement: "The ability to comprehend what is read is of little value unless one has the ability to retain and reproduce the important thoughts when the occasion demands."


From "Reading as Reasoning: A Study of Mistakes in Paragraph Reading," Dr. Edward L. Thorndike made this summation:

It appears likely that many children fail in certain features of these (school) subjects not because they have understood and remembered the facts and principles but have been unable to organize and use them; or because they have understood them but have been unable to remember them; but because they never understood them.

It appears likely also that a pupil may read fluently and feel that the series of words are arousing appropriate thoughts without really understanding the paragraph. Many of the children who made notable mistakes probably would have said that they understood the paragraph and upon reading the questions on the paragraph would have said that they understood them. In such cases the reader finds satisfying solutions to those problems which he does raise and so feels mentally adequate; but he raises only a few of the judgments which he should make.

In 1940, Roma Gans wrote in her doctorate dissertation, "This study investigates the ability of fourth, fifth, and sixth grade children to read critically from a variety of content; and attempts to discover the degree to which this reference reading ability is related to comprehension as measured by a selected group of reading tests. The scores of four hundred seventeen pupils in two New York City schools were analyzed." She discovered that pupils were not able to read

3 Thorndike, Edward L., "Reading as Reasoning: A Study of Mistakes in Paragraph Reading," Journal of Educational Psychology, 8; 323-32, June 1917.

critically unfamiliar material.

Miles Tinker\(^5\) stated in his conclusion, "Further analysis justifies the conclusion that there are many reading skills which are somewhat independent, rather than either a general silent reading ability, a general comprehension or a general speed of reading ability."

Jean Betzner\(^6\) made a study of written reproductions compared to oral reproductions. She found that children did as well, if not better, on the written part, if the material was easy. She also learned that pupils from the third to sixth grade showed an increase in ability in both written and oral recall. Between oral recall and general intelligence she found statistically significant correlation.

Ruth Potter\(^7\) substantiated the Betzner study in her thesis, finding that oral recall is better in difficult material. She also found that as the grades ascend there is less and less difference between oral and written recall.

In the Leavell and Sterling study,\(^8\) "Comparison of Basic Factors in Reading Patterns and Intelligence," they stated, "When the Kuhlmann-Anderson test was given as a measure of intelligence, there seemed to be significant differences in the median score of the superior intelligent group and the average group in only rate and comprehension."

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\(^6\)Betzner, Jean, Content and Form of Children's Original Compositions, Teachers College, Columbia University, New York. (Contribution to Education No. 442), 1932.


Dr. Erzsebet I. Baranyai⁹ wrote that, "In the performance of reading, intellectual and mechanical factors take part in proportion of 60:40."

Correlation of .45 ± .08 was found between reading and mental age at the Fifth Grade Level by Sister Fridiana¹⁰ in her study, "Achievement in Silent Reading in an Elementary School."

In the experiment carried on by A. I. Gates¹¹ in the Scarsborough, N. Y. schools, the correlation between reading and mental age was stated to become higher as the grades ascend.

Nellie L. Peake made an interesting study, "Relation Between Spelling Ability and Reading Ability," in which she concluded:

There is a tendency for high scores in spelling to accompany high scores in word meaning. The relatively high correlation between test scores and reading in most of the Grades Four to Eight examined is evident that abilities in these two subjects tend to accompany each other. The coefficient of correlation for the group as a whole is .814.

Reading in this study refers only to vocabulary knowledge and word meaning.

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⁹ Baranyai, Erzsebet I., "Relation of Comprehension to Technique in Reading," Pedagogical Seminary and Journal of Genetic Psychology, 59:3-26, September 1941.


The problem in Bernadetta Carter's thesis was to determine whether tests of visual perception, auditory discrimination and speed of handwriting could be used to diagnose inadequate spelling performance at the middle grade level. In her conclusions she wrote, "Speed of handwriting is not significant as a determining factor in spelling achievement. Auditory and visual factors are most important in discriminating between the very poor and the very good spellers."

In "The Fluency of Oral Expression" written by Katherine Torrant, unaided oral recall and recall as measured by multiple choice questions were compared. She found an average difference of eleven ideas in favor of the multiple choice test. "A correlation .49 was found between rate of recall and number of ideas recalled."

Douglas Courtney conducted an experimental study in 1941 in which he compared "two different measures in the measurement of reading comprehension." The measures were recall by reproduction (essay examinations) and recall by recognition (multiple choice questions). He tested forty-six pupils in his preliminary

---


test and seventy-two in his major study. All the pupils tested were Ninth graders. He found both measures highly reliable. About half as much material was recalled on the essay test as on the multiple choice test. His summary data indicated "zero measures and equal positive correlation between mental age and both measures."

In June 1934, three hundred eighty pupils in the middle grades were examined by Allan Acomb\textsuperscript{16} to determine the following psychological factors in reading and spelling:

1. Visual memory of word pattern.
2. Auditory recognition of words pronounced.
3. Speed of handwriting from copy.
4. Written recall from silent reading.
5. Fluency of written recall from silent reading.

Among Acomb's conclusions these are pertinent to this thesis:

Speed of handwriting is apparently an insignificant factor in the number of ideas and the amount of written recall recorded after silent reading.

With the advancement in grades the factors of mental age and written recall of ideas comprehended from silent reading become more closely related.

Spelling ability is definitely a limiting factor in the number of ideas recalled in writing and the amount of written recall after silent reading.

Reading ability is definitely a limiting factor in the number of ideas recalled in writing and the amount of written recall after silent reading.

The amount of written recall after silent reading is directly dependent upon the number of ideas comprehended during the silent reading.

Mental age is an extremely significant factor in determining reading and spelling ability as measured by grade achievement.

In Margaret E. Bucknam's\textsuperscript{17} thesis, her problem is stated as follows:

The purpose of this study is to compare the fluency of unaided oral recall with unaided written recall in silent reading, in geography, in Grade Five. It includes recall from different selections on the same level as measured by multiple choice questions constructed on the same material.

From her experiment Miss Bucknam arrived at these conclusions:

1. Unaided oral recall was superior to written recall. The difference of .64 memories was significant.

2. The difference between oral and written recall was greater for short than for long selections.

3. Recall on multiple choice questions was much superior to unaided oral recall.

4. The difference between multiple choice and oral recall was greater for long than for short selections.

5. Recall on multiple choice questions was much superior to unaided written recall.

6. The difference between multiple choice and written recall was greater for long than for short selections.

Parts from all these studies are related to some phase of this thesis. It is upon such a foundation of research that the author constructs this experiment.

