Comprehending and Using Text Ideas: The Order of Processing as Affected by Reader Background and Style

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THE ORDER OF PROCESSING AS AFFECTED
BY READER BACKGROUND AND STYLE

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The kind of reading typically demanded in content classrooms can be viewed as consisting of two major components: the comprehension of a text and the use of those comprehended ideas for such content-related thinking tasks as comparing, evaluating, problem-solving, speculating, and so on (Peters, 1982; Steinley, 1983, 1986). This study is about the order of processing between those two components. In dichotomous terms, that order could be more linear or more parallel. That is, a reader could read a given text in more of a linear fashion, first attending to comprehending the text and then to using those ideas for some thinking task. Or the processing could be more parallel with the reader alternating between comprehending and the thinking task, shifting attention from one component to the other while reading. This study explores two variables which would tend to predict either linear or parallel reading.

Bertram Bruce (1985), offering a "Second Phase" to P. David Pearson's description of the "Comprehension Revolution," suggests that the relationship between comprehension and more general thinking skills may be a natural and necessary area of future study. Previous studies and model-building have focused on the order of processing between decoding and comprehending (e.g., LaBerge & Samuels, 1974; Samuels, 1976; Gough, 1983) or between the components of the comprehending process (e.g., Kintsch & van Dijk, 1978; Ruddell & Speaker, 1985); however the order of processing between comprehension and more general thinking tasks is relatively unexplored. This study expands order of processing models by considering two variables which could affect order in a particular reading task. Specifically, two
research questions are addressed:

(1) Does the extent of a reader's background affect the order of processing between the two processes of comprehending a text and using text ideas for a thinking task?

(2) Does the typical processing style of a reader affect the order of processing between these two components?

A host of studies has established that a reader's previous knowledge or background affects the processes and products of comprehension (e.g., Bransford & Johnson, 1972; Pichert & Anderson, 1976); and many studies have demonstrated that cognitive processing styles can also influence comprehension (Spiro, 1979; Dunn, Bruce, Gould & Jay, 1981).

Method

Subjects

Data were gathered from 75 students in four undergraduate content area reading classes the second day of class over two consecutive semesters. Subjects were randomly assigned to one of two groups based on the text they were going to read. Although three of the subjects were graduate students, the rest were either juniors or first semester seniors from the content areas of math, English, art, music, the sciences and social sciences, foreign languages, home economics, and agriculture. They all, as a prerequisite to being in the class, had an overall college GPA of 2.5 or better and had met competency requirements in math, reading, language use, and speech.

Design and Materials

The experiment was structured about the two components of skilled reading discussed above—comprehending and using text ideas for a thinking task. Students read a text about a word game for the dual purposes of comprehension and comparing/contrasting (the thinking task for this experiment) that word game with another word game. The basic purpose was to measure the extent to which the dependent variable of order was more linear or parallel as affected by the independent variables of reader background and style. Each of these independent variables, background
and style, had two levels described respectively as "limited" or "extensive" background and "linear" or "parallel" processing style. This 2X2 design resulted in four groups: limited/linear (n=20), limited/parallel (n=17), extensive/linear (n=12), and extensive/parallel (n=26).

The first independent variable, reader background, was operationalized through the random assignment of subjects, 1) to read about a word game for which they had limited background or 2) to read about one for which they had extensive background. The topic of word games, favoring no particular college major, was chosen as a partial control against the varied backgrounds of the subjects. Moreover, that topic provided a means for controlling the amount (limited or extensive) of background the subjects would have available for reading the text. A preliminary survey conducted the semester before revealed that all students in my content reading classes had heard of and played two of the word games, Crossword Puzzles and Word Search (though under different titles); only two students had heard of (and one had played) Doublets. (In Doublets players begin with two unrelated words, such as dog and cat, and they attempt to link these by interposing other words of the same length and differing from the previous in one letter only.)

Thus a one-page text about Word Search was chosen as the comparison text; a similar text about Crossword Puzzles was chosen for the Extensive background group (n=38); and a third similar text about Doublets was the text for the Limited group (n=37). The three texts were written for this experiment. Other text factors which might affect order of processing--such as length, coherence, conformity to a text grammar, and so on--were controlled by creating texts which basically differed only on the game being written about. Each of the three texts contained six paragraphs, 15 sentences, and approximately 300 words. Each followed a common format that included by paragraph: (1) brief history of game; (2) overview of game and playing procedure, (3) example of the procedure accompanied by a visual, (4) extended example and another visual or visuals, (5) goals of the game including scoring, and (6) (except on Word Search) scoring example.

The second independent variable, reader style, was established through subjects' responses to a "Processing
Style Inventory" which was administered during the course of the experiment. This inventory directed students to classify themselves as either linear processors or parallel processors; and their responses resulted in two groups, linear (n=32) and parallel (n=43). The linear processors claimed that they typically read in more of a "step-at-a-time" order, typically focusing first on comprehending a text then attending to the thinking tasks for which they were reading. The parallel processors claimed they were typically "do-two-things-at-once" readers who, when reading for some thinking task, tended to switch back and forth (between comprehending and the thinking task) while reading.

