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ABSTRACT

The purpose of this study was to investigate the relationship between eye voice span (EVS), reading ability, and readability. Fifty average and poor third, fourth, and fifth-grade students were selected on the basis of their comprehension scores on the Gates-MacGinitie Reading Test. They were individually tested for EVS on paragraphs ranging in readability from second- to fifth-grade difficulty. The results show that (1) EVS appears more a function of grade than reading ability; (2) EVS increases with age (grade); (3) EVS tends to increase as material becomes easier but not significantly except for poor students; (4) older poor readers out-perform average third graders in EVS even though third-grade readers have more ability; and (5) older poor readers tend to perform as well as average readers in the same grade in EVS even though the average readers have more ability. A selected bibliography is included. (Author/MB)

THE RELATIONSHIP OF EYE-VOICE SPAN TO READING ABILITY AND READABILITY

A THESIS

SUBMITTED TO THE FACULTY

OF THE GRADUATE SCHOOL OF EDUCATION

OF

RUTGERS UNIVERSITY

THE STATE UNIVERSITY OF NEW JERSEY

BY

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CHAPTER I

THE PROBLEM

Reading behavior has been studied in many ways and for many years. Yet it is a difficult area to investigate because of the private nature of the process. One technique that has a substantial history in reading research is the "eye-voice span" (EVS). In reading aloud, the EVS is the distance, usually measured in words, that the eye is ahead of the voice. One consistent finding has been that EVS tends to increase with ability or age (Buswell, 1920; Rode, 1974).

A recent study by Rode (1974) has found, among other things, more support for the tendency of EVS to increase with ability or age. She found that, when reading material on a second-grade level, fifth-grade students had a longer EVS than third-grade students reading the same material.

A number of questions arise in relation to these findings. What does EVS reveal about the reading behavior of students in the elementary grades? Is there a change in EVS when an average student reads easy material compared to material on his reading level? Is there a change in EVS when poor readers read easy material compared to material

on his ability level? How do the EVS scores of good and poor readers compare when they read materials at their ability level? How do the EVS scores of good and poor readers compare when they all read the same easy material?

Statement of the Problem

In general, the problem investigated in this study is the effect on eye-voice span when the grade level (age) of the student varies from third to fifth grade and when the student reads material at his ability level as compared to easier material.

Hypotheses.--In order to answer the questions in this study, the following hypotheses were proposed:

1. There is a significant difference in mean eye-voice span scores between average third-, fourth-, fifth-, and poor fourth- and fifth-grade groups when they read at their respective reading ability levels.

2. There is a significant difference in mean eye-voice span scores when second-grade materials are read compared to materials at reading ability levels for average third-, fourth-, and fifth-, and poor fifth-grade groups.

3. There is a significant difference in mean eye-voice span scores between average third-, fourth-, fifth-, and poor fourth- and fifth-grade groups when they are all reading second-grade material.

Definition of Terms

Eye-voice span (EVS).--The number of words which the eye is ahead of the voice in oral reading.

Average reader.--A reader whose standard score on the comprehension subtest of the Gates MacGinitie Reading Test, Primary C or Survey D, fell between ±.5 standard deviation.

Poor reader.--A reader whose standard score on the comprehension subtest of the Gates-MacGinitie Reading Test, Survey D, fell below 1 standard deviation below the mean.

Readability.--Paragraphs were judged to be of second-, third-, fourth-, or fifth-grade readability (difficulty) when so determined by both the Fry Readability Graph (1968) and the Spache Readability Formula, revised (1974).

Ability level.--The ability level of a student was judged to be his score on the comprehension subtest of the Gates-MacGinitie Reading Test, Primary C or Survey D.

Overview of the Study

Chapter II will review the literature relating to eye-voice span, focusing in particular on EVS and readability and EVS and reading ability. Chapter III will present the procedures used in this study. Chapter IV will present the data and treatment of the data. Chapter V will summarize and present conclusions from the study.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter will survey the literature relative to eye-voice span (EVS) and the following areas: (1) reading ability of students, and (2) readability of materials. A summary and discussion will conclude the chapter.

Eye-Voice Span and Reading Ability

An early and extensive study of EVS was reported by Buswell (1920). Using eye-movement photography and simultaneous recording of the reader's voice, EVS was measured as the number of letter spaces between the reader's voice and his fixation point at various intervals in the reading material.

His 54 subjects ranged from second grade to college level. At the elementary level, two "good" and two "poor" readers were selected at each grade from second to sixth using the results of the Gray Oral Reading Paragraphs. Similarly, "good" and "poor" readers were selected at the four high school grades and at the college level.

Buswell found that the mean EVS is greater for "good" readers than that for "poor" readers at every school grade. He found, however, no consistent increase from

grade to grade. The mean EVS of high school pupils was greater than that of elementary pupils and the mean EVS of adults was greater than that of high school pupils. But some elementary pupils had a greater EVS than most high school pupils. He concluded that EVS should be well developed by the end of fourth grade.

Differences in EVS among good and poor readers were found at various positions in sentences. Good readers had a wider EVS at the beginning of sentences than poor readers who were more apt to "barge" right into reading before looking ahead. Also, good readers tended to have a shorter EVS at the end of sentences, whereas poor readers would not --often paying little attention to punctuation or meaning. Buswell found that poor readers had little variation of EVS at any position but good readers would vary their EVS according to position, presumably because of greater attention to meaning.

Quantz (1897) used the more primitive experimental procedure of quickly covering the reading material with a card and recording the words spoken afterward. He found that the faster readers had a longer EVS. Morton (1964) reported a similar finding when presenting fast and slow adult readers with selections of zero to eighth order of statistical approximations to English.

Resnick (1970), in studying the relations between perceptual and syntactic factors in reading, used the EVS technique with third and fifth graders and college students.

Each of the 40 subjects read 54 passages made of four sentences each largely from the first 1,000 words of the Thorndike-Lorge list. One group of college students read under perceptual strain (image upside down).

The passages were projected on a screen and the blackout points were the beginning of the second, third, or fourth sentence. At least 10 words followed the blackout point in the same sentence and line so that changes in punctuation or change in line had no effect on the EVS.

Measures were taken of EVS for each group and for the number of times each reader stopped at a phrase boundary. The mean EVS of third graders was 2.67 compared to 3.16, 4.67, and 2.75 for the fifth graders, college students, and college students reading under strain respectively. The mean number of times "reading to phrase boundary" for third graders was 21.5 compared to 25.7, 32.3, and 23.7 for fifth graders, college students, and college students reading under strain respectively.

A practice effect was noted, with the third-grade readers' mean EVS significantly longer ($p < .01$) in the last third of the selections and the mean EVS of college students reading under strain was significantly longer ($p < .05$) in the last third of the selections. No corresponding gain was noted in third graders' ability to read to stops in the last third of the selections.

Resnick concludes that third graders did not necessarily have the syntactic skills to call upon, so an

increased perceptual span produced no increase in appropriate syntactic processing.

Levin and Kaplan (1970) describe a set of experiments demonstrating the effects of grammatical constraints on EVS. To measure EVS a visual display was turned off at a predetermined point and the students were asked to say as many more words as they could beyond what they were reading when the display was turned off.

In one of these studies, Levin and Kaplan tried to determine whether readers reported phrase units and, if so, at what "level of sophistication" this would happen.

They used 10 subjects at each of six grade levels: second, fourth, sixth, eighth, tenth grades, and adults. The materials used were 8 two-word phrase sentences, 12 three-word phrase active sentences, 16 four-word phrase active sentences, and 9 structureless word lists. Two similar sets of sentences were used. One set made up with the vocabulary of a second-grade reader was used with the second- and fourth-grade readers. Another set was made up with the vocabulary of a sixth grade reader and was used with the sixth grade and older readers.

Levin and Kaplan found that older students (better readers) had a longer EVS than younger students; that there was a tendency for the EVS to be longest on the three-word phrase sentences; and, that faster readers had a longer EVS than slower readers. They concluded from this that students read to phrase units; that EVS is elastic--stretching

or shrinking to phrase boundaries (also noted by Buswell, 1920); and, that beginning readers read more word by word than older readers--hence their shorter EVS.

Marcel (1974) also reported, in a study using college students and fast and slow reading eleven year olds, that faster readers had a longer EVS than slower readers. He also noted that EVS is probably affected by output (voice) and may reflect output restrictions rather than perceptual processing.

Rode (1974) in a recent study sought to determine the factors which constitute a unit of meaning for children at the acquisition stage of the reading process. Students' ability to decode phrases and clauses was investigated at three developmental levels to determine the effects of syntactic structure on EVS. Fifty-four students, 18 in each of three groups, were taken from third, fourth, and fifth grades. Each was selected from average reading groups. Sentences constructed from the vocabulary of second-grade readers were used. Syntactic restraints were embedded in the stimulus sentences by varying the number of words (two or three) in noun and verb phrases which made up the two five-word clauses in each sentence. Forty-eight target sentences, written in three-sentence paragraphs, were used to measure EVS with six possible light-out positions for each paragraph.

Rode found that the oldest readers (fifth grade) had the longest EVS and that verb phrases served as

stopping points more frequently than noun phrases. Younger readers (third graders) terminated at noun and verb phrases more frequently than older readers. A corrected EVS was computed using Goodman and Burke's Reading Miscue Inventory (1971) and revealed that the mean number of times each age read to clause boundaries was greater than with errorless scoring. Rode concludes that this would indicate children at these three levels used already developed language skills to aid in the decoding process and attempted to get meaning from the text in units larger than the phrase.

Rode concludes that older readers attempted to decode a unit of meaning that was a clause and not a phrase; that EVS is differentially influenced by age (due presumably to reading skill); that the span expands at noun phrases and constricts at verb phrases; and, that children attempted to complete syntactic units even when unable to reproduce the exact words in the text.

The finding that, while the spans are markedly different for the three groups (oldest students having the largest), the performance of the three groups paralleled one another seems to indicate that children in the beginning stages of the reading process syntax to about the same degree that older, more skilled readers do.

