

furnish a basis for educational practice, a question may well be raised as to whether these measurements have been sufficiently developed and standardized to constitute an adequate foundation for educational procedure. The Curtis tests in arithmetic have been extensively used, but we know very little yet about what the results signify. Much more extended experimentation is necessary before educational measurements can furnish guides for teaching.

At a recent meeting of the Council of the American Psychological Association it was voted to authorize the organization of a committee of psychologists to cooperate with the National Research Council in connection with the war. Special investigations of problems connected with military affairs, such as the examination of recruits, re-education, shock, etc., will be undertaken, and the resources of psychological laboratories will be placed at the disposal of the Nation.

The Southern Society for Philosophy and Psychology held its twelfth annual meeting on April 12 and 13, 1917, at Randolph Macon Woman's College, Lynchburg, Va. It was voted to extend the scope of the Society so as to include "experimental education," and to hold the next annual meeting at Peabody College for Teachers, Nashville, Tenn. The following officers were elected: President, Prof. E. K. Strong, Jr., Peabody College, Nashville; Vice-President, Dr. T. V. Moore, Catholic University of America, Washington, D. C.; and Secretary-Treasurer, Prof. W. H. Chase, University of North Carolina.

Professor H. W. Conn, of Wesleyan University, known for his work on bacteriology, biology and evolution, has died at the age of fifty-eight years. His recent book entitled "Social Heredity and Social Evolution" is of particular significance for the theory of education.

Dr. Abraham Flexner, whose ideas in regard to "The Modern School" have recently created such commotion in conservative educational circles, has resigned from the New York City Board of Education, pleading pressure of other duties. Dr. Flexner has recently been advanced to the secretaryship of the General Education Board.

Dr. Walter F. Dearborn has been advanced from an assistant professorship to a full professorship of education at Harvard University. Dr. Henry W. Holmes has also been made full professor of education at that institution.

Dr. Frank W. Ballou, director of educational investigation and measurement in the Boston public schools, has been elected assistant superintendent of schools in that city.

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### READING AS REASONING: A STUDY OF MISTAKES IN PARAGRAPH READING

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It seems to be a common opinion that reading (understanding the meaning of printed words) is a rather simple compounding of habits. Each word or phrase is supposed, if known to the reader, to call up its sound and meaning and the series of word or phrase meanings is supposed to be, or be easily transmuted into, the total thought. It is perhaps more exact to say that little attention has been paid to the dynamics whereby a series of words whose meanings are known singly produces knowledge of the meaning of a sentence or paragraph.

It will be the aim of this article to show that reading is a very elaborate procedure, involving a weighing of each of many elements in a sentence, their organization in the proper relations one to another, the selection of certain of their connotations and the rejection of others, and the cooperation of many forces to determine final response. In fact we shall find that the act of answering simple questions about a simple paragraph like the one shown below includes all the features characteristic of typical reasonings.

*Conscient satisfaction*

J

Read this and then write the answers to 1, 2, 3, 4, 5, 6, and 7. Read it again as often as you need to.

In Franklin, attendance upon school is required of every child between the ages of seven and fourteen on every day when school is in session unless the child is so ill as to be unable to go to school, or some person in his house is ill with a contagious disease, or the roads are impassable.

1. What is the general topic of the paragraph?

2. On what day would a ten-year-old girl not be expected to attend school?  
.....
3. Between what years is attendance upon school compulsory in Franklin?  
.....
4. How many causes are stated which make absence excusable?  
.....
5. What kind of illness may permit a boy to stay away from school, even though he is not sick himself?  
.....
6. What condition in a pupil would justify his non-attendance?  
.....
7. At what age may a boy leave school to go to work in Franklin?  
.....

Consider first the following responses which were found among those made to Questions 1, 2, 5 and 6 above by two hundred pupils in Grade 6. (All are quoted exactly save that capitals are used at the beginning here regardless of whether the pupils used them.)

