DOCUMENT RESUME

ED 103 812 CS 001 672

AUTHOR	Kamm, Karlyn; Askov, Eunice
TITLE	The Effect of One Aspect of Sentence Structure, Embedded Parts, on Children's Comprehension.
PUB DATE	May 75
NOTE	14p.; Paper presented at the Annual Meeting of the International Reading Association (20th, New York City, May 13-16, 1975)
EDRS PRICE	MF-$0.76 HC-$1.58 PLUS POSTAGE
DESCRIPTORS	Elementary Education; Higher Education; *Readability; *Reading Ability; *Reading Comprehension; Reading Instruction; *Reading Research; Reading Skills; *Sentence Structure
IDENTIFIERS	*Embedding

ABSTRACT

This study investigated the effect of embedded parts (intervening words between the main subject and verb of a sentence) on young readers' abilities to comprehend when the embedded parts do not present a significant change in sentence structure. Two schools in Bemidji, Minnesota, were selected for the study: school one is located in a low socioeconomic area, while school two includes children from average or above average socioeconomic levels. Comprehension was tested through the use of the Wisconsin Design for Reading Skill Development Comprehension by questions pertaining to the detail contained either in the embedded test (Version E) or in another position in the sentence (Version C). Significant differences were found for school, sex, and grade main effects. No significant differences were found for the test version effect. (Author/RB)

THE EFFECT OF ONE ASPECT OF SENTENCE STRUCTURE, EMBEDDED PARTS, ON CHILDREN'S COMPREHENSION

Karlyn Kamm, University of Wisconsin-Madison
Eunice Askov, Pennsylvania State University

The investigators questioned whether the use of embedded parts (intervening words between the main subject and verb of a sentence) would affect young readers' abilities to comprehend. The overriding concern is that the position of certain factual material within a sentence may be a critical factor influencing a child's ability to get meaning from print.

Rationale

The effects of sentence structure on children's comprehension is a topic which researchers often debate. One specific issue of concern has been whether the use of subordinating clauses in sentences affects young readers' abilities to understand units of thought. One point of view regarding this issue is that although complexity of sentence structure has not traditionally been considered in determining difficulty of printed material, use of subordinate clauses has been found to be one factor among others contributing to the difficulty of a passage (1). The use and length of subordinate clauses are also considered among other measures in calculating the "syntactic density score," a "qualitative and quantitative description of linguistic structures" which may or may not be related to reading (2).

Pearson (3) offers another point of view regarding this issue. He concludes from a series of experiments that the use of subordinate clauses does not increase the difficulty level or affect readability. In fact, he concludes:

> Pedagogically, the data lend no support to the recommendation that the difficulty of written discourse can be reduced by eliminating subordinating constructions or reducing sentence length. When the semantic relation is held constant, and when the test question is relevant to the relation whose form is varied, either comprehension is equally efficient across forms or else the more subordinated and longer sentence forms elicit better comprehension.

Pearson further suggests that follow-up studies should check comprehension of sentences in different forms when presented in paragraphs. (He also suggests that different results may be obtained when the subject is able to look back through a paragraph to search for an answer.)

A concern related to the issue of the use of subordinate clauses is whether the position of subordinating clauses (at the beginning or end of the sentence) and/or the use of embedded parts affect readers' comprehension. Hamilton and Deese (4), for example, surveying results of other studies and of their own, conclude that sentences in which a subordinate clause followed the main clause (right-branching) were found much more comprehensible than the same sentence with the subordinate clause embedded between the subject and verb. (Although the subjects in their study were listening to sentences and then judging their comprehensibility, similar results might be expected if the subjects had read the material.)

The question proposed for investigation in this study was selected as a focus since the investigators felt the answer to whether embedded

parts would affect children's comprehension would have definite implications for further investigations into the effects of the use and position of subordinating clauses. If selections containing sentences in which a few words are inserted between the subject and verb should be more difficult for children to comprehend than ones containing the usual word order, then perhaps a critical point where comprehension breaks down for young readers can be identified. This investigation is the necessary basic step in the complicated process of determining specific problems children have in getting meaning from print. Certainly, additional information about comprehension problems children have should shed light on the entire process of creating readable materials for pupils of varying abilities.

Test Development

Pearson's recommendations to use paragraphs rather than single sentences were followed. The investigators also decided to test recognition rather than recall literal comprehension as Pearson (5) suggested. Two versions of the same material were needed--one containing sentences in which the subject and verb were interrupted by from one to a few words and one in which no interruptions occurred. A test from the Comprehension element of the Wisconsin Design for Reading Skill Development (6) was selected as suitable material for adaptation. The test, written for Level C (approximately second grade level) of the Wisconsin Design, is criterion-referenced, assessing mastery of the following objective:

> Objective: The child attends to and derives meaning from the important details in a simple selection written in the active voice.

Readability of the test at a second grade level was demonstrated in the Wisconsin Design for Reading Skill Development's Comprehension field test of several thousand students. The Design test, referred to as Version C in this study, was used by the control group. It was slightly changed to eliminate any words which might have been placed between the subjects and verbs. Any compound and/or complex sentences were converted into simple sentences.