Rode questions Levin and Kaplan's description of young readers as "word by word" readers and cites her study as evidence that the younger readers used previously acquired syntax and semantics to the level of the phrase

and that short-term memory and syntactic constraints in the text influences young readers' EVS.

Eye-Voice Span and Readability

In the studies cited above, control of the readability of the selections read has been handled in various ways.

Buswell (1920) had all the elementary pupils (second grade to sixth grade) read 43 selections with nine measurements taken. The material was described as "not too difficult for second graders." What, exactly, this means is not explained. Was the material "not too difficult" for the "good" second-grade readers or for the "poor" second-grade readers?

Resnick (1970) used the same material for each student at the third grade-, fifth grade-, and college levels constructed largely from the first 1,000 words of the Thorndike-Lorge list. The material was arranged into passages of four sentences each. The third graders were given training in all the words outside the 1,000 word list.

Levin and Kaplan (1970) used vocabulary drawn from second-grade readers in constructing the various sentences and lists used with second and fourth graders. The same procedure was used to construct sentences and lists from a sixth-grade reader to use with students at the sixth, eighth, tenth grades, and adults. In both instances, grammatical constraints were introduced to determine their

effect on EVS.

Morton (1964) used material from zero to eighth order statistical approximation to English and found EVS was directly related to the statistical approximations.

Rode (1974) constructed her sentences from a second-grade vocabulary and used the same material for each group of third-, fourth-, and fifth-grade "average" readers.

Summary and Discussion

Eye-voice span appears, from the literature cited, to be a good measure of maturity in the reading process. Faster readers have a longer EVS; older readers have a longer EVS than younger readers; older readers have a more flexible EVS than younger readers--one that is sensitive to grammatical and syntactical constraints in the material read.

Questions arise, however, when examining the experimental procedures used in the literature. In most of the studies, the youngest readers would typically read material with a readability close to their reading ability. Thus we find second- or third-grade pupils reading second-grade material being compared in terms of EVS with fifth- or sixth-grade pupils reading the same material.

Only Buswell (1920) addressed the issue of EVS and its relation to reading ability and readability. He compared good and poor readers at each grade level on the same

material. However, his use of only two subjects in each case makes his data difficult to generalize from. In fact, he notes that the mean EVS scores at the sixth-grade level could not be considered typical because of the atypical performance of one of the subjects!

In none of the studies was the readability of the materials determined by statistical measures. In most cases, the reading material, which was not reproduced in the studies, was constructed by the researchers from vocabulary taken from various lists or reading books.

Also, selection of good and poor, fast or slow, or average readers was diverse or, in some instances, not discussed. The approaches to this issue ranged from Buswell's use of Gray's Oral Paragraphs to Rode's selection of readers from "average" reading groups. Some researchers (Levin and Kaplan, 1970; Resnick, 1970) give no indication how readers were selected beyond the fact that they were in a certain grade.

On the whole, Buswell's study is the most satisfactory in terms of the selection of readers. However, the issue of readability is not handled adequately and, as noted above, the results must be interpreted cautiously in light of the small number of readers at each level.

It was the intent of this study to focus specifically on the differential effect of reading ability and readability on EVS.

CHAPTER III

PROCEDURE

This study attempted to determine the relationship of reading ability and the readability of various paragraphs and the eye-voice span (EVS) of average third-, fourth-, fifth-, and poor fourth- and fifth-grade readers.

This chapter includes a description of the population used in the study and details of the construction of the apparatus and materials used. Information concerning the selection and administration of tests, as well as the research design are also presented.

Population

The subjects for this study were students in the Irving School in Highland Park, New Jersey. Highland Park is located in central New Jersey and is an urban/suburban community of predominantly middle income residents. In recent years there has been an increase in low income residents with the majority of them locating in the Irving School area.

The school district consists of three elementary schools (K-5), a middle school, and a high school. Irving School is an Individually Guided Education/Multi-Unit

School (IGE/MUS-E), being one of the first in the state selected under the New Careers in Education program in 1972. As a result, the school is organized into units with Unit A consisting of first- and second-grade students; Unit B consisting of second- and third-grade students; and Unit C consisting of fourth- and fifth-grade students. A unit leader works with four or five teachers in each unit with approximately 90 students. Cross-unit grouping occasionally takes place and the three special education classes are generally mainstreamed for part or most of the day.

A total of 50 students from the third, fourth, and fifth grades were included in this study. Ten students were selected at the third-grade level and 20 each at the fourth- and fifth-grade levels on the basis of their scores on the Gates-MacGinitie Reading Test.

Tests

The Gates-MacGinitie Reading Test, Primary C, Form 1, comprehension subtest was used with the third-grade students and the Gates-MacGinitie Reading Test, Survey D, Form 1, comprehension subtest was used with the fourth- and fifth-grade students.

The Gates-MacGinitie tests have a standard score mean of 50 with a standard deviation (SD) of 10. "Average" readers were randomly selected from students whose standard scores fell between ±.5 (45-55). There were 10 each selected at the third-, fourth-, and fifth-grade levels in

this category. "Poor" readers were randomly selected from students whose standard scores were less than 1 SD below the mean (40). There were 10 each selected at the fourth- and fifth-grade levels. Table 1 presents the mean comprehension scores of these groups. Copies of the Gates-MacGinitie Reading Tests are found in Appendix A.

Construction of the Experiment Materials

Eight paragraphs were constructed with two paragraphs at each of the following reading levels: second, third, fourth, and fifth. Existing paragraphs from the Classroom Reading Inventory (Silvaroli, 1973) and the Sucher-Allred Reading Placement Inventory (Sucher & Allred, 1973) were modified and other paragraphs written to meet the following criteria:

1. Each paragraph had at least nine lines or approximately 100 words.

2. The modified paragraphs were of the proper readability as determined by the Fry Readability Graph (1968) and the Spache Readability Formula, revised (1974). That is, there were two paragraphs at each of the following levels: second, third, fourth, and fifth. Copies of the experimental paragraphs are presented in Appendix B.

Construction of the Testing Apparatus

A scan box was used modeled after Neisser's (1963) apparatus. It is a box with an opaque glass in the front surface which was used to present the paragraphs. It was

TABLE 1

MEAN COMPREHENSION SCORES FOR THE EXPERIMENTAL GROUPS ON THE COMPREHENSION SUBTEST OF THE GATES-MACGINITIE READING TESTS, PRIMARY C AND SURVEY D

Group	N Students	M Grade Score	SD
Poor fourth[a]	10	2.5	0.21
Poor fifth[a]	10	3.3	0.38
Average third[b]	10	3.9	0.61
Average fourth[a]	10	4.8	0.47
Average fifth[a]	10	5.6	1.14

[a]Gates-MacGinitie Reading Test, Survey D, Form 1.

[b]Gates-MacGinitie Reading Test, Primary C, Form 1.

so designed that the students could only see through the opaque glass to read the paragraphs on cards when a light inside the box was on. A switch was used to activate the light; when the experimenter pushed the switch, the light inside the box could be turned on or off.

Collection of Data

Pupils were grouped by grade level and administered the Gates-MacGinitie tests by the classroom teachers according to the instructions in the test manual. This was done early in February, 1976.

Those pupils selected for eye-voice span measurement were tested individually during a three-week period in February, 1976. Figure 1 indicates which paragraphs were used with each of the five groups.

Each pupil was given a practice paragraph to become accustomed to the testing procedure and was told to read the paragraph as if he or she were reading a book. Each pupil was encouraged to read as far as possible after the light-out point.

The experimental paragraphs each had three points where EVS was measured. Three sentences were selected with the light-out point occurring at the second word in each sentence. There were at least six words in the sentence beyond the light-out point on the same line. Since each paragraph had 3 measures of EVS, 12 measures of EVS were taken for each student--6 at each level of difficulty. To

Group	Practice Paragraph	Experimental Paragraphs 2	3	4	5
Average third	x	x	x		
Average fourth	x	x		x	
Poor fourth	x	x			
Average fifth	x	x			x
Poor fifth	x	x	x		

Note. N = 10.

Figure 1. Design of the study.

control for unequal difficulty, the order of presentation of the paragraphs was alternated for each student.

Each student's performance was tape recorded to facilitate accurate scoring of EVS (the number of correct whole words read after light-out) and to allow the testing to proceed as quickly as possible. The switch used to operate the light made a "click" when turned on or off which was loud enough to be recorded on the tape. Thus, there was no question during the scoring as to when the experimenter had turned out the light.

Treatment of Data

Eye-voice spans were calculated for each pupil for each paragraph read. These scores are presented in Appendix C. From these, mean EVS scores were derived for each group of average and poor readers for each of the paragraphs.

An analysis of variance was employed to test the null hypothesis that all the population means were equal. T-tests were used to determine significance of difference among the mean EVS scores.

CHAPTER IV

RESULTS AND DISCUSSION

This chapter presents an analysis and discussion of the data as related to the questions raised in Chapter I.

Results

The mean eye-voice span scores of five groups of students tested are presented in Table 2. To determine if significant differences exist among the mean scores, an analysis of variance was used. As indicated in Table 3, the F ratio of 5.30 is significant beyond the .001 level.

On the basis of the analysis of variance, t-tests were performed on each pair of means to test the three hypotheses of this study.

Hypothesis 1.--To test the first hypothesis that there is a significant difference in EVS between the experimental groups when they read at their ability levels, t-tests were performed on each pair of means. Table 4 presents the results of these tests.