\textsuperscript{17}Bucknam, Margaret E., "Comparison of the Fluency of Oral Recall with Written Recall in Silent Reading in Geography in Grade Five," Unpublished Ed.M. Thesis, Boston University, Boston, 1941.
CHAPTER III

PLAN AND CONDUCT OF THE EXPERIMENT

Plan:

In gathering the data on factors related to oral and written recall, the following experiment was conducted in three fifth grades of two schools in one city. These rooms contained one hundred and twenty-two pupils.

Conduct:

1. Selection of Material Use in the Study

Four selections of about one hundred and thirty words of equal difficulty and two selections of about three hundred and thirty words of equal difficulty were used in pairs in this study. The selections were chosen from a supplementary geography text and a supplementary geography reader and presented material unknown to the pupils. Although some of these selections were somewhat revised to the present purpose, they were originally taken from the following sources:

All the figures found in this chapter and the following discussion of the conduct of the experiment, up through Topic Number 9 on Test Procedure, are taken verbatim from—Bucknam, Margaret E., "Comparison of the Fluency of Oral Recall with Written Recall in Silent Reading in Geography in Grade Five." Unpublished Ed.M. Thesis, Boston University, Boston, pp. 8-28. (1941).
(a) Selections A and B


(b) Selections C, D, E, and F

Brannon, Frederick K., and Ganey, Helen M., Geography of North and South America, William H. Sadler, 1930.

In preparation for the decision to use these particular selections, five different geography texts and twelve different supplementary readers were consulted. The selections were paired as nearly as possible by considering the number of ideas and the kind of material presented in each. The reading vocabulary was within the reading range of the pupils and the subject matter was of interest to children of the grade. The selections have been lettered so that they might be conveniently referred to in this study. All material used in this experiment was mimeographed.

A list of ideas was prepared for each of the short selections. These lists included all of the ideas present in the paragraphs. Selections A and B included twenty-three ideas while selections C and D included twenty-four ideas. Pages 14 and 15 present one of the short selections and a list of ideas. A list of thirty ideas was prepared for each of the longer selections. Pages 16, 17 and 18 present one of the longer selections and a list of ideas. These lists were constructed in order to check each pupil's oral and written
The Cacao Tree

Chocolate and Cocoa come from the seeds of the cacao tree. This tree grows in tropical regions as it must have plenty of warmth and moisture. The cacao tree usually grows in the shade of other trees. Each pod has from 25 to 50 seeds. When the pods turn yellow or a reddish color, the natives know they are ready to be picked. The pods are cut from the trees by sharp knives fastened to long poles. The pods are dried for about a day, then the seeds are removed. The seeds are the size of an almond. They are put on large cement floors and are thoroughly dried before they are shipped to market. America buys much of its cacao from South America.
The Cacao Tree

1. Chocolate and coco-
2. come from the seed of the cacao tree
3. This tree grows wild in the tropical regions
4. as it must have plenty of warmth and moisture
5. The cacao trees usually grow in the shade
6. of other trees
7. Pods
8. which resemble cucumbers form on the tree
9. Each pod has from 25 to 50 seeds
10. When the pods turn a yellow or reddish color
11. the natives know
12. they are ready to be picked
13. The pods are cut from the trees
14. by sharp knives
15. fastened to long poles
16. The pods are dried
17. for about a day
18. then the seeds are removed
19. The seeds are the size of an almond
20. They are put on large cement floors
21. and are thoroughly dried
22. before they are shipped to market
23. America buys much of its cacao
24. from South America.
Coffee Land

The southeastern part of the Brazilian Highlands in South America is called "Coffee Land." Three-fourths of all the world's coffee is raised here, and coffee has brought much wealth to the people. There are miles and miles of coffee plantations where millions of coffee trees cover the hillsides. One reason why so much coffee is raised in this part of the Brazilian Highlands is that the climate and soil are just right for the best growth of the coffee plant. Another is that coffee-growing made an early start here, and as yet no other part of the world has caught up with Brazil in coffee production.

Coffee is raised on evergreen trees which are usually obtained by planting seeds. In many places the trees are only allowed to grow about six or eight feet high so that the berries may be easily picked. Harvest season on the Brazilian coffee plantation begins in May and lasts until October. During that season you will see the plantation workers gathering the ripe, red berries from the trees. A common way of picking berries is to pull them off and let them fall on large sheets which are spread under the trees.

The berries look somewhat like red cherries and each contains two seeds, or "beans", buried in soft pulp. After the berries have been picked, there are several ways of preparing the coffee
for market. One way is to spread the berries out on drying floors to dry in the sun. This takes two or three weeks, and from time to time the berries are stirred with rakes so that they will dry evenly. After drying, the berries are put through machines which remove the dried skin and pulp and clean and polish the beans. When the beans are finally ready to be sold, they are packed in large bags and sent for export. One-half of all the coffee which is shipped from Brazil is sent to the United States.
1. The southeastern part of the Brazilian Highlands
2. in South America
3. is called "Coffee Land"
4. three fourths of all the world's coffee is raised here
5. coffee has brought much wealth to the people
6. there are miles and miles of coffee plantations
7. where trees cover the hillsides
8. the climate and soil are just right for the best growth
9. coffee-growing made an early start here
10. no other part of the world has caught up with Brazil
11. coffee is raised on evergreen trees
12. which are usually obtained from planting seeds
13. the trees are allowed to grow about six or eight feet high
14. so that the berries may be picked easily
15. harvest season begins in May and lasts until October
16. plantation workers gather ripe, red berries from the trees
17. one way of picking them is to pull them off
18. and let them fall on large sheets which are spread under the trees
19. the berries look somewhat like red cherries
20. and each one contains two seeds or "beans"
21. buried in soft pulp
22. there are many ways of preparing coffee for market
23. one way is to spread the berries on drying floors in the sun
24. this takes two or three weeks
25. the berries are stirred with rakes so they will dry evenly
26. machines remove the skin and pulp
27. and clean and polish the beans
28. the beans are packed in bags for export
29. one half of all the coffee from Brazil
30. is sent to the United States
recall.

2. Subjects of the Study

The subjects of this study were one hundred and twenty-two fifth grade pupils from three different classrooms in two schools located in Somerville, Mass. Some members of the group come from poor homes while others came from homes in moderate circumstances. Many of these children have parents who were born in foreign countries. The following birthplaces were recorded: 24 from Italy; 19 from Canada; 14 from Ireland; 9 from Scotland; 6 from Greece; 4 from Portugal; 2 each from Syria, Armenia and England; and 1 each from Hungary, Newfoundland, Sweden, Belgium, Poland, the Azores and Madeira.

