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ABSTRACT

Two experiments investigated individual differences in semantic recall of expository text. In the first experiment, fourth grade students of superior and average ability read and recalled a prose passage that had been analyzed for its semantic and logical content with a content structure grammar. Unlike past research results, the superior students' mean proportional recall at several subordinate levels of the content structure was equal to their recall at more superordinate levels. The second experiment investigated this phenomenon further with a more heterogeneous population of fourth and sixth grade students with average or below average reading skills. These subjects read and recalled two passages that contained certain semantic relations ("covariance" and "collection" rhetorical predicates) at several subordinate levels of their respective content structures. The results again showed that readers with greater reading skill (the sixth graders) recalled proportionately more information at the selected subordinate levels than the less skilled readers (fourth graders). The data also suggested possible developmental differences in semantic recall, indicating the importance of studying individual differences in prose memory research. (Author/RL)

CENTER FOR THE STUDY OF READING

Technical Report No. 150

INDIVIDUAL DIFFERENCES IN THE RECALL OF LOWER-LEVEL TEXTUAL INFORMATION

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Abstract

Two experiments are reported which investigated individual differences in semantic recall of expository text. In Experiment 1, superior- and average-ability fourth graders were given a prose passage to read and recall. The passage was analyzed for its semantic and logical content using Meyer's (1975) content structure grammar, and subjects' recall protocols scored using her scoring procedures. In contrast with the results of past research, superior-ability students' mean proportional recall at several subordinate levels of the content structure was equal to their recall at more superordinate levels. Experiment 2 investigated this phenomenon further using a more heterogeneous population consisting for fourth and sixth graders, assessed as having either average or below average reading skill. Subjects read and recalled two passages written specifically to contain certain semantic relations (covariance and collection rhetorical predicates) at several subordinate levels of their respective content structures. Results again showed that those with greater reading skill (sixth graders) recalled proportionally more information at those selected subordinate levels than did the less skilled readers (fourth graders). Further, data are provided which suggest possible developmental differences in semantic recall. These and other findings are used to argue the importance of studying individual differences in prose memory research.

Individual Differences in the Recall of Lower-Level Textual Information

The use of psycholinguistic grammars to provide information about the effects of text variables on the recall of prose by individuals of different ability levels has increased significantly in recent years. The advent of generative grammars (Chomsky, 1965; Fillmore, 1968; among others) has provided considerable flexibility in the analysis of intrasentence characteristics for both syntactic and semantic aspects of sentences. With the development of text-based grammars (e.g., Fredriksen, 1975; Kintsch, 1974; Meyer, 1975; Thorndyke, 1977), information on the effects of other aspects of prose including intersentence relationships has been made available.

Of the text-based grammars attracting the attention of psychologists and educators, Meyer's (1975) analytical system has most consistently differentiated between subjects varying on some ability dimension. Further, Meyer's prose grammar is attractive to the researcher because it meets the following criteria: It was developed primarily for use with expository prose; it adequately describes the implicit and explicit relations between hierarchically related propositions (concepts) in text; it is reasonably parsimonious; and it has been shown to be a powerful predictor of prose recall (see Dunn, in press, for a review).

When Meyer's system is used to analyze text, it produces a single hierarchically arranged tree structure called the content structure. The content structure is composed of the words from the text, specified

case roles (similar to the case grammar of Fillmore, 1968), and a series of terms which explicate the nature of the logical relations between propositions (the rhetorical predicates of Grimes, 1975). All of these elements are termed idea units because all provide some level of semantic description.

The content structure illustrates the pattern of subordination of ideas in a passage. The top-level or superordinate ideas typically have many levels of subordinate ideas related to them which are shown by direct downward paths in the structure. Top-level ideas dominate their subordinate ideas, whereas the lower-level ideas generally describe or give more information about the ideas above them.

Meyer's system not only produces a pattern of subordination among ideas in a passage, but it also describes or labels the relationships among the ideas. She argues that a prose passage can be viewed as a complex proposition that can be subdivided into subpropositions bearing certain relations to one another. (This is analogous to the macro-structure described by van Dijk, 1977).