The first hypothesis was rejected in the case of the average fourth-grade group compared to the average fifth- and poor fourth- and fifth-grade groups (Figure 2) and in the case of the poor fourth-grade group compared to

TABLE 2

MEAN EYE-VOICE SPAN SCORES IN WHOLE WORDS OF THE EXPERIMENTAL GROUPS READING MATERIAL VARYING IN READABILITY FROM SECOND TO FIFTH GRADE (N = 10 x 5 groups)

Group	Readability	M Words	SD
Poor fourth	2	1.65	0.56
Poor fifth	2	2.08	0.47
Average third	2	1.22	0.58
Average fourth	2	2.09	0.98
Average fifth	2	2.43	0.81
Poor fifth	3	1.53	0.35
Average third	3	.98	0.47
Average fourth	4	1.94	0.74
Average fifth	5	2.17	0.69

TABLE 3

ANALYSIS OF VARIANCE ON EYE-VOICE SPAN SCORES OF THE EXPERIMENTAL GROUPS WHEN READING MATERIAL FROM SECOND- TO FIFTH-GRADE DIFFICULTY (N = 50)

Source of Variation	Sum of Squared Deviations	df	Mean Squared	F	p
Among samples	18.20	8	2.27	5.30	.001
Within samples	34.76	81	0.43		
Total	52.96	89			

TABLE 4

T-TESTS OF THE MEAN EYE-VOICE SPAN SCORES OF THE EXPERIMENTAL GROUPS READING AT ABILITY LEVEL

Groups	M	SD	df	t	p
Comparing average third with other groups					
Avg. 3	.98	.47			
Avg. 4	1.94	.74	18	3.46	.01
Avg. 3	.98	.47			
Avg. 5	2.17	.69	18	4.54	.001
Avg. 3	.98	.47			
Poor 4	1.65	.56	18	2.88	.01
Avg. 3	.98	.47			
Poor 5	1.53	.35	18	2.91	.01
Comparing average fourth with other groups					
Avg. 4	1.94	.74			
Avg. 5	2.17	.69	18	0.73	n.s.
Avg. 4	1.94	.74			
Poor 4	1.65	.56	18	0.99	n.s.
Avg. 4	1.94	.74			
Poor 5	1.53	.35	18	1.57	n.s.
Comparing poor and average fifth with other groups					
Poor 5	1.53	.35			
Poor 4	1.65	.56	18	0.57	n.s.
Poor 4	1.65	.56			
Avg. 5	2.17	.69	18	1.86	n.s.
Poor 5	1.53	.35			
Avg. 5	2.17	.69	18	2.62	.02

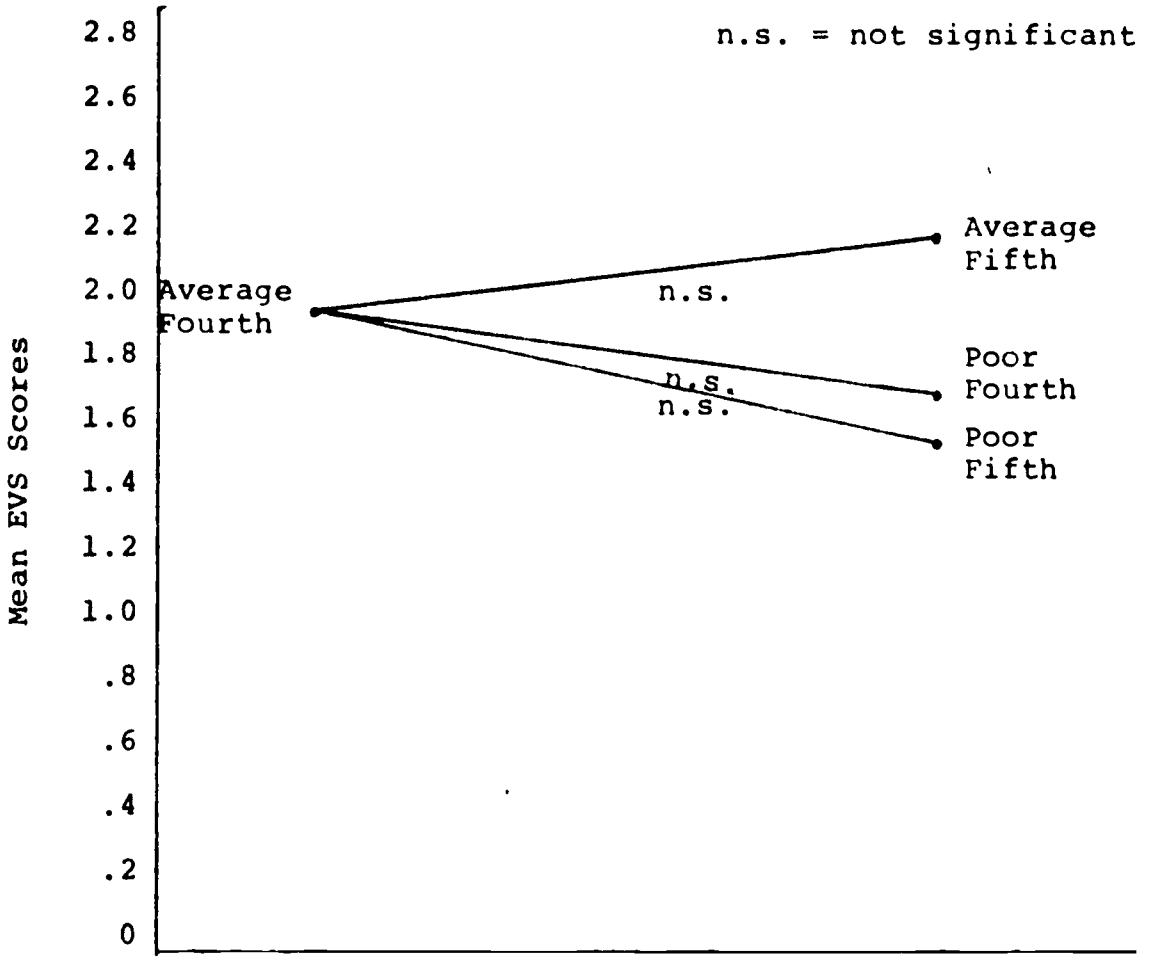

Figure 2. Mean eye-voice span scores at ability level materials for average fourth- compared to average fifth-, poor fourth-, and poor fifth-grade groups.

the poor and average fifth-grade groups (Figure 3).

The first hypothesis was retained in all instances where the average third-grade group was compared to all other groups and where the poor fifth-grade group was compared to the average fifth-grade group (Figure 4).

In addition, where the grade levels of the groups were different, the higher grade group had a higher EVS than the lower group, regardless of reading ability with the exception of the poor fourth-grade group compared to the poor fifth-grade group where the difference was not significant (Figure 5). The average third-grade group's reading ability was higher than both the poor fourth- and poor fifth-grade groups and yet its EVS was significantly lower than both those groups.

Hypothesis 2.--To test the second hypothesis that there is a significant difference in EVS when second-grade materials are read compared to materials at ability level for the experimental groups, t-tests were performed on each pair of means. Table 5 presents the results of these tests.

The second hypothesis was rejected in all cases except when the means of the poor fifth-grade group are compared when reading at second- and third-grade difficulty level. In the case of the average third-, fourth-, and fifth-grade groups, there is no significant difference in EVS when reading more difficult material compared to easier material.

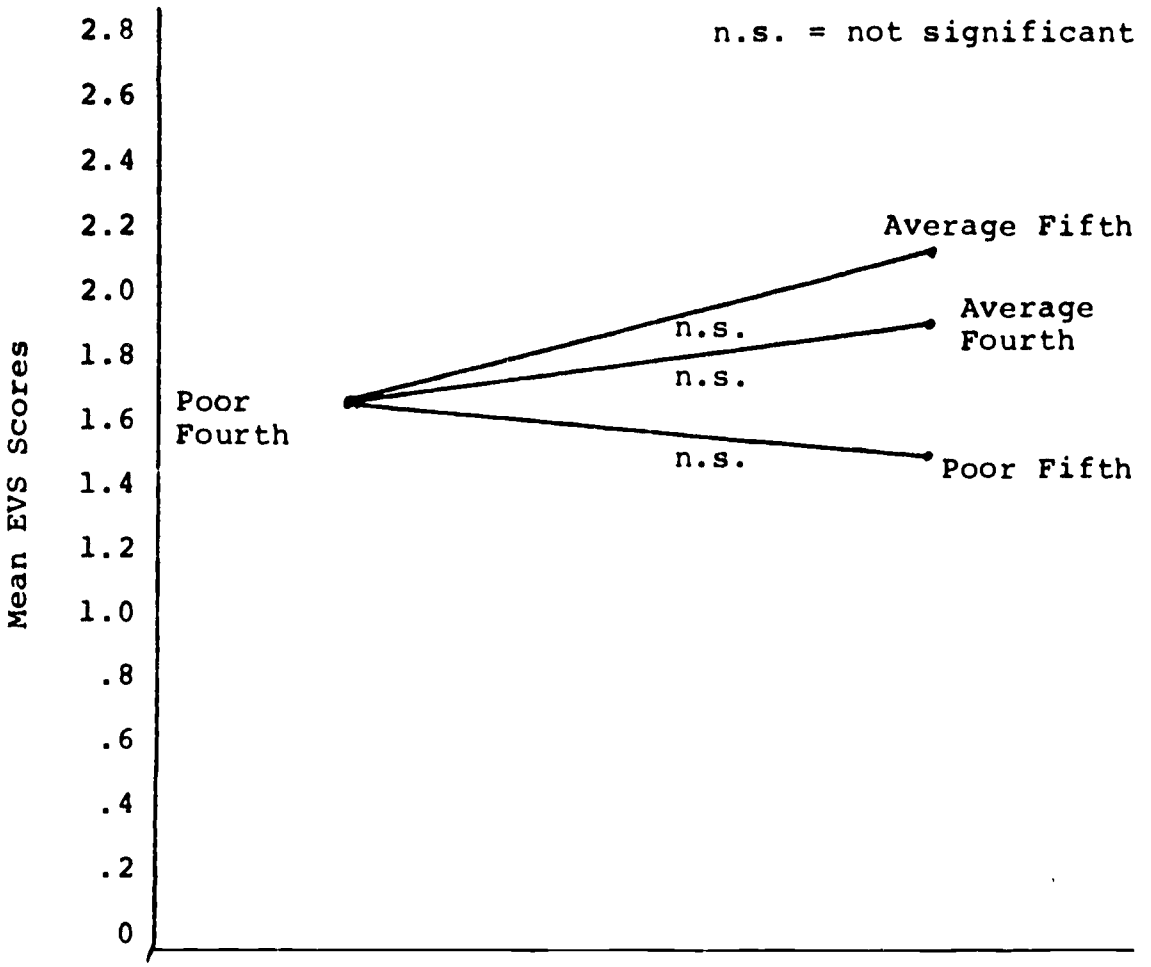

Figure 3. Mean eye-voice span scores at ability level material for poor fourth-, average fourth-, average fifth-, and poor fifth-grade groups.