3. Chronological Age Distribution of the Subjects

Figure 1, Page 20, shows the chronological age distribution of the one hundred and twenty-two pupils. The range was from nine years, eight months to fourteen years, four months, a total difference of four years and eight months with a mean of ten years, nine months as calculated February 12, 1941. This group was below normal according to chronological age.

4. Mental Age Distribution of the Subjects

Figure 1, Page 20, shows the mental age distribution of this group of fifth grade children. The mental ages of these pupils were obtained by the average of the results from the Otis Quick-Scoring Mental Ability Test,¹ and from the

¹Otis, Arthur S., Otis Quick-Scoring Mental Ability Tests, Beta Test: Form A, for Grades 4-9, World Book Co., Yonkers-on-Hudson, N. Y.
FIGURE 1

Distribution of Chronological Ages of 122 Fifth Grade Pupils

Mean = 10 yrs 9 mos.

Distribution of Mental Ages of 122 Fifth Grade Pupils

Mean = 11 yrs 2 mos.

Measured by Kuhlmann-Anderson and Otis Mental Ability Tests
Kuhlmann-Anderson Tests for Grade Five which were administered. The range was from eight years, seven months to fourteen years, ten months with a mean of eleven years, two months. This group was below average mentally.

5. Reading grades of the Subjects

Figure 2, Page 22, shows the distribution of the reading grades of the pupils as measured by the Durrell-Sullivan Reading Capacity and Achievement Tests. The reading capacity grade equivalent ranged from that of pupils just entering the fourth grade to seven months through the ninth grade with a mean of twelve years, two months. The age equivalent ranged from nine years, four months to fifteen years, a total of five years and eight months in reading capacity. The reading achievement grade equivalent ranged from that of pupils four months through the third grade to two months through the ninth grade, with a mean of eleven years, four months. The age equivalent ranged from eight years, eight months to fourteen years, seven months. The achievement ages of this group about equalled the mental ages while the capacity ages were above those of the achievement ages.

6. Spelling Grades

Figure 3, Page 24, shows the distribution of spelling
FIGURE 2

Mean = 12 yrs. 2 mos.

Distribution of Reading Grades of 122 Fifth Grade Pupils

Measured by Durrell-Sullivan Reading Capacity Tests

Mean = 11 yrs. 4 mos.

Distribution of Reading Grades of 122 Fifth Grade Pupils

Measured by Durrell-Sullivan Reading Achievement Tests
grades of this group as measured by the New Stanford Achievement Test, Form X. The spelling grade ranged from one month through the third grade to five months through the seventh grade with a mean of eleven years, six months. This group is below average with spelling grades ranging from eight years, seven months to thirteen years, three months.

7. Handwriting Comparison

The subjects of this study were given a handwriting test. The speed of handwriting was obtained by the writing of a nursery rhyme for one minute. The number of letters written per minute was recorded. There were thirteen pupils who were below age in handwriting speed and one hundred nine whose handwriting speed equalled that of their ages and above according to a table quoted by Durrell. The quality was measured by Freeman's "Handwriting Measuring Scale for Grade Five". The handwriting of forty-six pupils was graded as satisfactory, forty as good, thirty-six as poor.

8. The Equating of the Subjects into Groups

The one hundred and twenty-two pupils were divided into two equal groups, I and II, based on the results of the above tests. Pages 25 and 26 include the complete scores of the two groups.

4New Stanford Achievement Test, Form X.

5Durrell, Donald D., Improvement of Basic Reading Abilities Yonkers-on-Hudson, N. Y.: World Book Co., 1940.

6Freeman, Frank, Handwriting Measuring Scale for Grade Five, Columbus, Ohio: Zaner-Bloser Co.
FIGURE 3

Mean = 11 yrs. 6 mos.

Distribution of Spelling Grades of 122 Fifth Grade Pupils

Measured by New Stanford Achievement Test
<table>
<thead>
<tr>
<th>No. of Pupils</th>
<th>Reading Achievement</th>
<th>Reading Capacity</th>
<th>Spelling Score</th>
<th>Speed of Handwriting</th>
<th>Mental Age</th>
<th>No. of Pupils</th>
<th>Reading Achievement</th>
<th>Reading Capacity</th>
<th>Spelling Score</th>
<th>Speed of Handwriting</th>
<th>Mental Age</th>
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The reason for equating the groups in this manner is stated by Mary Kelty⁷ who wrote: "The average grade contains children with a range of five grades in a given ability. The material must be capable of treatment at different levels." Gray⁸ says: "There are four important facts concerning individual differences: (1) Children of a given age vary widely in achievement; (2) There is a great overlapping in achievement from grade to grade; (3) A given pupil is much more advanced in some phases of reading than in others; (4) Pupils progress in reading at different rates.

9. Test Procedure

Selection A was given to Group I as silent reading with written recall and to Group II as silent reading with oral recall. Selection B was given to group I as silent reading with oral recall and to group II as silent reading with written recall. All selections were presented in pairs in a similar manner in order to compare oral and written recall on the same material.


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<tr>
<th>Selections</th>
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<td><strong>Longer Selections</strong></td>
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<td>E</td>
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<td>F</td>
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All the written recall was given as a group test. Each child was given a printed selection face down, and told, "When I say 'Go', turn the paper over, read the story once with the idea that you will remember what you have read, then place the paper on your desk again face down." The selections were collected and blank sheets of paper were passed out. The pupils were then told, "Write as much as you can remember of the story. If there are any words which are hard to spell, spell them as best you can by sounding the letters in the word." When the pupils had finished writing, the papers were collected. The written recall was checked against a list of ideas from the selection all of which appeared in the test items. This was done by numbering the ideas on each pupil's paper in the order in which the recall was written. Page 27 presents a checked sample of written recall. The pupils were given as much time as they needed for reading the selection, and writing the
1. Night flying
2. Over air-mail routes
3. Done at night
4. There are lights all the way
5. Every few miles
6. There is a special kind of gas lantern
7. Whose light comes on
8. Whenever the sun stops shining
9. It is shut off
10. Whenever the sun comes out
11. There are many small fields
12. Where pilots can make a landing
13. In bad storms
14. If anything goes wrong with the machine
15. The regular landing fields
16. Are 250 miles apart
17. They have houses, post offices, repair shops, supplies
18. Extra airplanes and pilots
19. In case they are needed
20. These airports have very powerful beacons
21. Whose light can be seen 150 miles away
22. A pilot is never out of sight
23. Of one of these main landing fields
recall. These same directions were given for all written recall.

The oral recall tests were given individually, the child reading silently and repeating all that he remembered to the examiner. The oral recall was given in the classroom and the manner in which it was administered may have had some effect upon the score. In each case, however, the pupil taking the test could not be heard by his classmates. He was seated at a table apart from the other pupils. The child was given the selection and told, "Read this story to yourself once and when you finish, return the paper to me." When he had returned the paper, the examiner said, "Tell me all you can remember about the story." Each recall was checked against a previously prepared list of ideas or events in the selection. This was done by numbering the ideas on each pupil's paper as he recalled. The same directions were given for all oral recall.