Meyer describes two types of predicates: lexical predicates and rhetorical predicates. Lexical predicates are content words from text, usually verbs and their adjuncts, which take other words contained in the text as arguments. The relationships between the lexical predicate and its arguments are described by case or role relations similar to those described by Fillmore (1968). Rhetorical predicates consist of a finite number of labels and are often found at the higher levels of the content structure and generally describe the overall organization of the text. They are used

to describe how various subordinate ideas are related. A rhetorical proposition has a rhetorical predicate and, although it could have a single item from text as an argument, it typically takes entire lexical propositions or other rhetorical propositions as its arguments. In other words, rhetorical predicates are usually used to specify the relationship among larger segments of text rather than segments of simple sentences. These larger segments may include entire paragraphs or chapters of text. Lexical predicates, on the other hand, are generally used to relate intrasentence items.

Utilizing this prose structure as a standard, Meyer compared subjects' recall of the prose passage to the content structure of that passage. While the effects of several variables in prose were tested, Meyer's major finding was with regard to the effects of the level of a given idea unit (predicates and their related arguments) on its recall. She found that the height of an idea unit in a content structure was positively related to its recall. Thus the higher the given idea unit in the hierarchy, the greater the probability of its recall. Similar results have been reported by others using other hierarchical systems of text analysis (Kintsch, 1974; Kintsch, Kozminsky, Streby, McKoon, & Keenan, 1975; Meyer, 1977; Meyer & McConkie, 1973; Thorndyke, 1977).

Since Meyer's content structure predicts the relative probability of recall at specific levels of prose averaged across adult subjects, it may be useful in predicting developmental or ability differences in prose recall. Several recent studies from Meyer's laboratory have begun to address this

issue (Meyer, 1977; Meyer, Brandt, & Bluth, Note 1). Meyer (1977, Study 3) gave good, average, and poor readers the same passage to read and tested their comprehension using questions. Half the questions tested information at the higher levels of the passage's content or semantic structure, whereas the remaining half tested information contained in the structure's lower levels. Her results showed that all ability groups answered more high-level questions than questions concerning lower-level or detail information; further, more questions of both types were answered by students possessing greater reading skill.

In a recent study Meyer et al. (Note 1) found evidence for ability differences in the recall of semantic information from prose. In their study it is of interest to note that signalling (the emphasis of specific aspects of a passage's organization) was treated as an independent variable and a free-recall task was used as the primary data source. Ninth graders who were either high-, average-, or low-ability readers were given either a signalled or a nonsignalled version of two passages. Each passage dealt with a different topic. Of primary interest was the effect of the type of rhetorical predicate used to organize the top-level structure of the experimental passages on the encoding and retrieval of those passages by the various reading ability groups.

Several of the more important findings by Meyer et al. were: (a) Most students high in reading ability used the same top-level structure for organizing their recall protocols as that used by the author of the passage

(identified by the content structure), while most students having low comprehension did not; (b) Students employing the strategy of utilizing the higher-order structure of the passage recalled much more information than those who did not, particularly in the case of delayed recall; and, (c) There was some indication that signalling increased the immediate recall of poorer comprehenders who tended not to use the higher-order structure. However, these effects were not maintained with delayed recall.

Although of significant importance, neither of the individual difference studies by Meyer and her colleagues (Meyer, 1977, Study 3; Meyer et al., Note 1) adequately investigated the effects of lower-level semantic relations described by rhetorical predicates on recall. The Meyer et al. (Note 1) study used a free-recall task but it was concerned solely with the effects of the highest-level semantic relations in a given passage as described by Meyer's (1975) system. Further, despite the fact that Meyer's (1977, Study 3) results showed individual differences among reading comprehension groups, they are somewhat disappointing because they do not provide sufficient information for distinguishing between qualitative and quantitative differences in processing. This is indicated by a lack of interaction between students' reading ability and level of information contained in the content structure. Such an interaction, coupled with the results of the Meyer et al. (Note 1) study showing differential recall of higher-order semantic relationships between reading ability groups, would have strongly suggested that students processing different reading skills use different strategies when encoding text.