Version C was then modified for the experimental group to include interruptions between the subject and verb in as many sentences as possible. This version became Version E. The interruptions consisted of up to three words which were adjectives, adverbs, adjectival or adverbial phrases, or nouns used in apposition. Comprehension questions were then written for Version E to assess children's ability to recognize details which appeared in the words inserted between the subjects and verbs. The same questions were also used for Version C; however, the detail for that form was located either at the beginning or end of the sentences--not between the subjects and verbs.

Sample sentences from each version are shown below with the accompanying comprehension question to clarify the nature of the tests. The sentences are taken from a short narrative selection, usually of about 50 words in length.

Version C: The colt got up. Slowly he walked across the field.

Version E: The colt got up. He slowly walked across the field.

Comprehension Question: How did the colt walk? A. gently; B. quickly; C. softly; D. slowly.

Seven paragraphs with twenty-one questions were used in the two versions. One example paragraph with questions was provided to clarify directions in taking the test.

Procedures

Two schools in Bemidji, Minnesota were selected for the study. School one is located in a low socio-economic area; school two includes children from average or above-average socio-economic levels. The schools were intentionally chosen to provide a range of backgrounds among the subjects.

The experimental and control groups consisted of all chilren in Grades 2, 3, and 4, stratified randomly by school and sex. The results for Grades 2 and 3 were of greatest interest to the investigators. It was anticipated that the test, regardless of version, would be too easy for fourth graders. However, they were included for purposes of comparison with second and third graders' performance, especially on Version E.

In each school a grade level was tested at a time. The experimental and control groups were separated in the school cafeteria. An investigator, working first with one group, read the directions and had the children work through the example paragraph. Then she followed the same procedures with the other group. The test was monitored by the children's teachers and by college students who were working in the school. Although no time limits were set, most children took about 15-20 minutes to complete the test. They were allowed to look back for their answers.

The Hoyt reliability coefficient, a measure of internal consistency, was calculated for each test version. The reliability coefficient for Version C was found to be .86 (standard deviation = 4.18); for Version E it was .97 (standard deviation = 4.85). Since the reliabilities of the tests were quite satisfactory, an analysis of variance was performed to determine differences between means for the four main effects--school, sex, grade, and test version.

Results and Discussion

The analysis of variance performed is summarized in Table 1. Significant differences ($p. < .001$) were found for the school, sex, and grade main effects. In looking at the subjects by school, it is apparent that the mean for school two is higher (19.72) than mean for school one (18.17). This difference was not unexpected since the children in school one do come from a lower socio-economic area. In looking at the subjects by sex, a higher mean (19.92) was found for the girls than for the boys (18.06). This difference in performance between males and females is also not unexpected since girls, especially in elementary school, tend to do better than boys. Regarding the grade main effect the means for the subjects in second (16.34), third (19.10), and fourth grade (20.80) show that the test was progressively easier for each higher grade. This result was expected since we usually assume fourth graders will do better than third graders, and that third graders will do better than second graders.

No significant differences were found between the control form (Version C), which did not have any embedded parts and the experimental form (Version E) which did have the embedded parts. The subjects found

the two forms to be of equal difficulty. They could apparently answer the questions about sentences with embedded parts as easily as they were able to answer questions about sentences without embedded parts. The investigators did expect that since fourth graders can, in general, easily handle straightforward second grade material (containing no interruptions between subject and verb), they might not experience significant difficulty when embedded parts were inserted. The interesting point is, however, that when second graders were reading material written at a second grade level, they also experienced no difficulty comprehending the facts contained in the embedded parts.

Additional findings included a significant ($p < .025$) sex by test version interaction (see Table 2). The males, when compared against themselves, did better on Version C (no embedded parts) and the females, when compared against themselves, did better on Version E (with embedded parts). A significant ($p < .025$) sex by grade interaction was also found. The boys achieved a substantially higher mean at each successive grade level (14.37 for second graders, 18.81 for third graders, and 20.37 for fourth graders). The difference between the girls' means in second, third and fourth grade (18.78, 19.43, and 21.33, respectively) was not as dramatic (see Table 3). These results are not surprising since they tend to support the idea that boys begin to "catch up" with girls as they near the end of elementary school. These two significant interactions probably account for the significant ($p < .005$) test version by sex by grade interaction.

Conclusions and Implications

The process of determining the effects various aspects of sentence structure have on children's comprehension is indeed complex, and this

study is but a beginning effort in this process. The study was designed to focus on one aspect of sentence structure, embedded parts, and the results have indicated that brief material interspersed between the main subject and verb of a sentence does not amount to a significant change in the sentence structure. Apparently the use of embedded parts as defined in this study does not present a critical problem in children's comprehension. These nouns, adjectives, adverbs, and short phrases do not, therefore, constitute an additional factor to be considered in determining the difficulty of printed material. But, in order to be able to draw additional conclusions concerning the effects of the use of other types of embedded parts and the use and position of dependent clauses, further investigations must be carried out. The results of this study imply that there are several key areas of concern and that they should be considered in designing instruments to measure the effects of certain aspects of sentence structure on comprehension. These are discussed below.