The following two procedures were not included in Margaret E. Bucknam's study:

10. Percent of Major and Minor Ideas Recalled

Fifty major ideas were selected from the six reading selections at the discretion of the author and with the approval of Dr. Donald D. Durrell, dean of the School of Education of Boston University. Twenty-five of the ideas chosen were from selections A, C, and E and the other twenty-five were from selections B, D, and F. By these two groupings of
the selections the number of recalled major ideas could be counted and each pupil's percent was computed for oral and written recall separately. The minor ideas were computed in the same manner, except fifty-two recalled minor ideas were used as 100% for each grouping of the two types of recall. Pages 32-37 shows a check list of the ideas of all six selections with the major ideas underlined. This process made it possible to use the percents of remembered major and minor ideas in both oral and written recall.

11. The Number of Items in Parts of Selections

The items of selections C, D, E, F were divided in half, the first part of selection C having twelve items and the second part having twelve; selection D having twelve and twelve; selection E having fifteen and fifteen; selection F having fifteen and fifteen. Selections A and B had twenty-three items. In order to divide them evenly, in Group I these selections were given eleven items in the first part of the selections, while in Group II they were given twelve items in the first part. Then the items remembered in oral and written recall were tabulated separately, according to the part of the selections in which they occurred.
1. This flying
2. over air-mail routes
3. is done at night
4. there are lights all the way
5. every few miles
6. there is a special kind of gas lantern
7. whose light comes on
8. whenever the sun stops shining
9. it is shut off
10. whenever the sun comes out
11. there are many small fields
12. where pilots can make a landing
13. in bad storms
14. if anything goes wrong with the machine
15. the regular landing fields
16. are 250 miles apart
17. they have houses, post offices, repair shops, supplies
18. extra airplanes and pilots
19. in case they are needed
20. these airports have very powerful beacons
21. whose light can be seen 100 miles away
22. a pilot is never out of sight
23. of one of these main landing fields
1. In days when there were no engines
2. that could be used in airplanes
3. all experiments
4. were made with the sort of airplane
5. that today is called a glider
6. Men made planes:
7. shaped as nearly as possible like wings of birds
8. They discovered how to start off into the air
9. by running down a hill
10. with these planes fastened to their waists
11. the wind lifted them
12. off the ground
13. they found out how to balance themselves
14. in the air
15. while they glided a short distance
16. The farther they glided
17. the slower they went
18. they landed on ground lower than the hill
19. on which they started
20. A German
21. is said to have made a flight of 105 miles
22. in our day
23. men are again studying gliders
The Cacao Tree

1. Chocolate and cocoa come from the seed of the cacao tree.
2. This tree grows wild in the tropical regions.
3. As it must have plenty of warmth and moisture.
4. The cacao trees usually grow in the shade of other trees.
5. Pods which resemble cucumbers form on the tree.
6. Each pod has from 25 to 50 seeds.
7. When the pods turn a yellow or reddish color, the natives know.
8. They are ready to be picked.
9. The pods are cut from the trees.
10. By sharp knives.
11. Fastened to long poles.
12. The pods are dried.
13. For about a day.
14. Then the seeds are removed.
15. The seeds are the size of an almond.
16. They are put on large cement floors.
17. And are thoroughly dried.
18. Before they are shipped to market.
19. America buys much of its cacao from South America.
Rice

(Ideas)

1. The chief rice growing section of our country
2. is the coastal lowlands of Texas and Louisiana
3. Rice needs a large amount of water
4. when it is growing
5. if there is not enough rainfall
6. irrigation is used
7. The land is drained and flooded
8. again and again during the summer
9. About six inches of water
10. are kept over the fields
11. for six months or more
12. As the rice begins to ripen
13. the water is drawn off
14. so that the plants will ripen better
15. the fields will become dry
16. Rice is harvested
17. by machines
18. put into bundles to dry
19. After threshing
20. the rice is sent to mills
21. where the brown coat is removed
22. becoming white rice
23. The U. S. exports rice to other countries
24. because we raise more than we need
where the bed remains constant until those part of the water that is the volume of the bed is expressed. Changes are made when the water changes. Changes are made.

Changes are made when the water changes. Changes are made.

Changes are made when the water changes. Changes are made.

Changes are made when the water changes. Changes are made.

Changes are made when the water changes. Changes are made.
1. The southeastern part of the Brazilian Highlands in South America is called "Coffee Land". Three fourths of all the world's coffee is raised here. Coffee has brought much wealth to the people. There are miles and miles of coffee plantations where trees cover the hillsides. The climate and soil are just right for the best growth. Coffee-growing made an early start here. No other part of the world has caught up with Brazil in coffee. Coffee is raised on evergreen trees, which are usually obtained from planting seeds. The trees are allowed to grow about six or eight feet high, so that the berries may be picked easily. Harvest season begins in May and lasts until October. Plantation workers gather ripe, red berries from the trees. One way of picking them is to pull them off, and let them fall on large sheets which are spread under the trees. The berries look somewhat like red cherries. And each one contains two seeds or "beans". Buried in soft pulp, there are many ways of preparing coffee for market. One way is to spread the berries on drying floors in the sun. This takes two or three weeks. The berries are stirred with rakes so they will dry evenly. Machines remove the skin and pulp, and clean and polish the beans. The beans are packed in bags for export. One half of all the coffee from Brazil is sent to the United States.
The rubber tree grows wild in the Amazon Lowlands.

Rubber is the only important export of the region.

Men who gather the rubber are Indians and mestizos who live in little huts in the forest.

When the rubber-gatherer starts out for work in the morning,

he carries a small hatchet and a supply of tin cups.

He follows a narrow path through the forest from tree to tree.

He cuts several grooves in the bark of each tree.

and hangs a cup at the lower end of each groove.

The white juice which looks somewhat like cream begins to ooze out of the tree.

and drips slowly into the cup.

This juice is called "latex".

By noon the rubber-gatherer has "tapped" all the trees.

In the afternoon he starts out again carrying a large bucket.

He pours the latex from the tin cups into the bucket.

He builds a fire of sticks and palm nuts near his hut.

Over the blaze he places a metal cone.

With the small end up so that the smoke will pass through it.

On each end of the fire is a post with a forked end.

A pole rests between the forks so that it can be turned over.

The rubber-gatherer pours the latex on the pole above the smoke.

Turning the pole as he does so.

The heat and smoke harden the latex.

