DOCUMENT RESUME

ED 230 902 CS 007 163

AUTHOR Meyer, Bonnie J. F.; Rice, G. Elizabeth
TITLE Interaction of Text Variables and Processing Strategies for Young, Middle-Aged, and Older Expert Readers. Prose Learning Series, Research Report No. 12.
INSTITUTION Arizona State Univ., Tempe. Dept. of Educational Psychology.
SPONS AGENCY National Inst. of Mental Health (DHHS), Rockville, Md.
PUB DATE 83
GRANT AG-03438-01; NIMH/ROI-MH-31520
NOTE 40p.; Paper presented at the Annual Meeting of the American Educational Research Association (Montreal, Canada, April 11-15, 1983). Appendix marginally legible.
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Adults; *Cognitive Processes; *Language Processing; Middle Aged Adults; Older Adults; Reading Ability; Reading Comprehension; *Reading Research; *Recall (Psychology); *Schemata (Cognition)
IDENTIFIERS *Author Reader Relationship; Prose Learning; Reader Text Relationship; *Reading Strategies

ABSTRACT

A study examined how the text variables of organizational plan (top-level structure), emphasis plan (implemented through signalling devices), and presence of details influenced the selection of reading strategies by adults. Subjects--149 young, middle aged, and older expert readers--read and recalled in writing two expository prose passages of 388 words each. The results indicated that when the author's emphasis plan corresponded with his or her organizational plan, the readers were more likely to use a "structure strategy" in their processing. This resulted in recalls that were organized in the same manner as the original passage, showed a strong levels effect, and contained many of the logical relationships from the original text. In contrast, when the author's emphasis plan was in conflict with the organization plan (a "differential" emphasis plan), readers tended to use a "default strategy" of simply listing what they could remember or to devise other strategies. These recalls were less likely to be organized by the same plan used by the author, showed little or no levels effect, and contained fewer logical relationships than those from passages with normal emphasis plans. In addition, the presence of specific details was found to affect the processing strategies of readers under certain conditions. No significant differences were found in recall performances among the three age groups. (Passages used in the study are appended.) (Author/FL)

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy

ED230902

Interaction of Text Variables and Processing Strategies for Young, Middle-Aged, and Older Expert Readers

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Bonnie J. F. Meyer
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

by

Bonnie J. F. Meyer and G. Elizabeth Rice

Arizona State University

RESEARCH REPORT No. 12
Spring 1983

PROSE LEARNING SERIES

This paper was presented at the meetings of the American Educational Research Association in Montreal, Quebec, Canada, April 1983. Preparation of this paper was supported in part by Public Health Service grants NIMH/ROI MH 31520 and AG 03438-01
Requests for reprints should be sent to Bonnie J. F. Meyer, Department of Educational Psychology, Arizona State University, Tempe, Arizona 85287.

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY
COLLEGE OF EDUCATION
ARIZONA STATE UNIVERSITY
Tempe, Arizona 85287

007 163

Interaction of Text Variables and Processing Strategies for Young, Middle-Aged, and Older Expert Readers

Abstract

The prose recall study described in this paper examines how the text variables of organizational plan, emphasis plan, and presence of details may influence the selection of reading strategies by adults of different ages. 149 young, middle-aged, and older expert readers read and recalled in writing two expository prose passages of 388 words each. Results indicate that when the author's emphasis plan (implemented through signaling devices) corresponds with her organizational plan (or top-level structure) subjects are more likely to use a "structure strategy" in their processing of prose. This results in recalls which are organized in the same manner as the original passage, show a strong levels effect, and contain many of the logical relationships from the original. In contrast, when the author's emphasis plan is in conflict with the organizational plan (a "differential" emphasis plan), readers may use a "default strategy" of simply listing what they can remember or devise other strategies. These recalls are less likely to be organized by the same plan as used by the author, show little or no levels effect, and contain fewer logical relationships than recalls from passages with normal emphasis plans. In addition, the presence of specific details was found to affect the processing strategy used by the reader under certain conditions. No significant differences in recall performance among the three age groups were found.