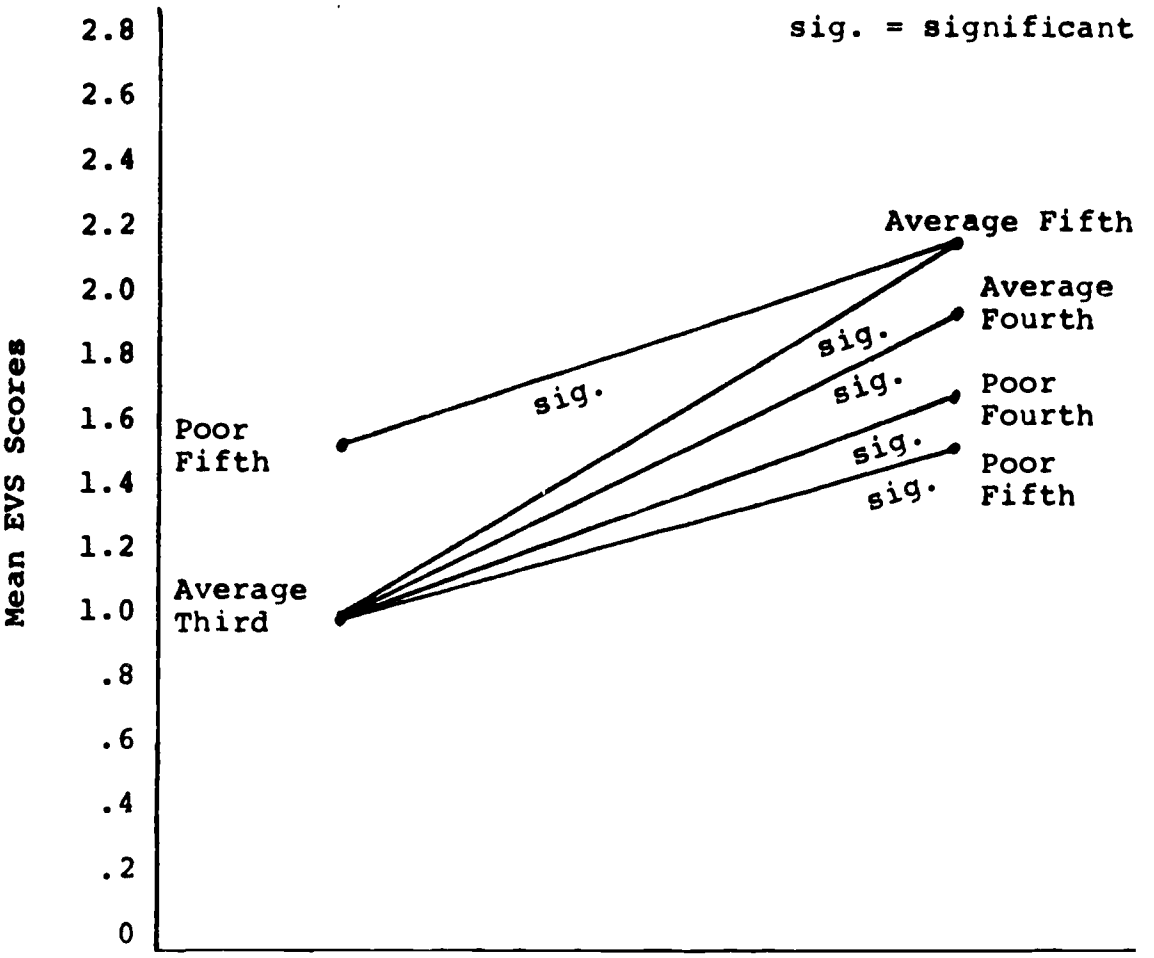

Figure 4. Comparison of poor fifth- and average third-grade groups with other groups when reading at ability level.

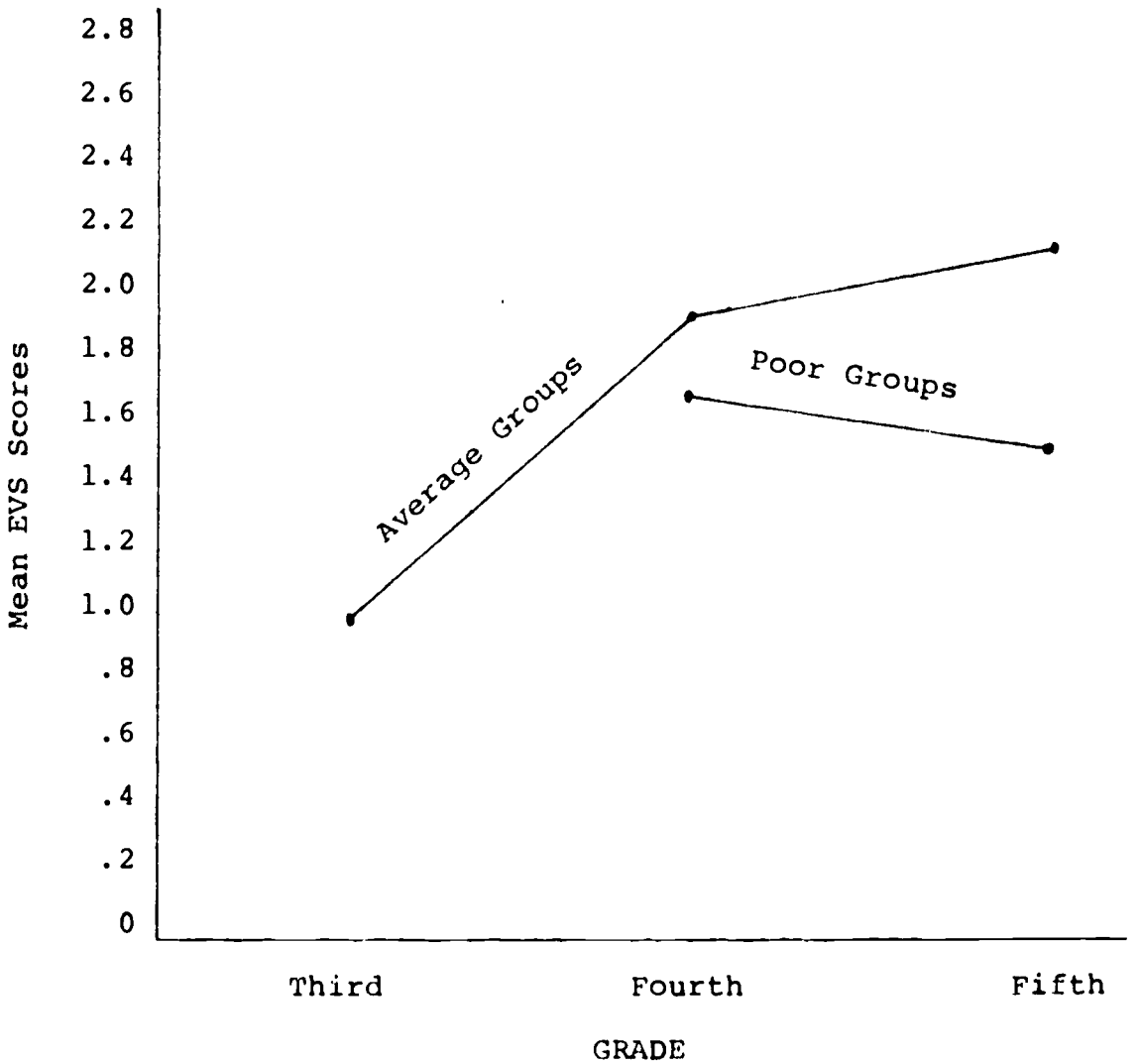

Figure 5. Mean eye-voice span scores of average and poor groups when reading at ability level.

TABLE 5

T-TESTS OF THE MEAN EYE-VOICE SPAN SCORES OF THE EXPERIMENTAL GROUPS WHEN READING MATERIAL AT SECOND-GRADE DIFFICULTY AND MATERIAL AT THEIR ABILITY LEVEL (N = 10)

Group	Readability	M	SD	df	t	p
Average third	2	1.22	.58	18	1.63	n.s.
Average third	3	.98	.47			
Average fourth	2	2.09	.98	18	0.79	n.s.
Average fourth	4	1.94	.74			
Average fifth	2	2.43	.81	18	1.57	n.s.
Average fifth	5	2.17	.69			
Poor fifth	2	2.08	.47	18	4.54	.01
Poor fifth	3	1.53	.35			

It can be noted, however, that the direction of the mean scores in all groups shows that, in absolute terms, the EVS is longer for the easier material with a significant difference between the means for the poor fifth-grade group (Figure 6).

Hypothesis 3.--To test the third hypothesis that there is a significant difference in EVS between the experimental groups when they all read material of second-grade difficulty, t-tests were performed on each pair of means. The results of these tests are presented in Table 6.

The third hypothesis was retained when the average third-grade group was compared to the average fourth-, fifth-, and poor fifth-grade groups and when the poor fourth-grade group was compared to the average fifth-grade group. It was rejected in all other instances.

Again, as in Hypothesis 1, it can be noted that when the grade levels of the groups were different, the higher grade group had a higher EVS than the lower grade group (Figure 7).