When a large ball of hardened rubber has been formed.

It is pulled off and a new one started.

The work of gathering rubber and hardening it into balls goes on in the forest from November until May.

By the end of the rubber-gathering season.

A large number of balls are ready for market.
CHAPTER IV

ANALYSIS OF THE DATA

After the data had been obtained for this experiment, eleven correlations were computed. For these computations the Pearson Product Moment Method was used.

It was necessary to lengthen both the oral and written recall tests in finding their accurate reliabilities. The short selections were compared with the long selections within each test. For this reason, the Spearman Brown "Prophecy" Formula was applied to make each test complete.

A complete table assembling the resulting coefficients of correlation of the factors related to oral and written recall that were analyzed in this study may be found on the following page. (Table I)

In addition, four comparisons were made. Parts of selections having the greater number of items remembered and the percents of major and minor ideas recalled were analyzed in both oral and written recall. The critical ratio method was employed to make these comparisons.

The correlations and the comparisons throughout this thesis would be higher if the experiment had not been limited to pupils of only one grade.
Table I

Summary of the Coefficients of Correlations of the Factors Related to Oral and Written Recall

<table>
<thead>
<tr>
<th>Other Factors</th>
<th>Oral Recall</th>
<th>Written Recall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental Age</td>
<td>.57</td>
<td>.55</td>
</tr>
<tr>
<td>Speed of Handwriting</td>
<td>.15</td>
<td></td>
</tr>
<tr>
<td>Spelling</td>
<td>.28</td>
<td></td>
</tr>
<tr>
<td>Reading Capacity</td>
<td>.58</td>
<td>.52</td>
</tr>
<tr>
<td>Reading Achievement</td>
<td>.59</td>
<td>.86</td>
</tr>
</tbody>
</table>
### Correlation Table and Computations

**Relation of Oral Recall and Written Recall**

#### X Scale Represents Items of Oral Recall

<table>
<thead>
<tr>
<th></th>
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<td>4</td>
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</table>

#### Y Scale Represents Items of Written Recall

<table>
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<tr>
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<th>15</th>
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<td>15</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

#### Computations

\[ r = \frac{\sum xy}{N} - \frac{C_x C_y}{S.D_x \times S.D_y} = 0.95 \]

\[ PE = 0.95 - 0.945 = 0.005 \]

\[ r = \frac{0.005}{\sqrt{N}} = 0.0317 \]

---

**Notes:**
- Correlation coefficients and their significance are calculated.
- The table and computations are used to determine the relationship between oral and written recall items.
Reliability of Oral Recall

\[ r = 0.665 \pm 0.0342 \]

The high positive correlation proves that the test items in oral recall were quite satisfactory for survey use. They gave consistent results that could be depended upon.

Reliability of Written Recall

\[ r = 0.67 \pm 0.0338 \]

This high positive correlation of 0.67 shows that the test material used in written recall was adaptable and consistent.

Relation of Oral and Written Recall

\[ r = 0.695 \pm 0.317 \]

A high positive correlation of 0.695 is statistically significant. These two types of recall, oral and written, accompany each other rather generally.

Relation of Mental Age and Oral Recall

\[ r = 0.57 \pm 0.0428 \]

The decided correlation of 0.57 makes it evident that these factors are favorably related. This relationship further
SCATTER DIAGRAM

Speed of Handwriting vs. Written Recall

X Scale Represents Letters written per Minute

<table>
<thead>
<tr>
<th>X Scale</th>
<th>75-79</th>
<th>80-84</th>
<th>85-89</th>
<th>90-94</th>
<th>95-99</th>
<th>100-104</th>
<th>105-109</th>
<th>110-114</th>
<th>115-119</th>
<th>120-124</th>
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<tbody>
<tr>
<td>Y Scale</td>
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<td>5</td>
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<tr>
<td>40-44</td>
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<td></td>
<td></td>
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<tr>
<td>35-39</td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>30-34</td>
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<td>25-29</td>
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<td></td>
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<td></td>
<td>19</td>
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<tr>
<td>15-19</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

f 3 5 2 9 16 13 12 22 15 5 6 4 7 2 1 122
substantiates the experiment of Jean Betzner\(^2\) in which she found a statistically significant correlation between oral recall and general intelligence.

Relation of Mental Age and Written Recall

\[ r = .546 \pm .0428 \]

The positive coefficient of correlation of .546 compares favorably with the correlation of .60 of these factors in grades five and six as computed in Allan Acomb's\(^2\) thesis.

Relation of Speed of Handwriting and Written Recall

\[ r = .145 \pm .089 \]

The .145 represents a low relationship between speed of handwriting and written recall. The correlation corresponds favorably to the low comparison of these factors in the Acomb\(^4\) study. Another interesting parallel that adds significance to this correlation is Bernadetta Carter's\(^5\) experiment in which she concluded, "Speed of handwriting is not significant as a determining factor in spelling."

\(^2\)Betzner, Jean, "Content and Form of Children's Original Compositions," Teachers College, Columbia University, New York, 1932, (Contribution to Education No. 442).


\(^4\)Acomb, op. cit., p.67.

Relation of Spelling and Written Recall

\[ r = .283 \pm .0564 \]

.283 is a low correlation compared to .38 for grades three and four and .57 for grades five and six found in Allan Acomb's\(^6\) study. The difference in these two findings seems to be caused by the fact that this study was conducted in only one grade and that the group tested for this thesis was below average in spelling.

Relation of Reading Capacity and Oral Recall

\[ r = .583 \pm .0405 \]

The comparison of these factors shows a favorable relationship. Reading capacity was interpreted, in this study, as meaning a pupil's potential reading ability. It is generally agreed that to comprehend and recall items or ideas from a printed page, one must first possess the ability to read the material. Frankly, the author anticipated an even higher correlation than .583.

Relation of Reading Capacity and Written Recall

\[ r = .516 \pm .045 \]

This marked correlation of .516 indicates that reading capacity may be considered a limiting factor in written recall.

\(^6\)Acomb, op. cit., p. 72
SCATTER DIAGRAM

Reading Achievement vs. Written Recall

X Scale Represents Reading Achievement

Y Scale Represents Items in Written Recall

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Number of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-39</td>
<td>1</td>
</tr>
<tr>
<td>40-49</td>
<td>2</td>
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<tr>
<td>50-59</td>
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<tr>
<td>60-69</td>
<td>12</td>
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<tr>
<td>70-79</td>
<td>24</td>
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<tr>
<td>80-89</td>
<td>17</td>
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<tr>
<td>90-99</td>
<td>31</td>
</tr>
<tr>
<td>100-109</td>
<td>21</td>
</tr>
<tr>
<td>110-119</td>
<td>6</td>
</tr>
<tr>
<td>120-129</td>
<td>2</td>
</tr>
</tbody>
</table>
Relation of Reading Achievement and Oral Recall

\[ r = .585 \pm .0403 \]

In this study reading achievement was interpreted as meaning the amount of knowledge of reading a pupil has achieved or acquired. This high correlation of .585 is very significant. It is evident that a pupil can recall more ideas if the material he reads is on his reading achievement level.