One major reason why Meyer (1977, Study 3) did not find an interaction between reading ability and semantic-structure level appears to be a function of her restricted data analysis. Even though she analyzed all information at all levels of the content structure, she dichotomized her data by combining correct responses from the highest eight levels and compared them with the combined data from the lowest eight levels using a cued-recall task. Collapsing data into two categories (high and low) may have masked differential recall at specific levels. Additionally, the use of a highly signalled passage and a cued-recall task may have further diluted possible differences in recall patterns.

Therefore, our first study was designed to determine if the pattern of recall at the lower as well as the higher levels of the content structure of a passage was different for children varying in reading ability. This study extended Meyer's research in that interest was focused on differential recall of information contained at all levels, not just the highest and/or lowest levels, of the content structure. The crucial test of this idea would be the occurrence of a significant interaction between reading ability and level in the content structure.

Experiment 1

Method

Subjects. Forty fourth grade students enrolled in a local public school system served as subjects. Twenty of the students were participants in a program for gifted learners and were selected for the program based on

classroom performance, performance at above grade level on a county-wide standardized test, and scoring at two or more standard deviations above the mean on an individual intelligence test (WISC). Twenty other students were identified as performing at grade level in classroom activities and on county-wide standardized tests. There were approximately the same number of boys and girls in each group. Those in the gifted program will be referred to as the high-ability group, while the others will be referred to as the average-ability group.

Materials. A 174-word passage, adapted from a longer one used by Meyer (1975), was rewritten using fourth-grade vocabulary based on the vocabulary list in the Silvaroli Informal Reading Inventory (1973). Further, the passage was written with relatively little emphasis (signalling) of the main points, thereby allowing for a more rigorous test of the levels effect by not making the main points of the passage obvious. The passage was then analyzed according to Meyer (1975) to yield its content structure.

Procedure. The children were tested in groups of five subjects each. All were asked to read the passage twice, very carefully, and then to write as much of the passage down from memory as possible in the order they wished. Subjects were told that a recall task would follow the reading task. Although subjects were tested in groups, each subject was given as much time as she/he needed for reading and recall, but was not allowed to refer to the passage during recall. They were told to use words that they recalled from text or to use their own words and not to worry about spelling.

Using the scoring procedures described by Meyer, the recall protocol of each subject was compared to the content structure of the passage, and those idea units recalled were noted. If an entire proposition from the passage was recalled, the subject received credit for recalling the content words as well as the relationships within that proposition. If two related propositions were recalled, the rhetorical predicates relating those propositions was scored as correctly recalled. Individual idea units recalled were counted as correct, but if not recalled in the context of the content structure, no relations or predicates associated with that idea unit were scored as correct.

Results and Discussion

Because the number of idea units at each level differed from the number of idea units at other levels, it was necessary to equate recall scores across levels. Thus the number of idea units at each level recalled by each subject was converted into a proportion of the total number of idea units at each level of the content structure.

A 2 x 2 x 6 (ability group x sex x level of idea unit in content structure) mixed analysis of variance was conducted on the proportional recall data. The level in the structure was treated as a repeated measure. The mean proportion of idea units recalled for each experimental group is listed in Table 1. The main effect of level of the idea unit in the semantic structure and the important two-way reading ability by semantic structural level interaction were found to be highly significant, $F(1,180) = 12.88$, $p < .005$;

$F(5,180) = 164.13$, $p < .001$, respectively. The levels main effect showed considerable deviation from the typical pattern of decreasing recall at increasing levels of subordination found by other investigators (e.g., Kintsch et al., 1975; Meyer, 1975). That is, the average recall from some of the subordinate levels was greater than at levels which were actually more superordinate (L1 = .22; L2 = .11; L3 = .16; L4 = .19; L5 = .22; L6 = .10).