	Percents.	Number per thousand
J 1. Unanswered.....	18	180
Franklin.....	4½	45
In Franklin.....	1	10
Franklin attendance.....	1	10
Franklin School.....	1½	15
Franklin attending school.....	1	10
Days of Franklin.....	½	5
School days of Franklin.....	½	5
Doings at Franklin.....	1	10
Pupils in Franklin.....	½	5
Franklin attends to his school.....	½	5
It is about a boy going to Franklin.....	½	5
It was a great inventor.....	½	5
Because its a great invention.....	½	5
The attendance of the children.....	½	5
The attendance in Franklin.....	½	5
School.....	7½	75
To tell about school.....	½	5
About school.....	4	40
What the school did when the boy was ill.....	½	5
What the child should take.....	½	5
If the child is ill.....	2	20
How old a child should be.....	½	5
If the child is sick or contagious disease.....	½	5
Illness.....	1	10
On diseases.....	½	5
Very ill.....	3	30
An excuse.....	2	20
The roads are impassable.....	1	10

Even rods are impossible.....	½	5
A few sentences.....	½	5
Made of complete sentences.....	½	5
A sentence that made sense.....	½	5
A group of sentences making sense.....	½	5
A group of sentences.....	3	30
Subject and predicate.....	½	5
Subject.....	½	5
The sentence.....	½	5
A letter.....	½	5
Capital.....	5½	55
A capital letter.....	½	5
To begin with a capital.....	2	20
The first word.....	½	5
A general topic.....	½	5
Good topic.....	½	5
Leave half an inch space.....	2½	25
The heading.....	½	5
Period.....	½	5
An inch and a half.....	½	5
An inch and a half capital letter.....	½	5
The topic is civics.....	½	5
The answer.....	½	5
J 2. Unanswered.....	6	60
Unless the child is so ill as to be unable to go to school.....	41	410
Unless the child is unable to go to school.....	½	5
Unless she is ill or the roads are impassable.....	1	10
Roads are impassable.....	1	10
When his baby or brother have some kind of disease.....	1	10
When a parent is ill.....	½	5
If her father or mother died.....	½	5
On her birthday.....	6½	65
On her fourteenth birthday.....	½	5
On every day.....	4	40
On any day.....	½	5
Expected every day.....	1½	15
On Monday and for 5 days a week.....	½	5
On Monday.....	1	10
On Friday.....	1	10
When school is in session.....	1	10
The beginning of the term.....	½	5
Fourteen year.....	½	5
Age 11.....	½	5
She is allowed to go to school when 6 years.....	½	5
A very bad throat.....	½	5
When better.....	½	5
J 5. Unanswered.....	2	20
If mother is ill.....	5½	55
Headache, ill.....	½	5
A sore neck.....	½	5
Headache, toothache or earache.....	½	5
When a baby is sick.....	½	5
Playing sickness.....	½	5
Serious.....	½	5
When the roads cannot be used.....	½	5
Contagious disease, roads impassable.....	1½	15
He cannot pass the hall.....	½	5
A note.....	½	5

J.6. Unanswered.....	15	150
Ill with a contagious disease.....	5	50
Seven years old.....	1/4	5
By bringing a note.....	6	60
When going with his mother to his cousin.....	1/4	5
Is to go his mother.....	1/2	5
When he is well and strong.....	1/2	5
To have a certificate from a doctor that the disease is all over.....	1/4	5
Somebody else must have a bad disease.....	1/2	5
Torn shoes.....	1/2	5
Neat attendance.....	1/2	5
When he acts as if he is innocent.....	1/2	5
Being good.....	1/2	5
By being early.....	1/2	5
Get up early.....	1/2	5
Come to school.....	1 1/2	15
Be at school every day.....	1/2	5
If he lost his lessons.....	1/2	5
Illness lateness or truancy.....	1/2	5
A bad boy.....	1/2	5
By not going to school.....	1/2	5
None.....	1/2	5
Not sick no condition and mother not ill.....	1/2	5
Not very good.....	1/2	5
When you come you get your attendance marked.....	1/2	5
Of being absent.....	1/2	5
His attendance was fair.....	1/2	5
Truant.....	1	10
If some one at his house has a contagious disease.....	6 1/2	65
When roads.....	1/2	5
If he was excused.....	1/2	5
Not smart.....	1/2	5
If his father or mother died.....	1/2	5
By not staying home or playing hockey.....	1/2	5

In general in this and all similar tests of reading, the responses do not fall into a few clearly defined groups—correct, unanswered, error No. 1, error No. 2, and so on. On the contrary they show a variety that threatens to baffle any explanation. We can, however, progress toward an explanation, by using the following facts and principles:

In correct reading (1) each word produces a correct meaning, (2) each such element of meaning is given a correct weight in comparison with the others, and (3) the resulting ideas are examined and validated to make sure that they satisfy the mental set or adjustment or purpose for whose sake the reading was done. Reading may be wrong or inadequate (1) because of wrong connections with the words singly, (2) because of over-potency or under-potency of elements, or (3) because of failure to treat the ideas produced by the reading as provisional, and so to inspect and welcome or reject them as they appear.