It can also be noted that when the groups are all reading the same material, in only one of the six instances is the EVS of the poor fourth- and fifth-grade groups significantly lower than readers of greater ability and that is when the average fifth-grade group is compared to the poor fourth-grade group (Figure 8).

Discussion

The results of this study demonstrate, as noted in the literature, that EVS gets longer as students get older

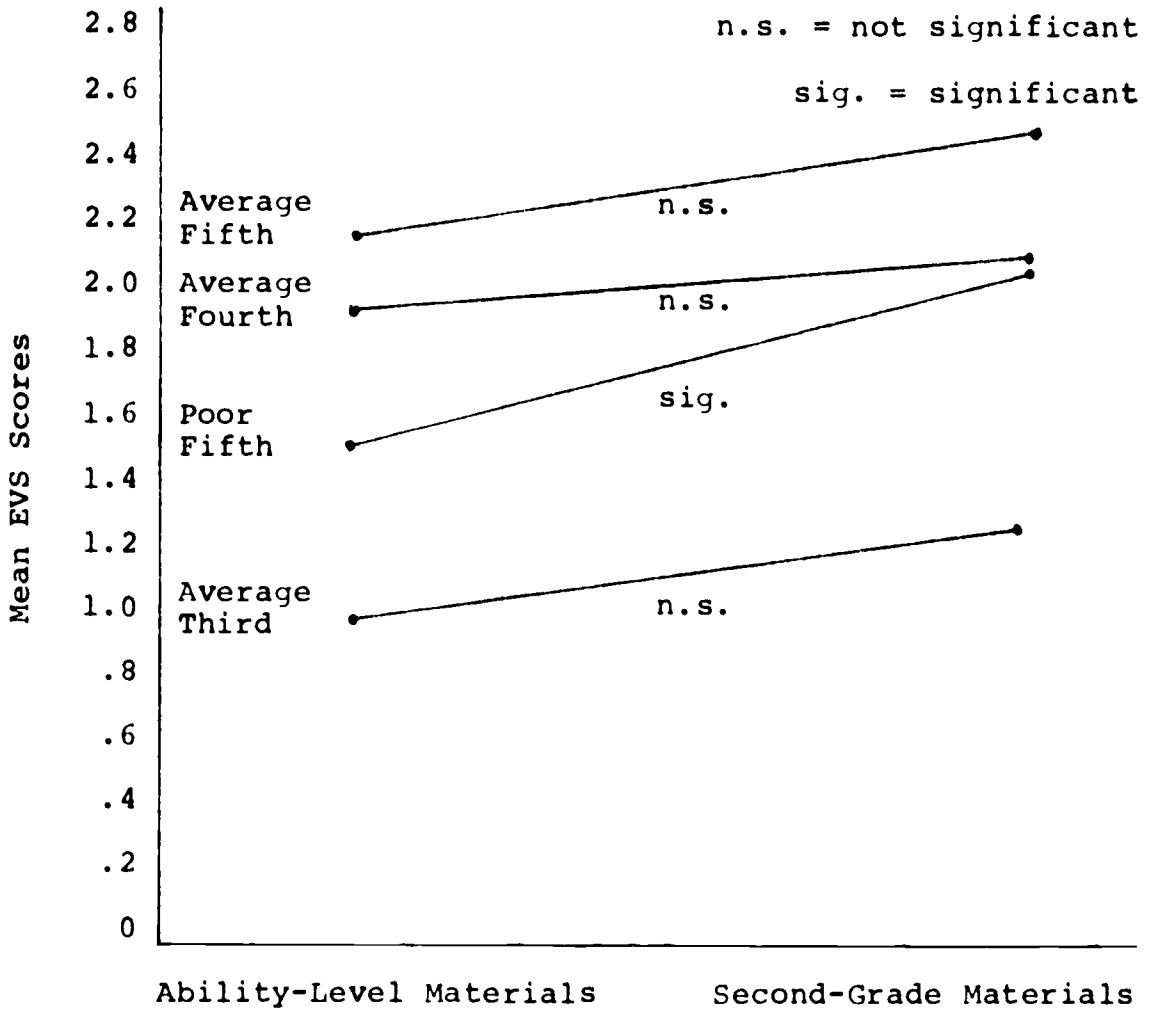

Figure 6. Comparison of mean EVS scores of average third-, fourth-, fifth-, and poor fifth-grade groups when reading ability-level and second-grade materials.

TABLE 6

T-TESTS OF THE MEAN EYE-VOICE SPAN SCORES OF THE EXPERIMENTAL GROUPS WHEN READING AT SECOND-GRADE DIFFICULTY

Groups	M	SD	df	t	p
Comparing average groups					
Avg. 3	1.22	.58			
Avg. 4	2.09	.98	18	2.92	.05
Avg. 3	1.22	.58			
Avg. 5	2.43	.81	18	3.81	.01
Avg. 4	2.09	.98			
Avg. 5	2.43	.81	18	0.84	n.s.
Comparing poor with average groups					
Poor 4	1.65	.56			
Avg. 3	1.22	.58	18	1.69	n.s.
Poor 5	2.08	.47			
Avg. 3	1.22	.58	18	3.61	.01
Poor 4	1.65	.56			
Avg. 4	2.09	.98	18	1.23	n.s.
Poor 4	1.65	.56			
Avg. 5	2.43	.81	18	2.47	.05
Poor 5	2.08	.47			
Avg. 4	2.09	.98	18	0.03	n.s.
Poor 5	2.08	.47			
Avg. 5	2.43	.81	18	1.15	n.s.
Comparing poor groups					
Poor 4	1.65	.56			
Poor 5	2.08	.47	18	1.82	n.s.

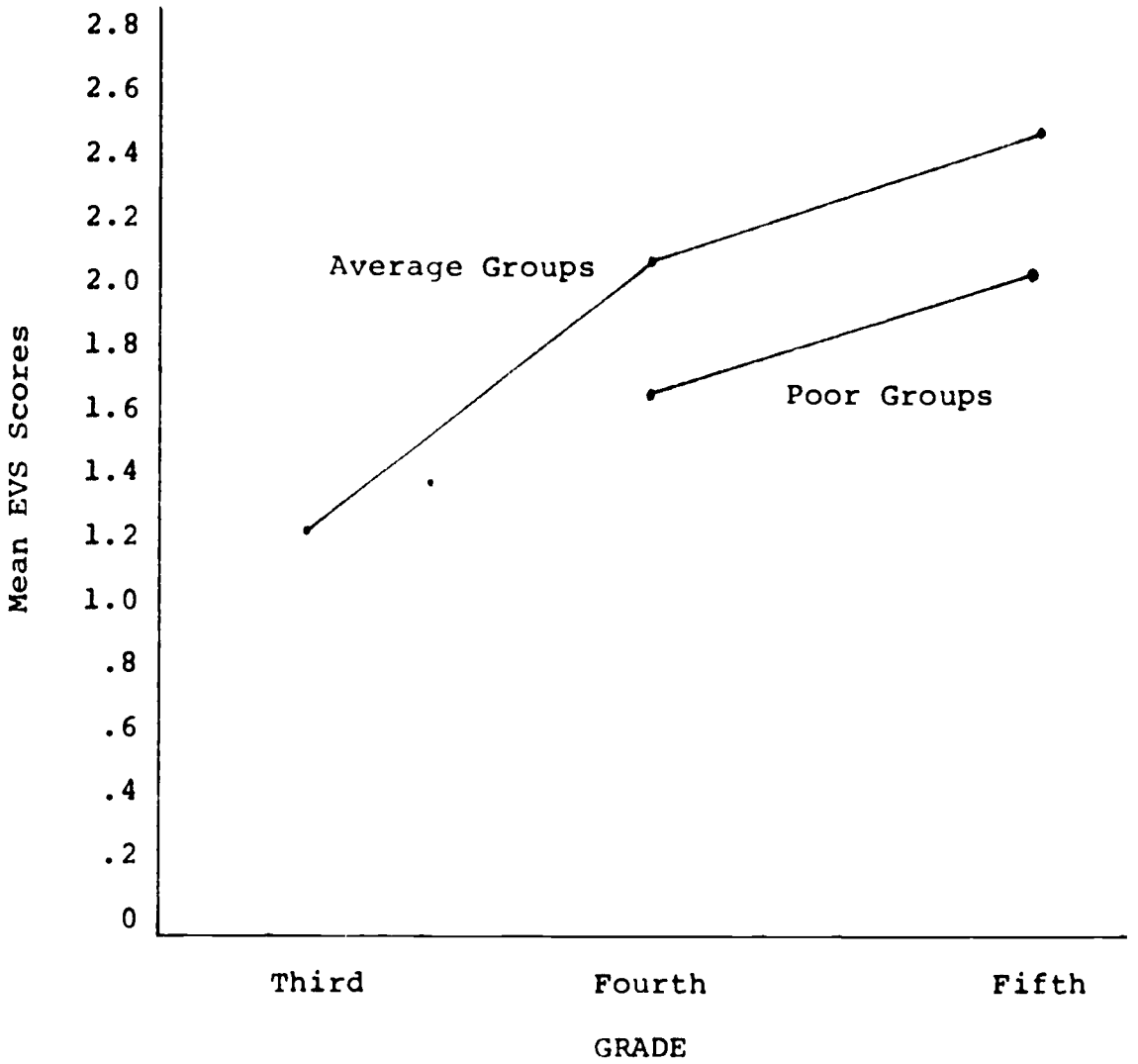

Figure 7. Mean eye-voice span scores of average and poor groups when reading second-grade material.