However, most of this deviation can be accounted for by the significant reading ability by semantic-structure level interaction shown in Table 1.

Insert Table 1 about here

The high-ability group appeared to recall more items at the fifth and sixth levels, which are the lower levels of the content structure, than did the average ability students. This was confirmed by Sheffe's post hoc tests ($p < .01$). On the other hand, the average-ability students tended to recall proportionally more of the higher-level items than lower-level ones, thus replicating the trends found by Meyer (1975) and others (e.g., Kintsch et al., 1975; Thorndyke, 1977). It is noteworthy that all of the items contained at levels five and six of the passage's semantic structure and recalled proportionally more by the high-ability students were found in two sentences which occurred in the middle of the actual passage subjects read: "If we use the coal, oil, and gas we have carefully, we will also have less pollution. Less pollution will save electricity we now use to control and clean up the pollution we have." Further, these lower-level five and six items were

arguments for either higher-order level three or level four covariance rhetorical predicates or other semantic relationships also expressed in these two sentences. A covariance rhetorical predicate is defined by Meyer (1975) "as a relation often referred to as condition, result or purpose, with one argument serving as the Antecedent and the other as the Consequent, or result of the Antecedent" (p. 34).

One possible explanation for these results is that the high-ability students simply had a greater short-term or working memory capacity, and produced lengthier recall protocols. This would, of course, increase the chance occurrence of idea units in their recall, including those at level five and six. This is apparently not the case, as the average- and high-ability groups had approximately the same number of words in their recall protocols (39.5 vs. 40 words, respectively).

Our results also raise the possibility that items which serve as arguments for certain higher-order semantic relations, described by Meyer's rhetorical predicates, may be recalled at a relatively high rate by high-ability students regardless of the level of their occurrence in the content or semantic structure of a passage. These results are in contrast with past research which has typically found that all subjects tend to recall items high in the content structure of a passage more frequently than items at the detail of subordinate levels (Kintsch et al, 1975; Meyer, 1975, 1977; Meyer & McConkie, 1973; Thorndyke, 1977). With the exceptions of Meyer's (1977) Study 3, and Meyer et al. (Note 1), none of these experiments was designed to test individual differences in reading ability; none, including

the two Meyer studies, were concerned with differential recall of specific semantic relations at lower levels in the hierarchy.

As mentioned earlier, a probable reason why our results differed from those obtained by Meyer (1977, Study 3) is that she dichotomized the recall data from the various content structure levels into high and low categories. By ignoring recall from the specific levels, she may have masked any differential recall produced by her various reading ability groups. Further, her use of a highly signalled passage and a cued-recall task may have made it easier for less skilled readers to encode and retrieve many points from the passage, even though they had not adequately comprehended it.

While the results of Experiment 1 suggest that subjects with different ability levels process prose differentially for recall, several aspects of the study prohibit a firm conclusion. First, the passage used, although typical of the material contained in many fourth-grade reading texts, was somewhat vague because of the lack of signalling of important semantic information. Because the high-ability students were in fact a select group, their text-encoding strategies and previous knowledge base (schemata) were probably superior to those of the average-ability person. Thus the greater recall of subordinate information by the high-ability students may have been due to increased processing of the passage (necessitated by its vagueness), and not to a specific differential sensitivity to cause the effect relations in text as described by Meyer's (1975) covariance rhetorical predicates.

A second experiment was conducted to replicate and extend the findings of Experiment 1. Two different passages containing selected rhetorical

predicates as well as increased signalling were constructed. (Although not treated as a variable, the increased signalling, which was approximately equal across passages, made the passages more natural and seemingly less contrived.) One passage was specifically written to contain covariance relationships at the middle levels of its content structure, allowing for the investigation of the differential sensitivity hypothesis stated above. The second contained other frequently occurring rhetorical predicates at its subordinate levels (collections and specifics, defined later) in order to determine if they differentially affect the semantic recall of students varying in reading ability. Further, a more representative sample consisting of both fourth and sixth grade students, at either average or below average reading ability, was selected. Use of these subjects allows a generalization to other rankings of ability difference as well as investigation of differences between age groups.