Everybody, of course, understands that (1) plays a part but it is not so clearly understood that a word may produce all degrees of erroneous meaning for a given context, from a slight inadequacy to an extreme perversion.

Thus *Franklin* in the paragraph quoted (J) varies from its exact meaning as a local unit through degrees of vagueness to meaning a man's name (as in "Franklin attends to his school" as a response to question 1), or to meaning a particular personage (as in "It was a great inventor" as a response to question 1). Thus *Contagious* in paragraph J permits responses to question 5 (What kind of illness may permit a boy to stay away from school, even though he is not sick himself?) ranging from "Scarlet fever, chicken pox, measles or diphtheria," through "Scarlet fever," "headache," "Serious," "Hay fever," "Pimple," to "Contagious or roads impassable," and "All kinds of disease." Thus *Paragraph* in J 1 when over-potent produces responses ranging from "A group of sentences making sense" through "A group of sentences," and "A few sentences," to "The sentence," "Subject and predicate," "Begin with a capital," "A letter," and "Commas and periods."

In particular, the relational words, such as pronouns, conjunctions and prepositions, have meanings of many degrees of exactitude. They also vary in different individuals in the amount of force they exert. A pupil may know exactly what *though* means, but he may treat a sentence containing it much as he would treat the same sentence with *and* or *or* or *if* in place of the *though*.

The importance of the correct weighting of each element is less appreciated. It is very great, a very large percentage of the mistakes made being due to the over-potency of certain elements or the under-potency of others.

Consider first the over-potency of elements in the questions. The first question about paragraph J was, "What is the general topic of the paragraph?" A large group of answers show over-potency of *paragraph*. Such are those quoted above to show variation in the understanding of the word. We also find an over-potency of *top* (in topic) combined with that of *paragraph*, resulting in such responses as: "Leave a half-inch space," "An inch and a half," "An inch and a half capital letter," "The topic of paragraph is one inch in."

The second question was: "On what day would a ten-year-old girl not be expected to attend school?" We find under-potency of *not* resulting in answers like "When school is in session" or "Five days a week." We find under-potency of *day* resulting in responses like "She is allowed to go to school when 6 years," "Age 11," and "Fourteen years."

We find over-potency of *day* shown by "Monday," "Wednesday," and "Friday"; of *ten-year-old girl* in "The ten-year-old girl will be 5 a."

*Ten-year-old* is over-potent in an interesting way, namely, in the very large number of responses of "On her birthday." Over-potency of *Attend school* seems to be one part of the causation of "To attendance with Franklin," "Ever morning at half past 8," "She should," and "Because he did learn."

Consider next over- and under-potency of the words or phrases in the paragraph. The following list of responses shows that each of ten words taken from the paragraph is over-potent so as to appear clearly influential in the response to each of the first three questions (and in seven of the cases to the fourth question as well). These occur within five hundred responses made by children within grades 5 to 8. Cases of under-potency would be still easier to collect.

The questions, I may remind the reader, were as follows:

1. What is the general topic of the paragraph?
2. On what day would a ten-year-old girl not be expected to attend school?
3. Between what years is attendance upon school compulsory in Franklin?
4. How many causes are stated which make absence excusable?

(The numbers refer to the question to which the words were the response.)