The dependent variable, order of processing, was measured by a second constructed instrument, the "Process Summary Sheet." Subjects first read and discussed the comparison text about Word Search, then they received instructions to read the target text--either Crossword Puzzles or Doublets--and compare/contrast that word game with the game of Word Search. When they felt they had completed the two tasks, they completed the following "Process Summary Sheet." (Directions were to mark the one which best described how they accomplished the task. On the originals, the open spaces below included the name of the appropriate word game):

1. I only focused on comprehending the text about _____. I don't remember doing any comparing and/or contrasting with Word Search.
2. I first focused on reading and comprehending the whole text about _____. Then, when I was done with that, I went back and began comparing and/or contrasting with Word Search.
3. I remember switching back and forth while I was reading. I would read and comprehend part of the text about _____. Then I would do some comparing and/or contrasting with Word Search. Then I would read and comprehend some more, then do more comparing and/or contrasting, and so on until I finally finished.
4. I don't remember thinking about comprehending the text about _____. I only remember comparing and/or contrasting _____ with Word Search.

The "Process Summary Sheet" served as a means for quantifying the self-reports of readers. The four responses
represent a continuum from linear to parallel processing with #1 indicative of remembering only attention to comprehension, #2 indicative of remembering attending first to comprehension and then to the thinking task, #3 indicative of remembering switching between comprehension and the thinking task, and #4 indicative of remembering total attention to the thinking task. When the four possible responses are dichotomized, #1 and #2 indicate linear processing--#2 because it matches the definition, #1 because it suggests a reader who, in effect, never "got to" the second component of using. Similarly #3 and #4 indicate parallel processing --#3 because it matches the definition and #4 because it suggests a reader who, although only remembering the component of using, logically had to allot some cognitive time to comprehension so that there would be information to use for the thinking task.

Procedures

1. Students read the Word Search text. A brief discussion followed to assure familiarity with the game, then the text was returned to the front of the room.
2. Based on the Random assignment, some received a packet containing the Doublets text; others received one with the Crossword Puzzles text. Other than these target texts, the packets contained exactly the same directions and measures.
3. Following directions which were both printed and read aloud, the students then read the target text with the instructions to comprehend the text and compare and/or contrast that word game (either Doublets or Crossword Puzzle) with the game of Word Search which they had read about and discussed earlier.
4. Once students felt they had completed the above task (comprehend and compare/contrast), they were instructed to go to the next page, the "Process Summary Sheet," and mark the choice which best described how they accomplished the task.
5. Following their completion of this form, they were instructed to turn it over and not refer to it again. Then a brief lecture about two kinds of processors was delivered. The lecture reflected the content and format of the next page, the "Processing Style Inventory," which they completed after the brief lecture. It was
emphasized in the lecture that whereas the first form they completed was a self-report of their particular reading behavior for that specific situations, the second form would be a self-report on their general reading style. The emphasis was an attempt to attenuate the carry-over effects of the first form on to the second.

6. One they had completed this page, the experiment was over, and all materials were collected.

Results

From an informal analysis of descriptive data, the two research questions can be answered positively. The background and style of the reader, as operationally defined, did effect the order of processing as measured by the "Process Summary Sheet." The four responses on the "Process Summary Sheet," it will be remembered, represent a 1-4 movement from linear to parallel processing. Limited background (the Doublets group) resulted in a lower mean score (\( \bar{X} = 2.0 \)) on the "Process Summary Sheet" than did extensive background (Crossword Puzzle, \( \bar{X} = 2.57 \)). In other words, those with a limited background tended to read in more of a linear fashion than those with an extensive background. The percentage distribution of these scores (Figure 1) shows that the limited background scores tended toward the #1 rating on the "Process Summary Sheet" while the extensive background scores tended toward the #4 rating. Similarly, those who classified themselves as linear processor had a lower mean score (\( \bar{X} = 1.87 \)) than those who chose the parallel processor category (\( \bar{X} = 2.60 \)). Their percentages were likewise distributed to support those directions (Figure 2, both Figures shown on the next two pages.) The observations were reinforced by chi-square test of the response distribution among the four groups: limited/linear, limited/parallel, extensive/linear, and extensive/parallel. The obtained chi-square = 3.87, df = 1, was significant at the .05 level.

In short, when readers had limited background, they tended to read in more of a linear fashion. When they had extensive background, their reading was more parallel. Similarly, readers who classified themselves as linear processors tended to read that way; those who classified themselves as parallel tended to read that way.
Figure 1. Effects of reader background: comparison of reader background (limited vs extensive) with reported order on a given task.

______ Doublets (N = 37)  
Limited Background

______ Crossword Puzzle (N = 38)  
Extensive Background

Linear Processing  Parallel Processing
Ratings on "Process Summary Sheet"
Figure 2. Effects of reader style: comparison of typical processing style (linear vs parallel) with reported order on a given task.

--- Linear (N = 32)

--- Parallel (N = 43)

Ratings on "Process Summary Sheet"
Discussion

The results of this exploratory study support the view that the background and style of the reader do affect the order of processing between the comprehending and using of text ideas for a thinking task. Further research is needed to develop more valid measures of processing style (the "Processing Style Inventory") and the actual processing of a text (the "Process Summary Sheet"). A second limitation has to do with the external validity of the results. Reading in the "real world," even that limited world of schools and universities, contains a wide variety of persons reading a wide variety of texts for a wide variety of thinking tasks. Future studies along these lines must be aimed at better addressing that complexity.

Future studies about these relationships should be conducted from the assumption that the comprehending and using of text ideas for thinking tasks are two related but different processes. If, as Bertram Bruce suggests, future directions should include studying the relationships between comprehension and more general thinking skills, then little is gained by grouping these two components under the rubric of comprehension. From early years on, teachers expect both comprehending and using text ideas from their students, and they commit much time to helping students improve their abilities to do both. Research focusing on the order-relationship between these two components, as well as other relationships that define their dynamics, should eventually contribute to these teaching efforts.

REFERENCES


