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ABSTRACT

One-hundred and eight eleventh graders were assigned to three treatment groups: skimming/pretest, skimming/no-pretest, and no-skimming/pretest. Then the pretest groups responded to items in the pretest, while the no-pretest group responded to items unrelated to the stimulus passages. Four weeks later, the skimming groups were asked to skim the two passages (one science and one social science) under controlled time limits. All subjects then immediately took the post-test. No significant main effect differences were noted for social science after adjustment for differences. For the science passage, the raw scores and gain scores differences between the skimming/pretest and the no-skimming groups were both significant. The raw score difference between the skimming/pretest and the skimming/no-pretest groups was also significant. When pretest scores were used as a covariate in analyzing the post-test raw scores, a significant main effect due to the amount of background information was found. It was concluded that skimming was effective only when there was cueing via exposure to the pretest. Since the subjects did not skim the social science passage effectively, the author believed that skimming strategy might be used appropriately for some types of material, but not for others without special instruction. Tables and references are included. (AW)

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Skimming Strategy in Reading Science and Social Science as a Function of Familiarity with Content

The relationship between skimming performance and familiarity with the content of stimulus passages in science and social science was investigated in the present study. Two aspects of familiarity were considered: a) the actual amount of prior knowledge about the subject matter of a given stimulus passage, or background information, and b) the cueing or pretest familiarity which may result from exposure to a set of questions relating to a stimulus passage prior to the presentation of the passage.

Previous studies considering the effects of pretest familiarity upon

reading performance have produced conflicting results and no assessment has previously been made with regard to skimming behavior. Similarly, while the amount of background information is commonly considered to affect reading performance, no empirical evidence has previously been presented to clarify the relationship between the amount of background information and skimming performance. This is basic information required for the development of a functional model of efficient reading behavior.

A remarkably meager amount of empirical evidence regarding the nature of the skimming process has been reported to date. Those studies which have been reported have not accounted for the familiarity variable, nor have they adequately controlled the strategy variable.

Rationale and Related Literature

Skimming is defined for the present study as the special reading strategy in which the reader does not look at or fixate upon all of the words on the printed page while processing information at a rate in excess of 800 words per minute (wpm). Previous studies involving eye-movement photography have reported evidence that readers are not able to fixate on every word when proceeding at rates in excess of 800 to 900 wpm (Spache,18; Taylor, 19; Tinker, 20, 21, 22). On the basis of such evidence, it has been commonly concluded that readers are necessarily skimming when they cover printed material at rates in excess of 800 to 900 wpm.

In order to ascertain whether skimming performance is influenced by familiarity with the content, it was first necessary to determine whether skimming was, in fact, an effective strategy for gaining information from the passages. The results of previous studies by Moore (12,13)

and Grayum (4) have indicated that individuals in high school and college are able to skim effectively. Moore (13) concluded that Ss who were able to skim effectively were able to score on a comprehension test was well as or better than Ss who were generally slower readers. It should be pointed out, however, that Moore did not control the differences in the amount of previous knowledge which the Ss had. The Ss in Moore's study included 84 females and only 11 males, with ages ranging from 19 to 58 years.

On the other hand, Hill (6), A. C. Smith (17), and Maxwell (9), among others, have observed that students do not necessarily skim effectively when directed to do so, even when given a limited purpose such as finding the main idea.

Kingston (8) and McDonald (10) have discussed the effect of background information on reading performance. The argument is that the reader who has background information about the subject matter of a passage will find the material easier to read than a person who has little background information about the topic. Weaver and Bickley (24) have suggested that reading in most situations is actually a "selecting of the parts of what we already know." Reading in this sense becomes essentially a process of confirming what the reader already knows. Weaver and Bickley's point of view may be more relevant to the process of skimming, or rapid and efficient reading in general, than it is to reading carefully and intensively, or to reading slowly. Certainly, a reader must, at the least, know the meanings of referential words in a passage and be able to make some appropriate

associations among the meanings to gain information from the printed discourse. Otherwise, decoding printed discourse is not possible at all, for reading necessarily requires some level of background information. Familiarity with the content of the material, i.e., background information, has not been investigated as a factor which affects a reader's ability to cover words in specific passages at a speed which would be considered to be skimming.