Relation of Reading Achievement and Written Recall

\[ r = .862 \pm .016 \]

This very high positive correlation of .862 between reading achievement and written recall definitely proves that a pupil's reading achievement level very closely parallels his ability in recording his remembered ideas.

Table II

Comparison of the Percents of Major Ideas and the Percents of Minor Ideas in Oral Recall

<table>
<thead>
<tr>
<th>No. of Pupils</th>
<th>( M )</th>
<th>P.E. ( M )</th>
<th>( M_1 - M_2 )</th>
<th>P.E. diff.</th>
<th>Critical Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percents of Major Ideas</td>
<td>122</td>
<td>58.06</td>
<td>.91</td>
<td>12.13</td>
<td>1.25</td>
</tr>
<tr>
<td>Percents of Minor Ideas</td>
<td>122</td>
<td>45.93</td>
<td>.86</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Percents of Major Ideas Reported in Oral Recall

<table>
<thead>
<tr>
<th>Percents (Score)</th>
<th>Tabulation of Cases</th>
<th>f</th>
<th>d</th>
<th>fd</th>
<th>fd^2</th>
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</thead>
<tbody>
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<td>9</td>
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<td>-9</td>
<td>-27</td>
<td>243</td>
</tr>
</tbody>
</table>

\[ N = 122 \quad \text{Sigma} = 15.08 \quad \text{Mean} = 58.065 \]

**Units in each Interval 4**
Table II gives a comparison of the percents of the total number of major ideas remembered and the percents of the total number of minor ideas remembered in the oral recall test. The difference of 12.13 between the means is evident that a greater percent of major ideas were recalled.

Table III
Comparison of the Percents of Major Ideas with the Percents of Minor Ideas in Written Recall

<table>
<thead>
<tr>
<th>Pupils</th>
<th>M</th>
<th>P.E. M</th>
<th>M1-M2</th>
<th>P.E.diff.</th>
<th>Critical Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percents of Major Ideas</td>
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<td>51.90</td>
<td>.78</td>
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<td>Percents of Minor Ideas</td>
<td>122</td>
<td>38.88</td>
<td>.84</td>
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</tbody>
</table>

Table III shows the comparison of the percents of the total number of major ideas recorded and the percents of the total number of minor ideas recorded in the written recall test.
<table>
<thead>
<tr>
<th>Number of Items</th>
<th>Tabulation of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-31</td>
<td>##</td>
</tr>
<tr>
<td>28-29</td>
<td>#</td>
</tr>
<tr>
<td>26-27</td>
<td>#/#/###/#</td>
</tr>
<tr>
<td>24-25</td>
<td>###/#/###/#</td>
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<td>22-23</td>
<td>#/###/###/###/###/###/#</td>
</tr>
<tr>
<td>20-21</td>
<td>#/###/###/###/###/#</td>
</tr>
<tr>
<td>18-19</td>
<td>#/###/###/###/###/###/###/###/###/###/###/###/###/###/###/#</td>
</tr>
<tr>
<td>16-17</td>
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</tr>
<tr>
<td>14-15</td>
<td>#/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/#</td>
</tr>
<tr>
<td>12-13</td>
<td>#/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/#</td>
</tr>
<tr>
<td>10-11</td>
<td>#/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/###/#</td>
</tr>
</tbody>
</table>
| 8-9             | #/#/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/#/###/
Table IV
Comparison of the Number of Items Remembered in First Parts of Selections with those in Last Parts of Selections in Oral Recall

<table>
<thead>
<tr>
<th>No. of Pupils</th>
<th>M</th>
<th>P.E. M</th>
<th>M1-M2</th>
<th>P.E. diff.</th>
<th>Critical Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Items from First Parts of Selections</td>
<td>122</td>
<td>20.39</td>
<td>.28</td>
<td>3.42</td>
<td>.46</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7.43</td>
</tr>
<tr>
<td>Items from Second Parts of Selections</td>
<td>122</td>
<td>16.97</td>
<td>.36</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table IV presents the fact that more items are remembered in the first part of the selections than in the second part.

Table V
Comparison of the Number of Items Remembered in First Parts of Selections with those in Last Parts of Selections in Written Recall

<table>
<thead>
<tr>
<th>No. of Pupils</th>
<th>M</th>
<th>P.E. M</th>
<th>M1-M2</th>
<th>P.E. diff.</th>
<th>Critical Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Items from First Parts of Selections</td>
<td>122</td>
<td>18.63</td>
<td>.32</td>
<td>5.33</td>
<td>.45</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11.84</td>
</tr>
<tr>
<td>Items from First Parts of Selections</td>
<td>122</td>
<td>13.30</td>
<td>.32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table V discloses a marked difference of 5.33 between the means of the number of items recorded in the first parts of the selections and the second parts of the selections.

The fact that more items are recalled in the first parts of the selections may be due partly to the location of the topic sentence in the beginning of each selection.

The differences between the means in Tables II, III, IV, and V are significant because the probabilities of chance happening are eliminated. This is indicated by the fact that all the critical ratios exceed the probable errors three times, or by three. 7

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary:

The purpose of this study was to compare the related factors: mental age, speed of handwriting, spelling, reading capacity and reading achievement with oral and written recall. Comparisons also were noted between percents of major ideas and percents of minor ideas recalled, and between the numbers of items remembered in first and last parts of selections, in oral and written recall. The relationship of oral and written recall was analyzed. Finally, the reliabilities of both oral and written recall were computed.

The study included oral and written recall from silent reading of geography material at the fifth grade level. One hundred and twenty-two pupils in Grade Five were the subjects of this experiment.

Conclusions:

It was evident with a correlation of .57 that mental age corresponded favorably with oral recall. Previous studies have also shown significant relationships between oral recall and intelligence or mental age.
The relationship of mental age to written recall denoted satisfactory correspondence, as signified by the coefficient of correlation of .55. Among the pupils tested the mental ages ranged from eight years, seven months to fourteen years, ten months, while the number of items recorded in written recall varied from 9 to 59. These wide differences within one grade level emphasized the importance of providing for the individual differences of the pupils.

In analyzing the speed of handwriting as compared with written recall, the correlation of .15 was quite low. Definite proof was thus established that being a rapid penman does not indicate that a pupil will be able to get a high score in written recall. The relationship between these two factors was very slight.