Franklin	1. Franklin. 1. Franklin and the diseases. 1. Franklin topic. 2. Franklin. 3. Because it is a small city. 3. Franklin was in school 141 years.
attendance	1. Attendance. 2. To attendance with Franklin. 3. In Franklin attendance upon school is required. Attending school 130 days.
school	1. School. 1. They must know their lessons. 2. In the beginning of school. 3. School in session. 3. In the years of school.
seven	1. Seven and fourteen. 1. How old a child should be. 2. He should attend school at 7 years. 2. Between seven and fourteen. 3. Seven years. 4. Under seven.
fourteen	1. Every child between seven and fourteen. In Franklin how old they are. 2. Fourteenth of every day. 2. Fourteen years. 3. Fourteen years. 3. Fourteen. 4. 7 to 14.

every	1. Every child. 2. Expected every day. 2. On every day. 3. Every year. 3. Every child between fourteen or thirteen. 4. Every day.
ill	1. Illness. 1. Very ill. 1. If the child is ill. 2. Ill. 2. A very bad throat. 3. He cannot go to school unless ill. 4. When child is ill. 4. Must be sick.
contagious	1. Contagious disease. 2. If she is sick or has a contagious disease. 3. Contagious disease. 4. Contagious disease.
disease	1. Fever. 1. About disease. 2. Often sick. 3. Unless ill or contagious disease. 3. Disease. 4. A terrible disease going out. 4. Because when a boy has disease.
impassable	1. The roads are impassable. 1. Snow. 2. When roads are impassable. 3. Seven to fourteen years or the roads are impassable. 4. Or the roads are impassable.

To make a long story short, inspection of the mistakes shows that the potency of any word or word group in a question may be far above or far below its proper amount in relation to the rest of the question. The same holds for any word or word group in the paragraph. Understanding a paragraph implies keeping these respective weights in proper proportion from the start or varying their proportions until they together evoke a response which satisfies the purpose of the reading.

Understanding a paragraph is like solving a problem in mathematics. It consists in selecting the right elements of the situation and putting them together in the right relations, and also with the right amount of weight or influence or force for each. The mind is assailed as it were by every word in the paragraph. It must select, repress, soften, emphasize, correlate and organize, all under the influence of the right mental set or purpose or demand.

Consider the complexity of the task in even a very simple case such as answering question 6 on paragraph D, in the case of children of grades 6, 7 and 8 who well understand the question itself.

John had two brothers who were both tall. Their names were Will and Fred. John's sister, who was short, was named Mary. John liked Fred better than either of the others. All of these children except Will had red hair. He had brown hair.  
6. Who had red hair?

The mind has to suppress a strong tendency for *Will had red hair* to act irrespective of the *except* which precedes it. It has to suppress a tendency for *all these children . . . had red*

hair to act irrespective of the *except Will*. It has to suppress weaker tendencies for *John, Fred, Mary, John and Fred, Mary and Fred, Mary and Will, Mary, Fred and Will*, and every other combination that could be a "Who," to act irrespective of the satisfying of the requirement "had red hair according to the paragraph." It has to suppress tendencies for John and Will or brown and red to exchange places in memory, for irrelevant ideas like *nobody* or *brothers* or *children* to arise. That it has to suppress them is shown by the failures to do so which occur. The *Will had red hair* in fact causes one-fifth of children in grades 6, 7 and 8 to answer wrongly,\* and about two-fifths of children in grades 3, 4 and 5. Insufficient potency of *except Will*\* makes about one child in twenty in grades 6, 7 and 8 answer wrongly with "all the children," "all," or "Will Fred Mary and John."

Reading may be wrong or inadequate because of failure to treat the responses made as provisional and to inspect, welcome and reject them as they appear. Many of the very pupils who gave wrong responses to the questions would respond correctly if confronted with them in the following form:

Is this foolish or is it not?

The day when a girl should *not* go to school is the day when school is in session.

The day when a girl should not go to school is the beginning of the term.

The day etc. . . . is Monday.

The day is fourteen years.

The day is age eleven.

The day is a very bad throat.

Impassable roads are a kind of illness.

He cannot pass the ball is a kind of illness.

They do not, however, of their own accord test their responses by thinking out their subtler or more remote implications. Even very gross violations against common sense are occasionally passed, such as letting Mary give Tom a blue dog, or giving "Thought the man fat out" as an answer to I 1. Usually, however, the irrelevance or inconsistency concerns something in the question or the paragraph and the failure to heed it is closely akin to the under-potency of certain elements.

#### I.

Nearly fifteen thousand of the city's workers joined in the parade on September seventh, and passed before the hundred thousand cheering spectators. There were workers of both sexes in the parade, though the men far outnumbered the women.

1. What is said about the number of persons who marched in the parade?

\* Some of these errors are due to essential ignorance of "except," though that should not be common in pupils of grade 6 or higher.