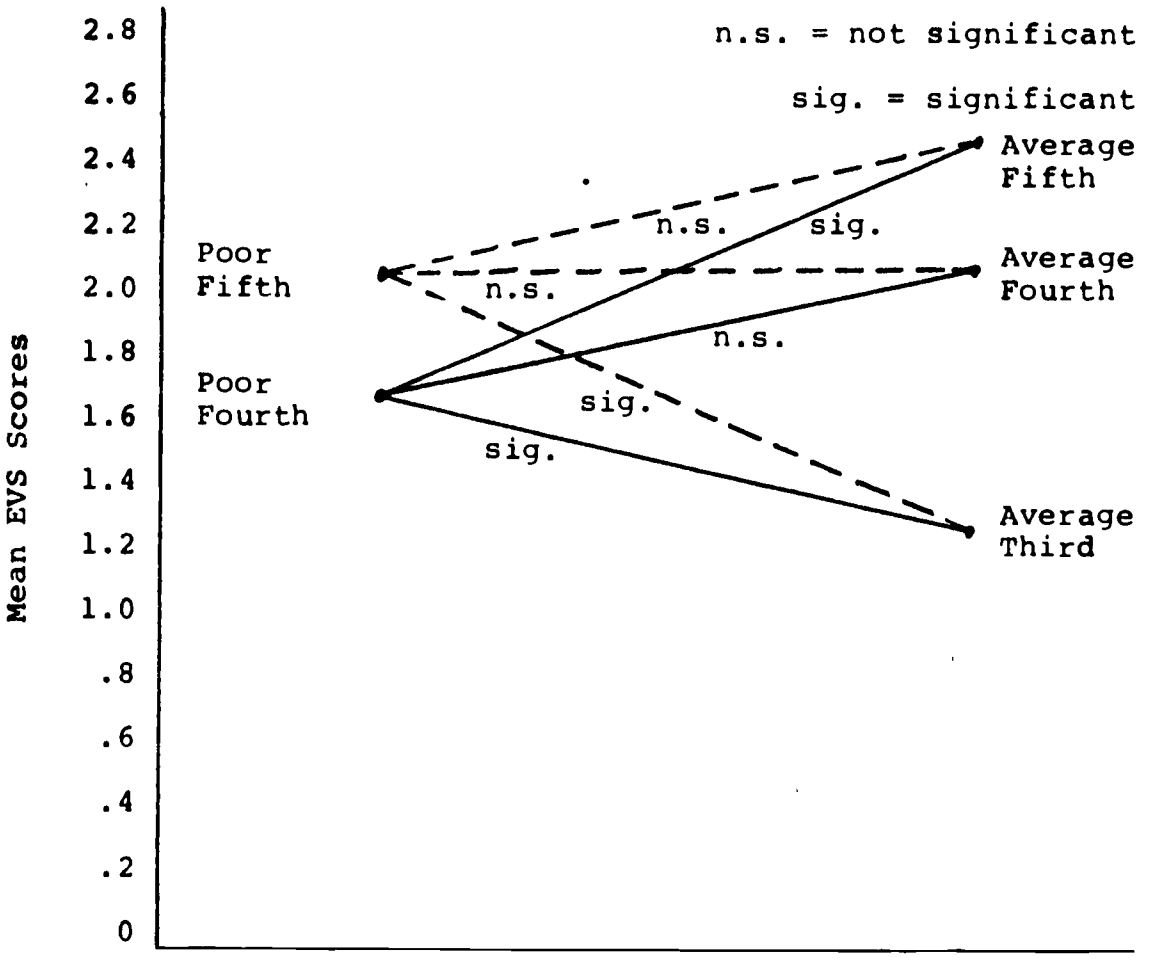

Figure 8. EVS of poor groups compared with average groups on second-grade material.

(move to higher grades). What was not noted in the literature, however, but can be seen in this study is that this holds for poorer students as well as average students. In fact, there is no significant difference among poor and average fourth-grade groups, poor and average fifth-grade groups, and poor fifth- and average fourth-grade groups when reading at ability level or at second-grade level (Figure 9). Nor is there any significant difference among poor fourth- and average fifth-grade groups when reading at ability level even though these two groups represent the widest range in reading ability. It seems clear that, in this study, grade in school (age), not reading ability, is the significant factor in EVS.

In this regard, the performance of the poor fifth- and average third-grade groups is interesting (Figure 10). Both have comparable ability as measured by the Gates-MacGinitie test. However, the EVS of the poor fifth-grade group is significantly greater than that of the average third-grade group on every measure of the study. This is true also for the poor fourth-grade group compared to the average third-grade group when reading at ability level (Figure 11). When both read at second-grade level the poor fourth-grade group is not significantly different than the average third-grade group even though second-grade readability matches the ability level of the poor fourth-grade group whereas it is easier material for the average third-grade group.

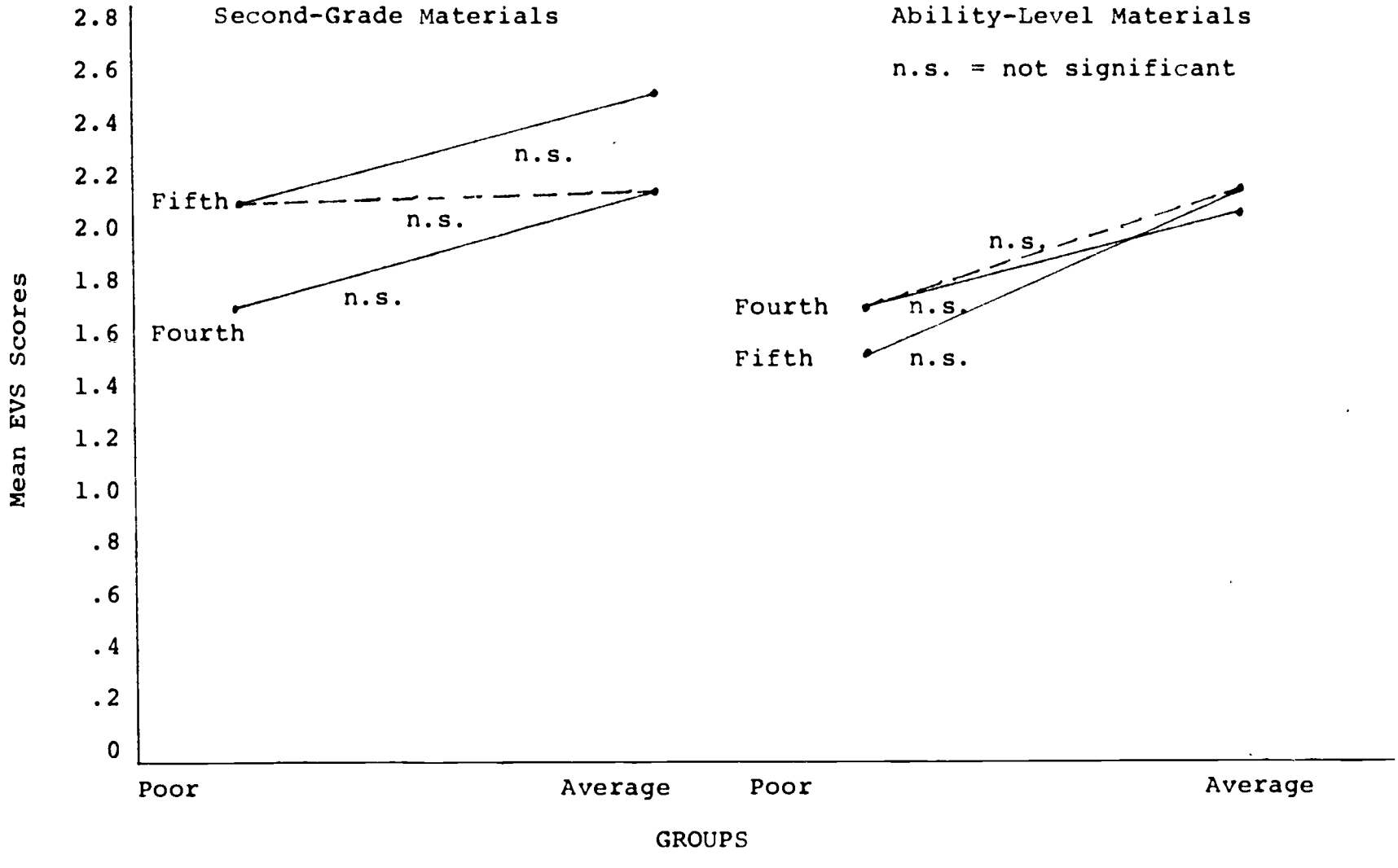

Figure 9. EVS of average and poor fourth- and fifth-grade groups when reading at second or ability level materials.

