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ABSTRACT

Eighty high school students enrolled in social studies classrooms participated in a study exploring the hypothesis that field dependence-independence is a perceptual dimension of cognitive style influencing text structure variables and the quality of free recall. Based on results of a test of field dependence/independence, 10 subjects served in each cell of a three-way factorial design. The factors were whether the subject's cognitive style was identified as field dependent or independent; whether the top-level structure of the target selection was organized as comparison-contrast or cause-effect; and whether the target selection contained inserted signals. Subjects were directed to read the target selections without making notes or marking the text to recall information for later rewriting, to take as much time as they needed to read, and to take the recall test when ready. Results indicated that (1) top-level structure and presence of signaling influenced readers' recall of text when the total amount of idea units was used as the sole dependent measure; (2) comparison-contrast top-level structure facilitated performance on each type of proposition for both field dependent and independent learners; and (3) cause-effect top-level structure, whether with or without signals, posed greater barriers for good readers' literal recall than did any other single variable. (HOD)

Effects of Readers' Cognitive Style, Text Structure and Signaling on Different Recall Patterns in Social Studies Content

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Running Head: Cognitive Style & Text Structure

Effects of Readers' Cognitive Style, Text Structure and Signaling on Different Recall Patterns in Social Studies Content

When good readers read text for the purpose of remembering important information for immediate recall, what influence would two different top-level structures and the presence or nonpresence of signaling have for readers identified on the basis of cognitive style? The present study explored the hypothesis that field dependence-independence is one perceptual dimension of cognitive style that is associated with the ability to manipulate text structural variables and influence quality of free recall. This investigation tested the hypothesis by determining from a subject's recall protocol the types of information remembered when the text was either a comparison-contrast or cause-effect top-level structure and with or without inserted signals.

Much recent research attention has been directed to studying how variations in text structure and construction influence the way readers process, comprehend and remember text content. Numerous studies have demonstrated that logical and meaningful organization of ideas in text were better remembered than those selections where sentences were randomly ordered (Frase, 1969; Myers, Pezdek, & Coulson, 1973; Perlmutter & Royer, 1973; deVilliers, 1974). Since these initial experiments, text structure protocol systems have been developed to categorize by type the ideational relationships which exist among propositions in text (Grimes, 1975; Kintsch, 1975; Meyer, 1975). The effects of different types of top-level structures categorized, such as comparison-contrast and cause-effect, have only begun to be studied. To date, only several studies have been conducted. These point up the effectiveness of comparison-contrast and

cause-effect structural patterns on readers' total amount of recall when compared with other patterns (e.g., simple listing, time order, problem-solution).

Another means by which text structured can be manipulated to influence free recall performance is to insert cues, or "signals", in the text to emphasize how ideas are related and which ideas are most important (Grimes, 1975; Halliday & Hasan, 1976; Meyer, 1975). Signaling content and structure has been demonstrated to facilitate free recall performance of low and average comprehenders (Meyer, Brandt, & Bluth, 1978; Britton, Glynn, Meyer & Penland, 1982). While the research to date dealing with top-level structures and the use of ideational signaling appears promising for predicting overall recall performance, more needs to be known about the relative efficiency of structure and signaling on selective processing and retention of concept-based idea units, especially in text content related to the academic disciplines.

Text-based variables have been shown to be strong predictors of free recall performance, but the interaction between reader cognitive style and text structural variables should also be considered. How readers of differing learning styles respond to "similar" task assignments have resulted in their taking very different approaches to meet the task. Several recent studies have demonstrated evidence that the field dependent-independent dimension of cognitive style has a pervasive influence on how text is processed (Annis, 1979; Goodenough, 1976; Witkin, Moore, Goodenough, & Cox, 1977). While no differences are apparent between field dependent and field independent learners on free recall of text that is well organized, the field independent students are better able to impose organization on poorly structured text and recall significantly more total

idea units than the field dependent students.