One matter of concern is the one or two words inserted between the subject and verb. These embedded parts may be so concrete that no matter what their position in the sentence (beginning, middle, or end), a child would be able to "spot" them and answer a question about them. In other words, in testing for detail, might the child be able to find one-word answers located in complicated sentences even though the sentence isn't really comprehended by the child? One way to check whether a sentence is difficult for a child to understand is to say a sentence to him and ask him to repeat it back. If he has trouble repeating the sentence, it might indicate that he hasn't "digested" it.

Another concern is whether the embedded part is merely a modifier and reinforces the information in the kernel sentence, or whether it changes the information, such as by adding a contradiction. For example, in the sentence, "John very quickly ran home," very quickly is not an unexpected modifier for the idea of "running." And, the answer to any question about this embedded part might be inferred correctly from the main sentence. But in the sentence, "John, usually good, did not call his mother on time," an opposite meaning to the one in the sentence is offered in the embedded part. That is, the inserted words do not enhance or reinforce the information in the kernel sentence and therefore, would have to be "synthesized" with the other parts of the sentence in order to achieve a complete understanding of the intended thought. None of the embedded parts in Version E contrasted with the general train of thought.

A third consideration in further investigating the effects of sentence structure on comprehension is whether the one to three inserted words between the subject and verb do not constitute enough of an interruption--so that comprehension is unaffected. The lack of significance for the test version effect in this study is an indication that an interruption of only one to three words does not create enough of a structural change to affect comprehens' . A test version similar to Version E should be constructed so that detail is found in embedded parts consisting of longer phrases and some clauses, and then used to measure comprehension in a situation similar to the one in this study.

A fourth concern is with the type of reader. Because it is uncertain whether good readers would necessarily perform better on the task

defined in this study, data on the pupils' reading achievement scores might be collected and examined as an additional main effect.

The format of a test is always a concern, and when testing for information contained in a sentence that is part of a larger paragraph, care should be taken, as was in this study, to be sure additional answer cues are not found in other parts of the paragraph. Isolating the sentences is an alternative format; however, it does not provide the child with as "realistic" a task, as does reading a "connected" paragraph.

Certainly, there are vast numbers of considerations in carrying out further research related to the use of embedded parts and their effect on comprehension. The important point is, however, that since sentence structure is a factor in comprehension, it should be examined systematically and in a manner which would bring about some concrete changes for the child. New information about the precise point where young readers "break down" and are unable to synthesize information from all the parts of a sentence could lead toward more effective skill-oriented instruction and the development of more appropriately leveled reading materials for all children.

References

1. Bormuth, John R. "Readability: A New Approach," Reading Research Quarterly, 1 (1966), 79-132.

2. Golub, Lester. "Syntactic Density and the Computer," Elementary English, in press.

3. Pearson, P. David. "The Effects of Grammatical Complexity on Children's Comprehension, Recall and Conception of Certain Semantic Relations," Reading Research Quarterly, in press.

4. Hamilton, Helen W., and Deese, James. "Comprehensibility and Subject-Verb Relations in Complex Sentences," Journal of Verbal Learning and Verbal Behavior, 10 (1971), 163-170.

5. Clymer, Theodore. "What Is 'Reading'? Some Current Concepts." In Innovation and Change in Reading Instruction, Sixty-seventh Yearbook, Part II. Chicago: University of Chicago Press, 1968.

6. Otto, Wayne, and Eunice Askov. The Wisconsin Design for Reading Skill Development: Rationale and Guidelines. Minneapolis: National Computer Systems, 1974.

Table 1

ANALYSIS OF VARIANCE TABLE FOR SCHOOL, SEX, AND TEST VERSION

Source	df	MS	F	p less than
School	1	163.26	11.14	.001
Sex	1	267.03	18.22	.001
Grade (2, 3, 4)	2	419.35	28.62	.001
Test version (C - without embedded parts) (E - with embedded parts)	1	.74	.05	NS
Interaction				
School by sex	1	23.15	1.58	NS
School by grade	2	36.71	2.51	NS
School by test version	1	.89	.06	NS
Sex by grade	2	85.63	5.84	.025
Sex by test version	1	77.84	5.31	.025
Grade by test version	2	2.43	.17	NS
School by sex by grade	2	25.69	1.75	NS
School by sex by test version	1	23.74	1.62	NS
School by grade by test version	2	.08	.01	NS
Sex by grade by test version	2	80.57	5.50	.005
School by sex by grade by test version	2	32.23	2.20	NS
Total	284			

Table 2

MEANS FOR SEX (ACROSS SCHOOL AND GRADE) AND TEST VERSION

	Version C	Version E
Males	18.51	17.62
Females	19.48	20.33

Table 3

MEANS FOR SEX (ACROSS SCHOOL AND TEST VERSION) AND GRADE

	Grade 2	Grade 3	Grade 4
Males	14.37	18.81	20.37
Females	18.78	19.43	21.33