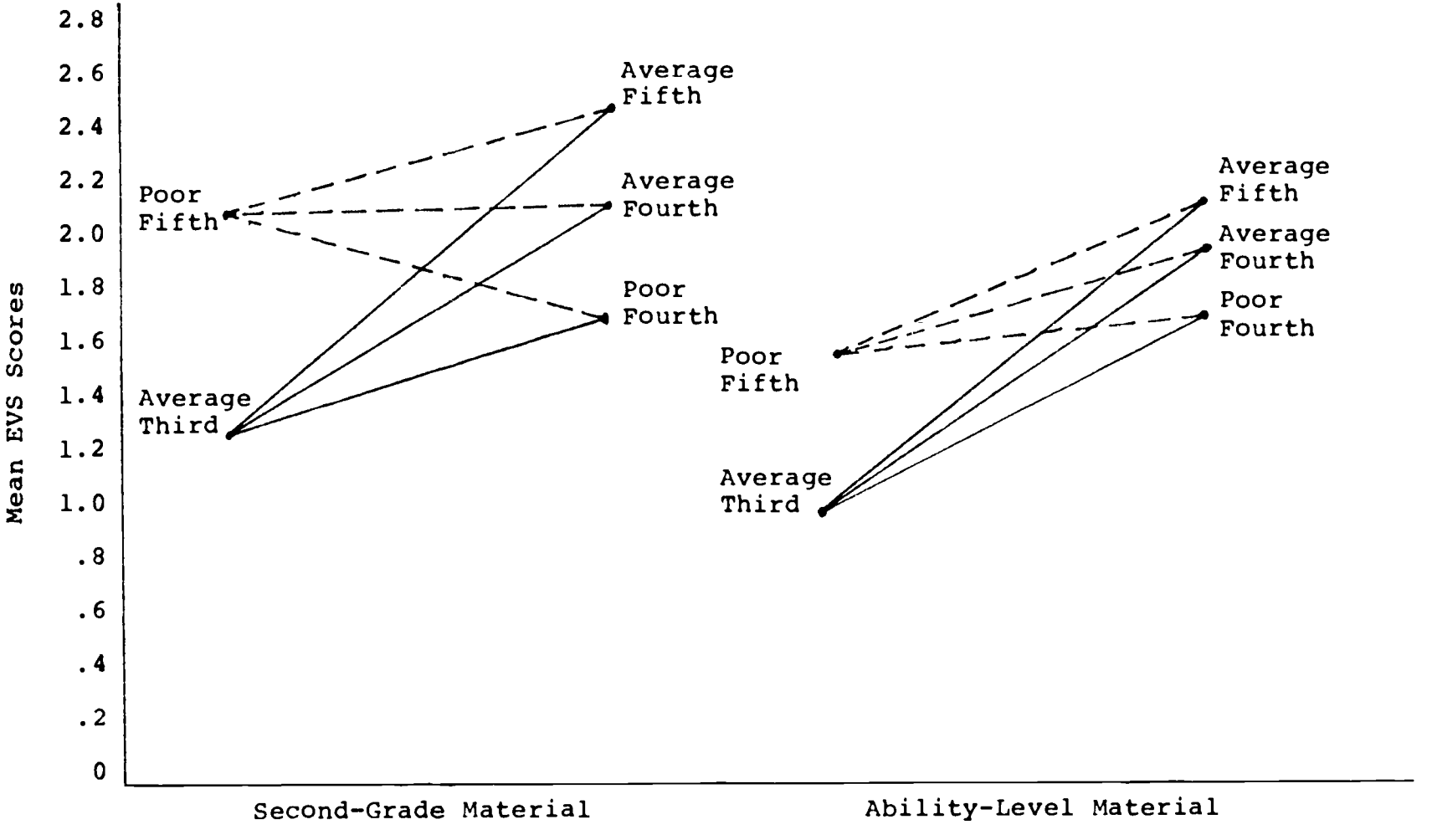

Figure 10. Poor fifth-grade group compared to average third-grade group at second grade and ability-level material.

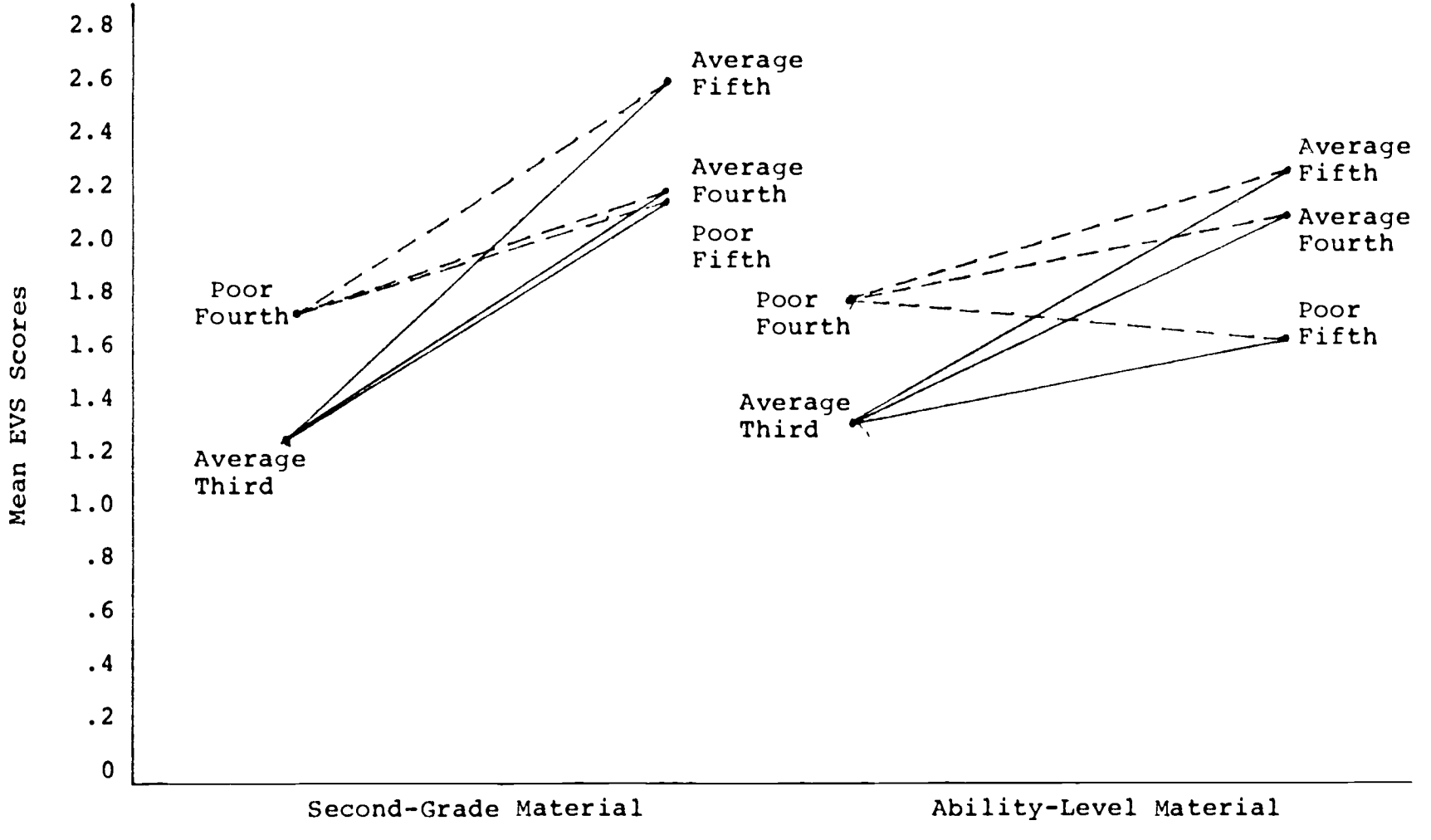

Figure 11. Poor fourth-grade group compared to average third-grade group at second grade and ability-level material.

The results demonstrate, as previously illustrated in Figure 9 (p. 36), that poor fourth- and fifth-grade groups have comparable EVS scores to average fourth- and fifth-grade groups. However, average third-grade students function quite differently in terms of EVS than older students who read less well than they do (Figure 12). The third-grade group reads better but have a shorter EVS.

It was also noted that for average third-, fourth-, and fifth-grade groups, difficulty of material has no significant effect on EVS. Although, in absolute terms, easier material resulted in a longer EVS for average students, only poor fifth-grade students had a significantly longer EVS on easier material (Figure 6, p. 31).

In summary, the following can be stated: (1) It appears that eye-voice span is more a function of grade (age) than reading ability; (2) eye-voice span increases with years in school; (3) eye-voice span tends to increase as material becomes easier but not significantly except in the case of poor readers; (4) older poor readers typically out-perform average third-grade readers on EVS measures even though third-grade readers have more ability; and (5) older poor readers tend to perform as well as average readers in the same grade on EVS measures even though the average readers have more ability.

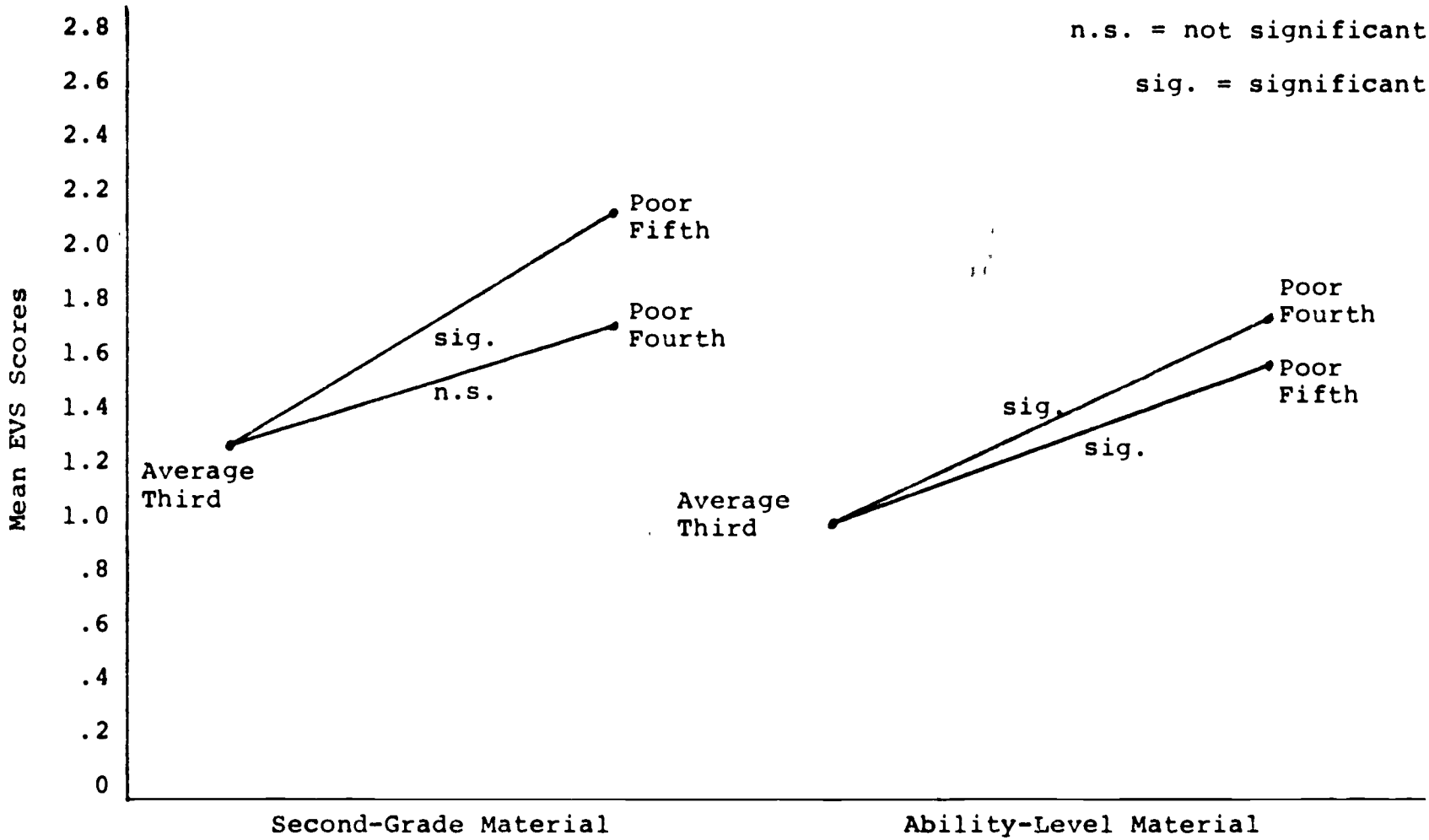

Figure 12. Average third-grade group compared to poor fourth- and poor fifth-grade groups at second grade and ability level material.