It thus appears that reading an explanatory or argumentative paragraph in his text-books on geography or history or civics, and (though to a less degree) reading a narrative or description, involves the same sort of organization and analytic action of ideas as occur in thinking of supposedly higher sorts. This view is supported by the high correlations between such reading and verbal completion tests, Binet-Simon tests, analogies tests and the like. These correlations, when corrected for attenuation, are probably, for children of the same age, as high as +.80.

It appears likely, therefore, that many children fail in certain features of these 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 would probably have said that they understood the paragraph and, upon reading the questions on it, would have said that they understood them. In such cases the reader finds satisfying solutions of those problems which he does raise and so feels mentally adequate; but he raises only a few of the problems which should be raised and makes only a few of the judgments which he should make. Thus one may read paragraph I with something like the following actual judgments:

*Fifteen thousand did something—there was a parade—September seventh was the day—there were two hundred thousand something—there was cheering—workers were in the parade—both sexes in the parade—the men outnumbered the women.*

Contrast these with the following which may be in the mind of the expert reader:

*Nearly fifteen thousand—not quite, but nearly—of the city's workers—people who worked for a living—joined in the parade—a big parade of nearly 15,000—on September seventh—the parade was in the fall—they passed before two thousand hundred cheering spectators—two hundred thousand saw the parade—they cheered it—there were workers of both sexes—there were men workers and women workers in the parade—the men far outnumbered the women. Many more men than women were in the parade.*

In educational theory, then, we should not consider the reading of a text-book or reference as a mechanical, passive, indiscriminating task, on a totally different level from the task of evaluating or using what is read. While the work of judging and applying doubtless demands a more elaborate and inventive organization and control of mental connections, the demands of mere reading are also for the active selection which is typical of thought. It is not a small or unworthy task to learn "what the book says."

In school practice it appears likely that exercises in silent reading to find the answers to given questions, or to give a summary of the matter read, or to list the questions which it answers, should in large measure replace oral reading. The vice of the poor reader is to say the words to himself without actively making judgments concerning what they reveal. Reading aloud or listening to one reading aloud may leave this vice unaltered or even encouraged. Perhaps it is in their outside reading of stories and in their study of geography, history, and the like, that many school children really learn to read.

## PRELIMINARY INVESTIGATION OF SKIMMING IN READING<sup>1</sup>

GUY M. WHIPPLE AND JOSEPHINE N. CURTIS

### SUMMARY

This appears to be the first published experimental study of the process of skimming in reading. Six subjects, university students and instructors, read selected prose passages in different ways: silently at normal rate, silently at maximal rate, aloud at normal rate, aloud at maximal rate and by skimming (sometimes at their own rate, sometimes at a prescribed rate). The speed of reading was recorded by a stop-watch and in most experiments the efficiency of the reading was tested by demanding a reproduction, orally or in writing, of the passage read. Each subject also reported, especially after the skimming tests, how the skimming or reading was done and in what ways the skimming differed from the other modes of reading.

The chief conclusions are:

- (1) There appear, even in this small group of college-trained persons, decided individual differences in speed and in efficiency of reading by all the methods, including skimming. One subject, for instance, skims three times as fast as another.
- (2) The time per word, in hundredths of a second, is approximately this: normal aloud, 35; maximal aloud, 29; normal silent, 26; maximal silent, 22; skimming, 14.
- (3) Knowledge that reproduction is to be demanded slows the rate of reading of all subjects by all methods.
- (4) Speed of skimming increases in the later portions of texts several pages in length.
- (5) The slowest reader is also the poorest reproducer.
- (6) The best reproducer is a fast, though not the fastest, reproducer.
- (7) The devices adopted in skimming are so different in different readers as to preclude summarizing.
- (8) Skimming, itself, embraces at least five different varieties, or modes.
- (9) When readers are forced to skim at a prescribed and unusually high rate, reproduction becomes very poor and the whole process becomes disagreeable and flurried.

<sup>1</sup> This investigation was carried on at the Educational Laboratory of Cornell University, from February to May, 1914. The general arrangement and supervision of the work was in the hands of Professor Whipple, now of the University of Illinois; the actual experimentation was in the hands of Dr. Curtis, now Assistant Psychologist at the Psychopathic Hospital, Boston. Acknowledgment is due to Mr. W. K. Layton, Assistant in Education, University of Illinois, for valued help in preparing the results for publication.