Most studies which have examined the effects of text-based structural variables using free recall have dealt with the assessment procedure as a single dependent measure; that is, the overall amount that a person remembers from the text. This overall amount retained is not sensitive to the prediction that the type of top-level text structure and inclusion/noninclusion of inserted signals could have selective effects on retention of individual idea units by readers with differing cognitive styles. We speculated in this study that there might be a different pattern of free recall idea units for the treatment groups across multiple dependent measures. To test this hypothesis, it was necessary to develop multiple dependent measures of learning outcomes by parsing and scoring the information included in subjects' recall protocols. Based on the information contained in two versions of a target selection (i.e., comparison-contrast and cause-effect top-level structure, both with signaling), subjects' protocols were categorized in the following manner: (a) for idea units remembered from the target selection, some units relate to basic conceptual relations (i.e., comparisons, contrasts, causes, effects) whereas others relate to supporting examples; (b) for units that serve as signals for the idea units in the target selection, some units preview the information to be detailed later, others signal the presence of conceptual relations (i.e., comparisons, contrasts, causes, effects), and other units signal summary sentences of previous information; and (c) for idea units that are text intrusions from other parts of the target selection, some units are appropriate whereas others are inappropriate. The present investigation was designed to test predictions related to free recall of information stated directly in the target selection. Idea units

which could be categorized as reader intrusions were not examined.

Method

Subjects and Design

The subjects were 80 students enrolled in social studies classrooms at a midwestern high school. In the present study, these subjects were identified from a population of 450 students as high in reading achievement, having attained a standardized reading test percentile score of greater than 66. Based on results of a test of field dependence/independence, 10 subjects served in each cell of a 3-way factorial design. The factors were (1) whether the subject's cognitive style was identified as field independent or field dependent, (2) whether the top-level structure of the target selection was organized as comparison-contrast or cause-effect, and (3) whether or not the target selection contained inserted signals.

Materials

All materials were administered to subjects by classroom teachers who followed a prepared script of instructions and procedures; these consisted of a test of field dependence-independence, a target selection and a recall test sheet. The Hidden Figures Test measured each subject's level of field dependence-independence. Based on the test evaluation procedure, those subjects whose scores placed them in the upper one-third of the group tested were classified as field independent; those whose scores placed them in the lower one-third were classified as field dependent. The middle one-third of the students tested were not included in the present study.

The target selection was contained in a packet along with specific instructions for reading. One-half of the packets included a comparison-contrast top-level structure of the target selection about the

differences between Rumanian and Russian forms of communist government. The other one-half of the packets contained a cause-effect structure about the effects of leadership on government practices in Rumania. Further, half of both versions of the target selection was presented with specific signal cues; the other half was without signals. All packets included a recall test sheet which contained instructions directing subjects to "rewrite the selection to the BEST of your MEMORY."

Procedure

Teachers administered the Hidden Figures Test to a population of 450 social studies students in tenth, eleventh and twelfth grade classrooms. Forty high achievement readers were randomly selected from those identified as field independent on the test, and forty other high achievement readers were similarly selected who were identified as field dependent. One week later, subjects received prepared packets containing a specific version of the target selection and the free recall measure. The top-level structure and signaling cues were manipulated such that 10 subjects from each of the field dependent and field independent cells received one of the following combinations: comparison-contrast, signaled; comparison-contrast, non-signaled; cause-effect, signaled; or cause-effect, non-signaled. Subjects were directed to read the target selections without making notes or marking the text to recall information for later rewriting, to take as much time as they needed to read and then to go on to the recall test when ready. Subjects worked on the recall test without any time limits imposed and could not return to the target passage for any help.

Scoring

Two researchers scored the subjects' protocols and were in close agreement on sample free recall passages and on random cross-reviews.

Disputes were settled by consensus. For the present experiment, each proposition in the protocol was scored as belonging to Idea Units, Signal Units or Text Intrusions. Idea Units were subcategorized into four types of phrases, clauses or sentences (comparison, contrast, cause, or effect) or were placed under the Example subheading. Signal Units had three basic subdivisions: Preview Cues; Relation Cues (Comparison, contrast, cause or effect, intrusion) and Summary Cues. Text Intrusions were classified as Text Appropriate or Text Inappropriate. Further elaboration to identify and illustrate each type of proposition follows.

Idea Units are propositions from the text that illustrate a type of relationship (cause-effect; comparison-contrast; or example) among or between events, people or thoughts. One example of a Idea Unit showing contrast is, "Rumanian Communism has become more liberal than Marxist Communism in Russia." That same basic Idea Unit stated as a cause-effect proposition is, "Nicolae Ceausescu took over in the 1960s as leader of the Rumanian government and immediately moved to liberalize Soviet Communist practices in Rumania." An "example" Idea Unit underscores, clarifies or substantiates cause-effect or comparison-contrast idea units. Example idea units would include propositions such as, "During the Arab-Israeli War in 1967, the Rumanian delegates to the United Nations refused to back Russia's stand against Israel." In this study, the number of Idea Units listed on the protocol analyses sheets were as follows: Cause (17), Effect (4), Example of Cause or Effect (25), Comparison (6), Contrast (54), Example of Comparison or Contrast (12).