Reading comprehension has typically been measured without ascertaining the amount of previous information which Ss had about the subject matter before reading the material (Kingston, 8). Since it is known that individuals vary greatly in the amount of background information which they possess, it is readily conceivable that two persons could obtain the same score on a comprehension test after reading a given passage even though they differed significantly in the amount of specific background information which they had before reading the passage. One person may have gained a great deal of information from reading, while the other person may have gained very little information that he did not possess prior to reading. It is extremely important, therefore, to assess the amount of previous information which readers have before reading in order to determine the amount of information gained from reading (Rankin, 14). Information gain is measured by administering a pretest as well as a posttest of comprehension. The information gain score is calculated by computing the difference between the pretest score and the posttest score for each individual.

Exposure to a pretest, however, can be a confounding variable in research (Campbell and Stanley, 2). It can be argued that exposure to

a set of questions relating to the content of a stimulus passage may affect a person's response patterns to parts of the discourse during the act of reading or skimming. The pretest questions may cue the reader to look for answers to specific questions when he subsequently reads the passage.

Rothkopf (15), Rothkopf and Bisbicoes (16), Bruning (1), Frase (3), and Morasky (11), in their studies of mathemagenic behavior, have concluded that questions presented immediately prior to reading generally do not necessarily facilitate comprehension or "learning" from prose materials. If the presentation of relevant or adjunct questions just prior to reading a passage does not necessarily have a facilitating effect upon reading performance, then it would seem unlikely that exposure to a pretest would affect reading performance when there is a lapse of time, say, several weeks, between the pretest and the posttest, the latter being taken immediately after exposure to the stimulus passage. Karlin and Jolly (7) found that exposure to a pretest did not affect posttest scores when there was a time lapse of several months. They observed the same results when the pretest and posttest were exactly the same form of the test as when an alternate or "equivalent" form was used. Ware and Bowers (23), as well as Gustafson and Toole (5), found that the pretesting did not influence achievement on the posttest.

Despite the findings of previous studies, the Ss involved in a pilot study related to the present investigation frequently indicated that they could remember questions that were part of the pretest, even after a time lapse of more than two weeks. Further, some of the Ss indicated that their having previously answered the pretest questions had

helped them to gain information when they skimmed the stimulus passages. For these reasons it was considered desirable to determine the possible effect of the pretest on skimming performance.

METHOD

Subjects. One-hundred-eight grade eleven students in a large senior secondary school in North Vancouver, British Columbia, were randomly selected to serve as subjects in this study. The Ss were randomly assigned to three treatment groups: (1) Skimming/Pretest; (2) Skimming/No-Pretest; (3) No-Skimming/Pretest.

Materials. One of the two stimulus passages was scientific in nature and dealt with the solar system. The other passage, in the area of social studies, was concerned with the age of exploration. Each passage contained 1400 words. The Flesch reading ease scores were 64.30 and 63.48 respectively for the science and the social science selections. These scores indicate that the passages were in the average seventh to eighth grade level. Each selection was presented in seven 200-word segments (± five words) on consecutive pages of stimulus booklets. The length of line was 18 picas.

A set of fifty-six multiple choice items was used as the measuring instrument for the science passage. For the history passage, the criterion measure included forty-four multiple-choice items. All items had five alternatives arranged in random order.

The Van Wagenen Rate of Comprehension Scale, Form D, was used to measure the initial rate of comprehension of all Ss.

Procedure. In the first experimental session, the Van Wagenen Rate of Comprehension Scale, Form D, was administered to all Ss. Then the Ss in the Skimming/Pretest and the No-Skimming/Pretest groups responded to the batteries of multiple-choice items for science and social science. The order of presentation was counterbalanced. The Ss in the Skimming/No-Pretest group responded to items not related to the two stimulus passages in any way. This dummy activity included 100 items and required approximately the same amount of time for completion as the two batteries of items answered by the Pretest groups.

Four weeks after the first session, the Ss in the Skimming groups were asked to skim the two stimulus passages under carefully-controlled time limits. Instructions to the Ss regarding the skimming procedure were to get as much information as they could from each page within the time allowed. The time limit for each page was twelve seconds. The signals to turn the pages were recorded on tape as part of the pre-recorded instructions for the Ss. The order of presentation of the two passages was counterbalanced.

The Ss in the No-Skimming group were engaged in an unrelated activity during the time the other Ss were skimming. All Ss in the study responded to the corresponding posttests immediately after the Skimming groups were exposed to the stimulus passages.