Experiment 2

Method

Subjects. Ninety-two fourth and sixth grade students were selected from a different school than the one used in Experiment 1. Children having average or below average reading ability served as subjects. Reading ability was determined by both students' California Achievement Test (CAT) reading scores and teacher evaluations. If a discrepancy was found between any student's CAT scores and teacher ratings, that student was not included in the sample for Experiment 2.

Materials. Two expository prose passages differing slightly in length were modified from material contained in two third grade textbooks. The semantic content and structure of each were analyzed using Meyer's (1975) content structure procedure. The shorter passage, called "Greeks and Romans," had 165 words and was found to contain seven levels of subordination in its content structure. It was written specifically to contain a covariance relationship (cause and effect or antecedent and consequent) at its most superordinate level (L1) and other covariance relationships at one of the more subordinate levels (L4). Again, this passage was used to determine if the higher recall of the subordinate semantic information by the high-ability students in Experiment 1 at lower levels in the content structure was in fact due to a differential encoding sensitivity for covariance relationships, or merely attributable to their superior processing of the poorly signalled passage used.

The second passage, "Water Pollution," contained 222 words and described the types of water pollution, their causes, and possible solutions to the problem. The resulting content structure had five levels of subordination and had a type of response rhetorical predicate at its highest level consisting of an equally weighted problem and solution. At levels three and four (more subordinate levels) collection rhetorical predicates were the most frequent, although several specific predicates were present. (It is quite difficult to write a meaningful passage with collections only.) According to Meyer (1975), a collection rhetorical predicate describes a list of

elements in text related in some unspecified manner (e.g., lakes, rivers, ponds) and is basically categorical in nature. A specific rhetorical predicate gives more detailed information about something that was stated earlier in a more general manner (e.g., "polluted water may have disease germs in it;" specific -- "It may contain germs that cause typhoid fever"). This passage was used to determine if good readers are only differentially sensitive to logical relations like cause and effect (described by covariance relations) or encode and recall information represented by frequently occurring rhetorical predicates, like collections and specifics, regardless of their level of subordination.

Passages were arranged in counter-balance order in packets of seven pages each. The first page of each consisted of an information page, with the next two pages containing identical copies of the same passage and the fourth being a blank recall sheet for that passage. The remaining pages (five-seven) consisted of an identical arrangement for the other passage.

Procedure. The procedure was similar to that used in the first experiment with the exception that students were tested during their regularly scheduled reading classes. Subjects were informed prior to the experimental task that they would be tested for recall. After reading the first passage twice at their normal reading rate, students wrote as much of the passage as they could recall in any order they wished on the blank sheet of paper. They were given as much time as required and were told to use words that they recalled from the text or their own words. They were instructed further not to worry about correct spelling. After the

first passage was recalled, students were asked to take a five-minute rest before beginning the second passage and were asked to time themselves using a clock at the front of the room. The same procedure was then followed for the remaining passage.

Results and Discussion

The recall data from each passage were analyzed separately because passages differed in length, types of rhetorical relations each contained, and the number of levels of subordination in their respective content structures. As was done in Experiment 1, the number of idea units recalled by each subject at each level in the content structure was converted into the proportion of the total possible units that could be recalled at that given level.

"Greeks and Romans" passage. The proportional recall data from the Greeks and Romans passage were analyzed using a 2 x 2 x 2 x 6 (sex x grade x reading ability x levels in the content structure) mixed analysis of variance, with the latter being a repeated measure. The main effects of grade, $F(1,84) = 15.12$, $p < .001$; reading ability, $F(1,84) = 22.30$, $p < .001$; and levels in the content structure, $F(6,504) = 16.50$, $p < .001$ were found to be significant. Sixth graders' mean proportional recall was higher than fourth graders' (.26 vs. .13). Average reading ability students' mean proportional recall (.26) was greater than low-ability students' recall (.12). The levels main effect again showed some deviation from the typical pattern of decreasing recall as a function of greater subordination (L1 = .34; L2 = .30; L3 = .12; L4 = .11; L5 = .12; L6 = .18; L7 = .12).