The coefficient of correlation, .28 expressed a rather low relationship between success in spelling and success in written recall. The lack of higher correspondence between these two factors may be caused partly by the below-average spelling scores of the pupils tested and the fact that the ranges in all the tests were limited because only one grade level was included in the experiment.

Reading capacity and oral recall showed a favorable relationship of .58. This merely substantiated the obvious truism that a pupil cannot recall ideas that he cannot read.

With the decided correlation of .52, the indication was
that reading capacity may be considered a controlling factor in a pupil's ability to write the ideas he remembers.

The number, .59, represented a relatively close parallel between reading achievement and oral recall.

The high positive correlation between reading achievement and written recall was greatly significant. Thus these two factors go hand in hand. A pupil can not be expected to record ideas satisfactorily, unless he has a corresponding skill in reading. With this exceedingly high relationship between these two elements, teachers may understand how essential it is that pupils must be able to read the material with comprehension before they can recall and write the ideas in reports and essay examinations.

It was encouraging to note that a greater percent of the total major ideas, than the minor ideas were remembered in written recall. This was indicated by the difference of 13.02 between their means. However, it is a sobering fact to elementary teachers that only an average of about one-half of the total major ideas and an average of just a little more than one-third of the total minor ideas, were recorded in written recall.

In oral recall there was a parallel correspondence in the comparison of the major and minor ideas, similar to the one found in written recall. The mean difference of 12.13 was not quite so great and the average percents of major and minor ideas
remembered were slightly higher, 58.06 and 45.93 respectively.

When comparing items recalled in first and last parts of selections, the first parts listed the most items. In oral recall an average of 3.42 more items were reported, while in written recall an average of 5.33 more items were recorded. This indicated that material which appears in the last part of selections or paragraphs needs to be more highly motivated or given more attention by teachers to insure adequate, balanced recall of all important ideas from all parts of selections or paragraphs read silently.

The relation of oral and written recall is high enough to prove that the two types of recall correspond. It may be concluded that pupils generally making high scores in oral recall make the high scores in written recall, as shown in the correlation coefficient of .69 in these two factors.

The high relationship between the short and long selections of the oral and written recall tests showed that they approximate a true measure. The correlations of .66 and .67 respectively, proved the tests to be consistent, in measuring oral and written recall, for survey use.
CHAPTER VI

PROBLEMS OF FURTHER SEARCH

Great progress and experimentation lie ahead in developing the higher thought processes. This is a small segment of what can be learned about the role of recall in the future study. The following problems, closely associated with this thesis, would aid in the search further:

1. What further knowledge can be learned about the importance and the part of oral and written recall in teaching and developing of the higher thought processes?

2. What relationships exist between both oral and written recall and imagery? Are they inter-dependent?

3. What would be the results if a similar study were repeated in grades higher and lower, and in a wide range of grades, using reading material from history or literature?

4. What differences would be noted if the selections were read orally to the pupils being tested and then the oral and written recall items scored?
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Much of the flying over air-mail routes is done at night and there are lights all the way. Every few miles there is a special kind of gas lantern whose light comes on whenever the sun stops shining. It is shut off whenever the sun comes out. There are many small fields where pilots can make a landing in bad storms or if anything goes wrong with the machine. The regular landing fields are 250 miles apart. They have houses, post offices, repair shops, supplies and extra airplanes and pilots in case they are needed. These airports have very powerful beacons, whose light can be seen by an airplane 130 miles away. A pilot is never out of sight of one of these main landing fields.
1. Night flying
2. Over air-mail routes
3. Is done at night
4. There are lights all the way
5. Every few miles
6. There is a special kind of gas lantern
7. Whose light comes on
8. Whenever the sun stops shining
9. It is shut off
10. Whenever the sun comes out
11. There are many small fields
12. Where pilots can make a landing
13. In bad storms
14. If anything goes wrong with the machine
15. The regular landing fields
16. Are 250 miles apart
17. They have houses, post offices, repair shops, supplies
18. Extra airplanes and pilots
19. In case they are needed
20. These airports have very powerful beacons
21. Whose light can be seen 180 miles away
22. A pilot is never out of sight
23. Of one of these main landing fields
Gliders

In the days when there were no engines that could be used in flying machines, all experiments were made with the sort of airplane that today is called a glider. Men made planes shaped as nearly as possible like the wings of birds. They discovered how to start off into the air by running down a hill with these planes fastened to their waists. Then, when the wind lifted them off the ground, they found out how to balance themselves in the air while they glided a short distance. The farther they glided, the slower they went, and they always landed on ground lower than the hill on which they started. A German is said to have made a flight of one hundred and sixty-five miles. In our day, men are again studying gliders.
Selection D

(Ideas)

1. In days when there were no engines
2. that could be used in airplanes
3. all experiments
4. were made with the sort of airplane
5. that today is called a glider
6. Men made planes
7. shaped as nearly as possible like wings of birds
8. They discovered how to start off into the air
9. by running down a hill
10. with these planes fastened to their waists
11. the wind lifted them
12. off the ground
13. they found out how to balance themselves
14. in the air
15. while they glided a short distance
16. The farther they glided
17. the slower they went
18. they landed on ground lower than the hill
19. on which they started
20. A German
21. is said to have made a flight of 103 miles
22. in our day
23. men are again studying gliders
Chocolate and cocoa come from the seeds of the cacao tree. This tree grows in tropical regions as it must have plenty of warmth and moisture. The cacao tree usually grows in the shade of other trees. Pods which resemble cucumbers form on the trees. Each pod has from 25 to 50 seeds. When the pods turn yellow or a reddish color, the natives know they are ready to be picked. The pods are cut from the trees by sharp knives fastened to long poles. The pods are dried for about a day, then the seeds are removed. The seeds are the size of an almond. They are put on large cement floors and are thoroughly dried before they are shipped to market. America buys much of its cacao from South America.
The Cacao Tree

1. Chocolate and cocoa come from the seed of the cacao tree.
2. This tree grows wild in the tropical regions.
3. As it must have plenty of warmth and moisture.
4. The cacao trees usually grow in the shade of other trees.
5. Pods which resemble cucumbers form on the tree.
6. Each pod has from 25 to 50 seeds.
7. When the pods turn a yellow or reddish color, the natives know.
8. They are ready to be picked.
9. The pods are cut from the trees.
10. By sharp knives.
11. Fastened to long poles.
12. The pods are dried for about a day.
13. Then the seeds are removed.
14. The seeds are the size of an almond.
15. They are put on large cement floors.
16. And are thoroughly dried.
17. Before they are shipped to market.
18. America buys much of its cacao.
19. From South America.
SELECTION D