Signal Units are individual words or phrases that provide the reader with an added cue to the type of main proposition presented. In the Comparison-Contrast Target Passage presented to the subjects in this

experiment, there were 4 preview signals, 20 compare-contrast signals, 7 example signals, 10 intrusion signals and 20 summary signals. The Cause-Effect Target Passage presented to the subjects included 6 preview signals, 22 cause-effect signals, 9 example signals, 8 intrusion signals, and 22 summary signals. An example of a preview signal would include subheadings such as, Different Views on World Affairs . Compare-contrast signals would include words or phrases such as "but now" or "in sharp contrast." Intrusion signals would be items such as "incidentally," or "it could be noted that.." Examples of summary signals are "in conclusion," "thus," and "in summary."

Text Appropriate Intrusions are propositions from sections of the original text other than the concept relations that contain information relevant to the requested recall. An example of a text appropriate intrusion includes, "The equipment they bought was used to start up new industries in Rumania." There were 7 text appropriate intrusions in the cause-effect version and 15 in the comparison-contrast version of the target selection.

Inappropriate Text Intrusions are propositions from a section of the original text other than the concept relations that contain information that are not relevant to the requested recall. For example, the subject's recall dealing with the Rumanian position during the Arab-Israeli war might include the fact that "all nations send delegates to the United Nations." In the cause-effect passage there were 8 text inappropriate intrusions; 15 were present in the comparison-contrast passage.

Results and Discussion

Recall

The proportion for each type of proposition in the recall protocols of

the eight experimental groups is presented in Table 1. Sixteen separate three-way analyses of variance were performed for the data (transformed to mean percentages) using the factors of cognitive style (field dependent vs. field independent), top-level structure (comparison-contrast vs. cause-effect), ideational signals (non-signaled vs. signaled) and each of the 16 types of propositional units. No significant interactions were found among cognitive style, top-level structure and signaling for any of the 16 types of propositional units. Significant interactions between top-level structure and signaling were found for recall of "effect" and "contrast concept relation units" (F =3.97, df =72, p =.05) and "summary signal" units (F =16.88, df =72, p <.001). No significant interactions were found to exist between cognitive style and signaling for any of the 16 types of propositions. One significant interaction was found between cognitive style and top-level structure when the two were analyzed with "cause" and "comparison concept relation" units (F =4.30, df =72, p <.05). Significant main effects occurred for the amount of "preview", "summary" and "overall signal" units when signaling was considered (F =3.97, df =72, p =.05). Main effects for top-level structure were found for 10 of the 16 propositional units (p <.05): all "concept relations", "relation, summary, example and overall concept signals," and the total "overall idea units." Subjects who read the comparison-contrast version of the target passage recalled a greater proportion of idea units in each of the ten types of propositions listed above than did those subjects who read the cause-effect version. Finally, there was significant main effect attributed to cognitive style for the proportion of "overall idea units" recalled (F =3.80, df =72, p =.05). Field independent subjects recalled a significantly greater percentage of total idea units than did the field

dependent subjects for the comparison-contrast, non-signaled target selection. Field independent comparison-contrast group subjects also recalled significantly more of the total idea units than either the field dependent or independent subjects when the cause-effect target selection was read.

Discussion

As in previous studies, top-level structure and presence of signaling was found to influence readers' recall of text when total amount of idea units are used as the sole dependent measure. The present study also identified that cognitive style will also impact on how good readers process expository text. When a more detailed analysis is conducted, further gradations of differential performance of the experimental groups emerge. The outstanding finding was the impact of the top-level structure on recall for virtually every type of propositional unit identified for analysis. That is, the comparison-contrast top-level structure seemed to facilitate performance on each type of proposition for both field dependent and independent learners. Cause-effect top-level structure, whether with or without signals, posed greater barriers for good readers' literal recall than did any other single variable.

Clearly the data are incomplete for analyzing subjects' differential pattern of recall. Analysis must proceed to include novel inferences drawn from the passage information, vague summaries which point up ideas without demonstrating complete grasp of the propositions, and inaccuracies of produced recall protocols. The results of the present study indicate that when reading ability is controlled differential patterns of comprehension occur due in part to cognitive style and top-level structure. This study also is intended to point out at least one viable alternative to purely

linguistic forms of protocol analysis. Parsing methods used in the present study can be refined and validated and may eventually hold more relevance for studying comprehension processes in a field-based setting.