Design. The primary dependent measure was the posttest raw score, the total number of correct answers on each of the two criterion measures. A second dependent measure was the gain score (posttest score minus the pretest score). The gain score could, by definition, be calculated only

for those two groups which responded to the pretest.

Rate of comprehension scores were treated as a covariate in order to ajust the dependent variable for possible differences among Ss in general rate of comprehension.

RESULTS

The posttest raw score means and the gain score means are given for the science passage in Table 1 and for the social science passage in Table 2.

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TABLE 2 about here.

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The covariate, rate of comprehension, was found to be significantly related to the dependent variable when the posttest raw scores were considered, both for science ($F = 15.72$, $p < .001$) and for social science ($F = 20.13$, $p < .001$). However, rate of comprehension was not significantly related to either passage when the gain scores were considered.

After adjustment for initial differences due to general rate of comprehension there were significant main effect differences among treatment group means for science ($F = 5.21$, $p < .01$). No main effect differences were observed for history ($F = 1.05$, $p > .05$).

No further tests were performed on the history data since there

TABLE 1

Science Posttest Raw Score and Gain Score Means Before and After Adjustment for the Covariate. (N = 108)

Treatment Group	(N)	Raw Score Means	Adjusted Raw Score Means	Gain Score Means	Adjusted Gain Score Means
Skimming					
Pretest	(36)	25.36	25.04	4.18	4.25
No-Pretest	(36)	18.47	18.66	----	----
No-Skimming	(36)	21.56	21.46	0.78	0.80

TABLE 2

Social Science Posttest Raw Score and Gain Score Means Before and After Adjustment for Covariate. (N = 108)

Treatment Group	(N)	Raw Score Means	Adjusted Raw Score Means	Gain Score Means	Adjusted Gain Score Means
Skimming					
Pretest	(36)	17.70	17.47	2.20	2.12
No-Pretest	(36)	15.58	15.76	----	----
No-Skimming	(36)	15.42	15.43	1.00	1.02

was no evidence of differences among the adjusted cell means. Further contrasts were made for the science data involving the posttest raw score means and the gain score means.

In order to test the assumption that Ss are able to skim effectively, contrasts were made between the two Skimming groups and the No-Skimming groups for the science passage. The observed difference between the posttest raw scores of the Skimming/Pretest and the No-Skimming groups was 3.80, which was statistically significant ($F = 5.31$, $p < .05$). When gain scores were considered, a statistically significant difference was again observed ($F = 7.21$, $p < .01$).

The Skimming/Pretest group was compared with the Skimming/No-Pretest group in order to determine whether the pretest had a sensitizing effect on the Ss. The observed posttest raw score difference of 6.89 was significant ($F = 10.80$, $p < .01$).

When pretest scores were used as a covariate in analyzing the posttest raw scores, a significant main effect due to the amount of background information was found ($F = 26.31$, $p < .01$).

DISCUSSION

Analysis of the data collected in this study revealed that skimming performance of grade eleven students on the science passage was effective for the Pretest group but not for the No-Pretest group. It was concluded that familiarity with the content of the science passage could be induced by exposure to a related pretest. In fact, skimming was effective only when there was cueing via exposure to the

pretest. It is conceivable that familiarization or cueing may be effected by processes other than the pretest questions used in the present study. The format, the style of the passage, and graphic aids, for example, may also have cueing effects. The nature and extent of induced familiarity deserves further investigation.

Differences in the nature of the stimulus passage seem to affect skimming performance, since, overall, the Ss were not able to skim the social science passage effectively. Skimming strategy may be used appropriately for some types of material, but not for others without special instruction and practice. The results of the present study must be interpreted cautiously, however, since further study and replication is required in order to determine whether the skimming strategy may be applied as effectively in one content area as the other.

It was also concluded that, as predicted, having a greater amount of background information did facilitate skimming. Ss who had a greater amount of background information were able to gain more information by skimming than the Ss who had less background information. This conclusion tends to support the point of view that skimming is predicted upon a process of confirming (or disconfirming) predictions which the skimmer makes on the basis of his background information. Further research on the validity of such a model of skimming performance is indicated.

The relationship of skimming with other factors such as re-

dundancy reduction (the use of key words), practice effect, and short-term memory should also be studied in order to develop a sound basis for a model of skimming strategy in reading.

REFERENCES

1. Bruning, R. H. "Effects or Review and Test-like Events within the Learning of Prose Material," Journal of Educational Psychology, 1968, 59, 16-19.