The levels main effect is of little interest because of the significant two-way, grade by levels interaction, $F(6,504) = 2.75$, $p < .02$. The means are shown in Table 2, where it can be seen that generally (with the exception of L6) the fourth grade students' recall shows the typical declining pattern

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Insert Table 2 about here

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whereas the sixth graders' recall pattern shows not only high recall of the level one superordinate structure defined by a covariance relationship, but relatively high recall at some of the subordinate levels as well (most notably levels four through seven). Of major interest is the fact that the items contained at these lower levels were arguments for other covariance rhetorical predicates found at level four of the content structure of this passage. This result is quite similar to the post-hoc finding in Experiment 1, showing that high-ability fourth grade readers recalled proportionally more arguments of lower level covariance rhetorical predicates than did their less skilled counterparts. Further, results from both studies suggest that cause and effect relationships expressed by covariance rhetorical predicates and their related arguments are more easily encoded by the more skilled readers.

The only other significant finding was the two-way grade by reading ability interaction, $F(1,84) = 8.77$, $p < .005$. The means shown in Table 3 indicate that sixth grade average reading ability students recall proportionally more items than fourth graders and less skilled sixth grade students.

Insert Table 3 about here

This was confirmed by Sheffe's post-hoc comparisons tested at the .05 level.

Although the above results appear to be reliable when passages contain covariance rhetorical predicates at the lower levels, the proportional recall data from the Water Pollution passage was used to determine if similar findings occur when other rhetorical predicates frequently encountered in prose (i.e., collections and specifics) are placed at lower levels of the content structure of a passage.

"Water Pollution" data. Like the Greek and Roman passage data, a similar four-way analysis of variance performed on the Water Pollution proportional recall data yielded significant main effects of grade and reading ability, $F(1,84) = 24.60$, $p < .001$; $F(1,84) = 27.3$, $p < .001$, respectively; with sixth graders recalling proportionally more items on the average than fourth graders (.15 vs. .08) and average-ability readers producing greater mean proportional recall (.14) than low-ability readers (.09). The levels main effect was also significant, $F(4,336) = 31.74$, $p < .001$ (L1 = .21; L2 = .16; L3 = .08; L4 = .09; L5 = .04).

The important two-way grade by levels in the content structure interaction was again found to be significant, $F(4,336) = 2.93$, $p < .03$, and followed a pattern similar to that found with the Greeks and Romans data. As can be seen in Table 4, fourth grade children's mean proportional recall tended to produce the typical decreasing pattern as a function of increased subo dination whereas the sixth graders' pattern showed less decline. Again

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Insert Table 4 about here

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it should be noted that levels three and four of this passage contained a

disproportionate number of relations described in its content structure by collection rhetorical predicates, although some specific predicates occurred as well.

In order to test the hypothesis of differential sensitivity, orthogonal planned comparisons (Ferguson, 1966) were computed between fourth and sixth graders' mean proportional recall at levels three and four (see Table 4 for means). Significant differences favoring the sixth graders were found for level three, $F(1,336) = 8.36$, $p < .005$, and level four, $F(1,336) = 11.69$, $p < .001$.

The results based on both passages suggest that sixth grade readers encode frequently occurring semantic relations (i.e., covariance and collection relations) more readily than less experienced fourth grade readers, even when those relationships occur at relatively lower levels of the semantic structure of a passage. These results are quite similar to the results of the first experiment, showing that highly skilled fourth grade readers recalled significantly more covariance predicates and their related arguments than did less skilled fourth grade students.