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Table 1

Proportion of 16 Types of Propositions in Recall Protocols for 8 Treatment Groups

GROUP	N	RELATION 1	RELATION 2	EXAMPLE RELATION	PREVIEW SIGNAL	RELATION SIGNAL	EXAMPLE SIGNAL	INTRUSION SIGNAL	SUMMARY SIGNAL	APPROPRIATE INTRUSION	INAPPROPRIATE INTRUSION	CONCEPT RELATION UNITS	OVERALL IDEA UNITS	CONCEPT SIGNALS	OVERALL SIGNAL UNITS	OVERALL INTRUSION UNITS	TOTAL TEXT IDEA UNITS
FIELD DEPENDENT																	
COMPARISON-CONTRAST																	
UNSIGNALED	10	3.1 (7.0)	8.7 (6.1)	12.5(19.3)	0.0 (0.0)	2.0 (3.4)	4.2 (6.9)	0.0 (0.0)	1.0 (2.1)	5.7 (9.9)	1.3 (2.8)	6.0 (5.4)	9.2(10.2)	2.0 (3.1)	1.0 (1.3)	3.5 (4.7)	5.1 (5.4)
SIGNALED	10	5.0 (8.0)	17.9 (8.0)	23.3(19.5)	5.0(10.0)	2.5 (3.5)	1.4 (4.5)	2.0 (4.2)	8.5 (7.4)	4.2 (9.6)	4.6(10.4)	11.4 (6.6)	17.4(10.2)	1.9 (2.0)	5.1 (6.0)	4.4 (8.1)	11.2 (6.2)
CAUSE-EFFECT																	
UNSIGNALED	10	3.5 (4.9)	7.6 (7.6)	10.4 (8.0)	0.0 (0.0)	0.9 (1.9)	1.1 (3.5)	0.0 (0.0)	0.4 (1.4)	4.0 (7.1)	2.5 (5.2)	5.5 (5.0)	7.9 (5.9)	0.6 (1.2)	0.3 (0.8)	3.2 (4.3)	4.1 (2.9)
SIGNALED	10	4.1 (4.8)	6.3 (5.4)	6.4 (7.5)	10.0(21.0)	1.8 (3.8)	1.1 (3.5)	0.0 (0.0)	0.4 (1.4)	3.3 (6.4)	1.2 (3.9)	5.2 (4.4)	5.8 (5.4)	0.9 (2.2)	1.8 (7.6)	2.2 (3.4)	4.8 (6.0)
FIELD INDEPENDENT																	
COMPARISON-CONTRAST																	
UNSIGNALED	10	13.0 (13)	16.1(12.2)	28.3(20.1)	0.0 (0.0)	3.0 (6.3)	0.0 (0.0)	1.0 (6.7)	0.5 (1.5)	7.1 (7.5)	3.3(10.5)	14.7(12.3)	21.5(13.7)	2.0 (4.1)	0.8 (1.8)	5.2 (7.4)	11.1 (7.5)
SIGNALED	10	8.3 (16)	17.2 (9.1)	22.5(19.6)	5.0(15.8)	3.5 (4.1)	5.7 (7.3)	4.0 (9.6)	8.0 (7.8)	5.7 (9.9)	7.6 (5.6)	12.7(11.4)	17.6(13.0)	4.4 (4.4)	5.8 (5.6)	4.1 (5.9)	11.7 (7.5)
CAUSE-EFFECT																	
UNSIGNALED	10	2.3 (3.0)	10.2(10.1)	14.8(10.5)	0.0 (0.0)	0.4 (1.4)	2.2 (4.6)	0.0 (0.0)	0.4 (1.4)	9.3 (9.5)	2.5 (5.2)	6.2 (5.4)	10.5 (6.9)	0.8 (1.5)	0.4 (0.6)	5.9 (6.3)	5.4 (3.6)
SIGNALED	10	2.3 (3.0)	6.5 (7.6)	10.8(12.6)	6.6(16.1)	0.4 (1.4)	2.2 (4.6)	0.0 (0.0)	0.4 (1.4)	4.6 (7.0)	2.5 (5.2)	4.4 (4.6)	7.6 (7.9)	0.8 (1.5)	2.6 (5.3)	3.5 (4.1)	5.1 (5.4)