2. Campbell, D. T., & Stanley, J. C. Experimental and Quasi-experimental Designs for Research on Teaching. In N.L. Gage (Ed.), Handbook of Research on Teaching. Chicago: Rand McNally, 1963, 171-246.

3. Frase, L. T. "Learning from Prose Material: Length of Passage, Knowledge of Results, and Position of Questions, "Journal of Educational Psychology, 1967, 58, 262-272.

4. Grayum, H. S. An Analytic Description of Skimming: Its Purpose and Place as an Ability in Reading. (Doctoral dissertation, University of Indiana, Interlibrary loan) Bloomington, Indiana: Indiana University, 1952.

5. Gustafson, H. W., & Toole, D. L. "Effects of Adjunct Questions, Pretesting, and Degree of Student Supervision on Learning from an Instructional Test, " Journal of Experimental Education, 1970, 39,

6. Hill, W. R. "Influence of Direction upon Reading Flexibility of Advanced College Readers," Thirteenth Yearbook of the National Reading Conference. Milwaukee: National Reading Conference, 1964, 119-125.

7. Karlin, R., & Jolly, H. "The Use of Alternate Forms of Standardized Reading Tests," Reading Teacher, 1965, 19, 187-191.

8. Kingston, A. J. "A Conceptual Model of Reading Comprehension," Tenth Yearbook of the National Reading Conference. Milwaukee: National Reading Conference, 1961.

9. Maxwell, M. "Assessing Skimming and Scanning Skills Improvement," Eighteenth Yearbook of the National Reading Conference. Milwaukee: National Reading Conference, 1969, 229-233.

10. McDonald, A. S. "Flexibility in Reading," International Reading Association Conference Proceedings. New York: Scholastic Magazines, 1963, 8.

11. Morasky, R. L. & Willcox, H. H. "Time Required to Process Information as a Function of Question Placement," American Educational Research Journal, 1970, 7, 561-567.

12. Moore, W. J. A Laboratory Study of the Relation of Selected Elements to the Skimming Process in Silent Reading. (Doctoral dissertation, Syracuse University) Ann Arbor, Mich.: University Microfilms, 1956.

13. Moore, W. J. "The Skimming Process in Silent Reading," In Challenge and Experiment in Reading, J. A. Figurel (Ed.), International Reading Association Proceedings, 1962, 7, New York: Scholastic Magazines, 203.

14. Rankin, E. F., Jr. "The Cloze Procedure - A Survey of Research," Fourteenth Yearbook of the National Reading Conference. Milwaukee: National Reading Conference, 1964, 133-148.

15. Rothkopf, E. Z. "Learning from Written Instructive Material: An Exploration of the Control of Inspection Behavior by Test-like Events", American Educational Research Journal, 1966, 3, 241-249.

16. Rothkopf, E. Z. & Bisbicoes, EE. Selective Facilitative Effects of Interspersed Questions on Learning from Written Materials. Journal of Educational Psychology, 1967, 58, 56-61.

17. Smith, A. C. The Influence of Change in Purpose Upon Ocular Motor Reading Behavior of University Freshmen. (Doctoral dissertation University of Oregon) Ann Arbor, Mich.: University Microfilms, 1963.

18. Spache, George D. "Is This a Breakthrough in Reading? Reading Teacher, 1962, 15, 258-263.

19. Taylor, S. E. "Eye Movements in Reading: Facts and Fallacies," American Educational Research Journal, 1965, 2, 187-202.

20. Tinker, M. A. "Eye Movements in Reading," Journal of Educational Research, 1963, 30, 241-277.

21. Tinker, M. A. "Recent Studies in Eye Movements in Reading," Psychological Bulletin, 1950, 55, 4.

22. Tinker, M. A. "Uses and Limitations of Speed of Reading Programs in Schools," Proceedings of the Forty-fourth Annual Education Conference, Newark, Delaware: University of Delaware, 1963, 10, 9-18.

23. Ware, W. B. & Bowers, N. D. "The Possibility of Pretest-Instruction Interaction in the Classroom under Two Conditions of Pretesting," Paper presented at the 1969 annual meeting of the American Educational Research Association, Los Angeles, February, 1969.

24. Weaver, W. & Bickley, A. C. "The Retrieval of Learning Sets by the External Display of Reading Materials, "Sixteenth Yearbook of the National Reading Conference. Milwaukee: National Reading Conference, 1967, 38-46.