General Discussion

The results of the present study question previous evidence suggesting that memory structures for expository text (text-based schemata) can be represented by, or are isomorphic to, the hierarchical content structure of a passage. While the hierachial model was shown to be a rough approximation of one's schema for text, individual differences in reading ability were found to be related to significant deviations from the strict recall

hierarchies reported previously (e.g., Kintsch et al., 1975; Meyer, 1975, 1977; Meyer et al., Note 1). Better-skilled readers (high-ability fourth graders, Experiment 1; sixth grade readers, Experiment 2) recalled proportionally more items from certain subordinate levels than at more superordinate levels of the experimental passages' content structures. In contrast, the recall pattern produced by less-skilled readers (average-ability fourth graders, Experiment 1; fourth grade readers, Experiment 2) followed the previously reported pattern of decreasing recall with increased subordination of information in the content structure. These results underscore the importance of assessing the role of individual difference variables in prose memory research, particularly now that powerful tools like Meyer's (1975) content structure text grammar are available.

What is it about these selected semantic relations occurring at the lower levels which make them more "memorable" for the better skilled reader? Because of their basically implicit nature, it may be that many semantic relationships (described by Meyer's rhetorical predicates) require certain inferential skills which are learned or developed. If this were true, then it could be expected that the recall protocols of better-skilled readers would contain proportionally more rhetorical predicates than those of their less-skilled classmates even at the lower levels of subordination. In order to test this notion, a random sample of 20 fourth grade and 20 sixth grade protocols for each passage used in Experiment 2 was selected. Individual proportions were calculated from the fourth level of subordination contained in the content structures of both passages, since one was specifically

written to contain covariance rhetorical predicates and the other to contain primarily collection predicates at this level. Analysis of the Greeks and Romans data showed sixth graders' mean proportional recall (.26) to be significantly greater than fourth graders' recall (.12), $\underline{t}(39) = 3.30$, $\underline{p} < .005$. Less dramatic, but similar results were found with the Water Pollution data where again, on the average, sixth graders recalled proportionally more predicates than fourth graders (.30 vs. .27), $\underline{t}(39) = 2.89$, $\underline{p} < .005$.

Given the above, a reasonably strong argument can be made that the higher recall of semantic information at subordinate levels by better-skilled readers is due in part to a differential encoding sensitivity for covariance and collection rhetorical predicates. Only future research will determine if these results occur if other predicates, particularly those occurring less frequently, are utilized.

The question of whether this difference in encoding is primarily a function of developmental factors or learning will also have to await further research. However, the results of the present study give prima facie evidence for the importance of developmental factors, if it is assumed that the superior-ability fourth grade (Experiment 1) and the sixth grade readers (Experiment 2) were at approximately the same level of semantic development, not yet reached by the less-skilled fourth grade subjects. At the very least, our results suggest that individual differences (perhaps even developmental differences) exist and that further extension of text grammars like Meyer's into semantic development research is clearly justified.

Reference Note

1. Meyer, B. J. F., Brandt, D. M., & Bluth, G. J. Use of author's textual schema: Key for ninth graders' comprehension. Paper presented at the meeting of the American Educational Research Association, Toronto, Canada, March 1978.

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Table 1

Mean Proportion of Idea Units Recalled from the "Breeder Reactor" Passage as a Function of Reading Ability and Level in the Content Structure

Reading Ability	Level in Content Structure					
	1	2	3	4	5	6
Average	.26	.11	.18	.17	.13	.04
High	.17	.10	.13	.20	.30	.16

Table 2

Mean Proportion of Idea-Units Recalled from the "Greeks and Romans" Passage as a Function of Grade and Level in the Content Structure

Grade	Level in Content Structure						
	1	2	3	4	5	6	7
Fourth	.25	.24	.15	.05	.06	.11	.05
Sixth	.44	.36	.09	.17	.17	.26	.20

Table 3

Mean Proportional Recall of the "Greek and Romans" Passage as a Function of Grade and Reading Ability

Grade	Reading Ability	
	Low	High
Fourth	.11	.15
Sixth	.13	.35

Table 4

Mean Proportion of Idea Units Recalled from the "Water Pollution" Passage as a Function of Grade and Level in the Content Structure

Grade	Level in Content Structure				
	1	2	3	4	5
Fourth	.15	.13	.05	.04	.04
Sixth	.27	.19	.11	.12	.05

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