CHAPTER V

SUMMARY AND CONCLUSIONS

This study examined the effect on eye-voice span of varying the spread between reading ability and readability in average third-, fourth-, fifth-, and poor fourth- and fifth-grade students. Fifty students were selected by means of a standardized test and tested for EVS on paragraphs ranging in readability from second- to fifth-grade difficulty.

The results showed that, as noted in the literature, EVS increases with age (grade).

Further, it was shown that difficulty of material has no significant effect on EVS except for poor students who had a significantly longer EVS on easier material. However, EVS was consistently longer on easier material for all groups. This is a strong indication that the difficulty of the material does influence EVS. All four groups showed this trend but the difference was significant for the poor fifth-grade group.

The performance of the average third-grade group in relation to the other groups on EVS measures indicates that their EVS is shorter than older students, even older students of less ability.

In this regard, it appears that though EVS is a reading behavior, it is only slightly related to reading ability and much more a function of age or grade in school. The longer EVS of older students may relate to more experience with oral language and more experience anticipating speech patterns. It is also possible there is a developmental factor involved in the evident difference between third-grade and older students.

Limitations

The conclusions of this study should be interpreted in light of the following limitations:

1. No students of above average ability were tested and so no conclusions can be drawn about their EVS. Also, no students were tested on material above their ability level and so conclusions relating to difficulty of material hold only for material at or below ability level.

2. The number of students tested and the type of school and community make generalizations to other settings difficult.

3. Use of a 20 minute comprehension subtest as the only means of identifying average and poor students, while an improvement over other studies cited, could be considered a limitation.

4. The question of difficulty of material read by the students was handled by using two readability formulas. This again is an improvement over most studies cited but

only scratches the surface of the question of how difficult the material is.

5. The sample size was small at each level and no poor third-grade group was included. A larger sample and the inclusion of a poor third-grade group would strengthen the design of this study.

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APPENDIX A

GATES-MACGINITIE READING TESTS,

PRIMARY C AND SURVEY D

Forms 1, Vocabulary and Comprehension removed due to copyright restrictions.

Published by Teachers College Press, Teachers College, Columbia University, New York

EXPERIMENTAL PARAGRAPHS

Second-Grade Readability

Hillman Street had been roped off for a block party.

All along* the street children were carrying popcorn.

Bob carried popcorn to his stand. Mark was selling cake.

And Ann was selling cookies.

Maria was* putting candy on a long counter when she smelled smoke.

"Fire! Fire!" she shouted.

Mr. Ryan, who was running the block party, ran up to the children.

"Take down* the stands so the fire engines can get through," he said.

After the fire was out, Maria said, "Now we'll have to call off the party." "It would take all day to put the stands up again," said Bob.

"I have an idea," said Ann.

Second-Grade Readability

Steve Silver lived on the third floor of a big apartment house.

His friend Jim Rogers lived in the same building six floors above Steve.

One afternoon* both Mrs. Silver and Mrs. Rogers had gone to a meeting, and Jim was staying with Steve.

The boys were playing with Steve's dog Star.

They had* taught Star to stand on his back legs.

The telephone ran while the boys were playing. It was Mr. Silver.

He said,* "Steve, I have time to help you pick out your new suit today. Get a taxicab and have the driver take you to Wood's Men's Store.

I'll meet you and pay the driver."

"May I invite Jim?" asked Steve. He's staying with me today."

Third-Grade Readability

The day the Homan's left on vacation there was lots of work to do.

First, Mrs. Homan packed the items that she and her family would need.

Then she* made snacks for them to eat on the way.

This work kept her occupied all morning.

Terry, her* son, polished the car so it was like new.

When he was through, he drove it to a gas station.

There a* man put in the gas and checked the tires to make sure there was enough air in them.

Mary Homan was busy calling all her friends to say goodbye.

Glancing out the door, she saw her dad fall down as he tried to load the car with one hand while holding a large suitcase in the other.

Third-Grade Readability

Mrs. Young put on her new glasses. Then she went out in the bright sun.

She admired the* large rose in bloom on her front lawn.

She went forward to examine it and then she stopped in shock.

She hadn't had a rose there for years!

Mrs. Young* removed her glasses in haste and rubbed her eyes.

The rose was gone. She replaced them and the rose reappeared.

In suspense, Mrs. Young looked up and down the street.

To her* surprise, horses trotted on the road not cars.

There were no lights, the people wore old-fashioned clothes, and things seemed to move in slow motion.

Fourth-Grade Readability

The history of baseball shows that the game has changed a great deal since it was first played. In 1839, Abner Doubleday set up the rules for playing a baseball game. Later on, uniforms appeared.

The players* wore long pants, a fancy white shirt and a straw hat.

The umpire wore a long coat, a tall silk hat and carried a cane.

Rakes, ax* handles and tree branches were used as bats.

The first World Series was played in 1903.

Baseball fans* wanted to see the top teams from the two major leagues play. The winners would be the champions of the baseball world.

Fourth-Grade Readability

People riding in wagon trains did not have our easy ways of traveling.

Their trip was made in what was called a Conestoga Wagon.

These were* good wagons but they were not comfortable.

The wagons were large. They had broad wooden seats.

Sitting on these seats was a weary task. The bumping and churning of the ride* could be compared to being on a ship in rough water.

When this* old wagon reached a river the wheels were removed.

Then the wagon was made into a flat boat. These are but a few of the interesting facts about these old wagons.

Fifth-Grade Readability

A team of experts proved that seals had a keen sense of hearing.

These men* trained blind seals to expect food when they heard sounds.

The seals always began snapping when a shrill signal was sounded.

It was proved that even a soft signal, a considerable distance away, could make these sea mammals respond.

That should* make the fisherman who splashes his oars, or talks loudly, start thinking.

The same* team of experts also trained seals to recognize different sounds.

One bell-tone meant food, two bell-tones meant no food. In the beginning, the seals made mistakes when the two bell-tones were sounded.

Fifth-Grade Readability

The Praying Mantis is a gardener's helper.

The large* insect eats many smaller insects that ruin plants.

The type of Praying Mantis we see was brought to America from Europe.

The Praying Mantis is actually a cousin of the grasshopper and cricket.

The male is somewhat smaller than his female partner.

Unlike the cricket, it does not make a merry noise.

It waits* silently on a leaf or a stem in search of prey.

The Praying Mantis is different from other insects in one way.

Most insects turn* their entire bodies to see behind them.

The Praying Mantis can remain in one spot and watch everything because its eyes rotate in a variety of directions.

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*Light-out point.

APPENDIX C

RAW EYE-VOICE SPAN SCORES

RAW EYE-VOICE SPAN SCORES IN WHOLE WORDS OF THE EXPERIMENTAL GROUPS WHEN READING MATERIAL AT ABILITY LEVEL

Subjects	EVS	Subjects	EVS	Subjects	EVS	Subjects	EVS	Subjects	EVS
Average Third		Average Fourth		Average Fifth		Poor Fourth		Poor Fifth	
1	.67	1	2.00	1	3.33	1	1.67	1	1.83
2	1.83	2	1.67	2	3.17	2	2.50	2	1.83
3	.67	3	.05	3	1.83	3	2.17	3	1.67
4	1.33	4	2.83	4	1.67	4	1.33	4	1.67
5	1.00	5	2.00	5	2.83	5	2.00	5	1.00
6	1.33	6	1.83	6	2.17	6	.50	6	1.00
7	.17	7	2.33	7	1.83	7	1.83	7	2.00
8	1.00	8	2.20	8	1.33	8	1.83	8	1.33
9	1.17	9	2.17	9	1.67	9	1.50	9	1.33
10	.67	10	2.33	10	1.83	10	1.17	10	1.67

RAW EYE-VOICE SPAN SCORES IN WHOLE WORDS OF THE EXPERIMENTAL GROUPS WHEN READING MATERIAL OF SECOND-GRADE DIFFICULTY

Subjects	EVS	Subjects	EVS	Subjects	EVS	Subjects	EVS	Subjects	EVS
Average Third		Average Fourth		Average Fifth		Poor Fourth		Poor Fifth	
1	1.50	1	1.83	1	3.00	1	1.67	1	1.50
2	2.00	2	2.00	2	3.17	2	2.50	2	2.67
3	.83	3	.06	3	1.33	3	2.17	3	2.50
4	1.50	4	2.50	4	2.50	4	1.33	4	2.67
5	.67	5	1.67	5	3.67	5	2.00	5	1.67
6	1.67	6	1.67	6	2.50	6	.50	6	1.50
7	.33	7	2.17	7	2.50	7	1.83	7	2.33
8	.50	8	3.50	8	1.17	8	1.83	8	2.17
9	1.50	9	2.00	9	1.67	9	1.50	9	1.67
10	1.67	10	3.50	10	2.83	10	1.17	10	2.17