Rice-Growing

The chief rice-growing section of our country is the coastal lowlands of Texas and Louisiana. Rice needs a large amount of water when it is growing, so if there is not enough rainfall, irrigation is used. The land is drained and flooded again and again during the summer. About six inches of water are kept over the fields, for two months or more. As the rice begins to ripen the water is drawn off so that the plants will ripen better and the fields will become dry. Rice is harvested by machines and put into bundles to dry. After threshing, the rice is sent to mills where the brown coat is removed, leaving white rice. The United States exports rice to other countries because we raise more than we need.
Rice

(Ideas)

1. The chief rice growing section of our country
2. is the coastal lowlands of Texas and Louisiana
3. Rice needs a large amount of water
4. when it is growing
5. if there is not enough rainfall
6. irrigation is used
7. The land is drained and flooded
8. again and again during the summer
9. About six inches of water
10. are kept over the fields
11. for six months or more
12. As the rice begins to ripen
13. the water is drawn off
14. so that the plants will ripen better
15. the fields will become dry
16. Rice is harvested
17. by machines
18. put into bundles to dry
19. After threshing
20. the rice is sent to mills
21. where the brown coat is removed
22. becoming white rice
23. The U. S. exports rice to other countries
24. because we raise more than we need d
The southeastern part of the Brazilian Highlands in South America is called "Coffee Land." Three-fourths of all the world's coffee is raised here, and coffee has brought much wealth to the people. There are miles and miles of coffee plantations where millions of coffee trees cover the hillsides. One reason why so much coffee is raised in this part of the Brazilian Highlands is that the climate and soil are just right for the best growth of the coffee plant. Another is that coffee-growing made an early start here, and as yet no other part of the world has caught up with Brazil in coffee production.

Coffee is raised on evergreen trees which are usually obtained by planting seeds. In many places the trees are only allowed to grow about six or eight feet high so that the berries may be easily picked. Harvest season on the Brazilian coffee plantation begins in May and lasts until October. During that season you will see the plantation workers gathering the ripe, red berries from the trees. A common way of picking berries is to pull them off and let them fall on large sheets which are spread under the trees.

The berries look somewhat like red cherries and each contains two seeds, or "beans", buried in soft pulp. After the berries have been picked, there are several ways of preparing the coffee
for market. One way is to spread the berries out on drying floors to dry in the sun. This takes two or three weeks, and from time to time the berries are stirred with rakes so that they will dry evenly. After drying, the berries are put through machines which remove the dried skin and pulp and clean and polish the beans. When the beans are finally ready to be sold, they are packed in large bags and sent for export. One-half of all the coffee which is shipped from Brazil is sent to the United States.
1. The southeastern part of the Brazilian Highlands
2. in South America
3. is called "Coffee Land"
4. three fourths of all the world's coffee is raised here
5. coffee has brought much wealth to the people
6. there are miles and miles of coffee plantations
7. where trees cover the hillsides
8. the climate and soil are just right for the best growth
9. coffee-growing made an early start here
10. no other part of the world has caught up with Brazil
11. coffee is raised on evergreen trees
12. which are usually obtained from planting seeds
13. the trees are allowed to grow about six or eight feet high
14. so that the berries may be picked easily
15. harvest season begins in May and lasts until October
16. plantation workers gather ripe, red berries from the trees
17. one way of picking them is to pull them off
18. and let them fall on large sheets which are spread under the trees
19. the berries look somewhat like red cherries
20. and each one contains two seeds or "beans"
21. buried in soft pulp
22. there are many ways of preparing coffee for market
23. one way is to spread the berries on drying floors in the sun
24. this takes two or three weeks
25. the berries are stirred with rakes so they will dry evenly
26. machines remove the skin and pulp
27. and clean and polish the beans
28. the beans are packed in bags for export
29. one half of all the coffee from Brazil
30. is sent to the United States
The rubber tree grows wild in the Amazon Lowlands, and rubber is the only important export of the region. The men who gather the rubber are Indians and Mestizos who live in little huts in the forest. When the rubber-gatherer starts out for work in the morning, he carries a small hatchet and a supply of tin cups. Following a narrow path through the forest, he soon reaches the first rubber tree. With his hatchet he cuts several grooves in the bark and hangs a cup at the lower end of each one. The white juice which looks somewhat like cream begins to ooze out of the tree and drips slowly into the cup. This juice is called "latex". By noon the rubber-gatherer has "tapped" all the trees and is back home.

In the afternoon the rubber-gatherer starts out again, this time carrying a large bucket. Following the path from tree to tree, he pours the latex from the tin cups into the bucket. When the bucket is full, he builds a fire of sticks and palm nuts near his hut. Over the blaze he places a metal cone with the small end up so that the smoke will pass through it. On each end of the fire is a post with a forked end. A pole rests loosely between the forks so that it can be turned over and over.
Rubber-Gathering

The rubber-gatherer pours the latex over the middle of the pole just above the smoke, turning the pole as he does so. The heat and smoke harden the latex, forming a coating around the middle of the pole. When a large ball of hardened rubber has been formed, it is pulled off the pole and a new one started. The work of gathering rubber and hardening it into balls goes on in the forest from November until May. By the end of the rubber-gathering season, a large number of big balls are ready for market.
1. The rubber tree grows wild in the Amazon countries.
2. Rubber is the only important export of the region.
3. Men the Rubber are Indians and mestizos.
4. Who live in little huts in the forest.
5. When the rubber-gatherer starts out for work in the morning.
6. He carries a small hatchet and a supply of the cups.
7. He follows a narrow path through the forest, from tree to tree.
8. He cuts several grooves in the bark of each tree.
9. And hangs a cup at the lower end of each groove.
10. The white juice which looks somewhat like cream.
11. Begins to ooze out of the tree.
12. And drips slowly into the cup.
13. This juice is called "latex".
14. By noon the rubber-gatherer has "tapped" all the trees.
15. In the afternoon he starts out again carrying a large bucket.
16. He pours the latex from the cups into the bucket.
17. He builds a fire of sticks and palm nuts near his hut.
18. Over the blaze he places a metal cone.
19. With the small end up so that the smoke will pass through it.
20. On each end of the fire is a post with a forked end.
21. A pole rests between the forks so that it can be turned over.
22. The rubber-gatherer pours the latex on the pole above the smoke.
23. Turning the pole as he does so.
24. The heat and smoke harden the latex.
25. When a large ball of hardened rubber has been formed.
26. It is pulled off and a new one started.
27. The work of gathering rubber and hardening it into balls.
28. Goes on in the forest from October until May.
29. By the end of the rubber-gathering season.
30. A large number of balls are ready for market.