Interaction of Text Variables and Processing Strategies for Young, Middle-Aged, and Older Expert Readers

Bonnie J. F. Meyer and G. Elizabeth Rice
Arizona State University

The prose recall study described in this paper examines how the text variables of organizational plan, emphasis plan, and presence of details may influence the selection of reading strategies by adults of different ages. These reading strategies are thought to guide the processes involved in building a reader's cognitive representation of a text. A text can be written with various sorts of organizations, and a reader can likewise approach a text with various organizational expectations. The interaction between the text dimensions and readers' strategies affects both the organization and the content of recall of the text. This interaction is examined with groups of young, middle-aged, and older expert readers through several measures of prose recall, including recall structure, the levels effect, and recall for logical relations.

Background

Text Variables:

Organizational Plans. Organizational plans, or top-level structures, are patterns or frameworks for the topic content and can be viewed as a type of schema in the mind of the writer or reader. Under the Meyer system of prose analysis (Meyer, 1975; in press) the use of these plans is seen to produce a hierarchical organization of passage content in which the more

important ideas (from the author's perspective) are superordinate to those of lesser importance. The organizational plans used for the passages in this study come from those identified by Meyer (1977) and include the response: problem/solution top-level structure, the comparison top-level structure, and the collection: time/order top-level structure. These different types of organizational plans are thought to affect readers' expectations differentially during reading as well as to affect their search plans during retrieval (Meyer, in press; Meyer & Rice, 1982).

Emphasis Plans. By using different emphasis plans, the author can attempt to focus the reader's attention on different information in the text. Under a normal emphasis plan, the information highlighted by the author is that which corresponds to the critical junctures in the organizational plan; usually this is the information at the highest levels of the content structure (Meyer, 1975) of the text. In contrast, a differential emphasis plan highlights information which is not part of the author's organizational plan; often this is from the lower levels of the structure.

An emphasis plan is implemented through the use of signaling (Meyer, 1975). Signaling of logical relationships in a passage explicitly points these relationships out to the reader. Examples of signaling for comparison relationships include the use of phrases such as "in contrast," "however," "but," "on the other hand" and for causal relationships examples include "therefore," "as a result," etc. Details can be highlighted

with pointer words such as "important," or "notable." Three types of emphasis plans were used in this study: normal emphasis (signaling of the superordinate relationships of the organizational plan); differential emphasis (emphasizing details through pointer devices); and no emphasis (no signals or pointers). Emphasis plans are thought to affect readers' processing under a selective encoding model (Meyer, in press; Meyer & Rice, 1982).

Presence of Details. The third text variable to be examined was that of the presence of specific details in the text such as names and dates. This variable was included because we had postulated the existence of a "detail strategy" for older adults on the basis of earlier work (Meyer & Rice, 1981). While we have not confirmed the presence of such a strategy, we have found that the presence or absence of specific details affects the organization and not simply the content of the reader's cognitive representation of the text (Meyer & Rice, 1982).

Processing Strategies:

We have previously presented a model of how the reader constructs a representation in memory of the text, based on the writer's cues (Meyer, in press; Meyer & Rice, 1982). This model, depicted in Figure 1, identifies three reading strategies: the structure strategy; the default/list strategy, and other reader generated strategies. These are briefly described below.

Inset Figure 1 about here

The Structure Strategy. The structure strategy is the dominant reading strategy hypothesized for skilled comprehenders in a prose learning task. Skilled readers appear to approach text with knowledge about how texts are conventionally organized and with a strategy to seek and use the top-level structure in a particular text as an organizational framework to guide encoding and retrieval (Meyer, 1981; in press). Processing activities for the structure strategy focus on a search for major text-based relationships among propositions.

Default List Strategy. While the structure strategy is a systematic plan for processing text, the default strategy is not. The reader simply tries to remember something from the text and produces a list of propositions.

Other Strategies. Other strategies include systematic reading plans which are more idiosyncratic. Rather than focusing on the author's organization, the reader may choose some other organization based on his own interests or abilities. The detail strategy mentioned above, under which a reader chooses to remember and emphasize specific details rather than higher level propositions, comes under this category.

Prose Recall and Aging:

The number of studies of adult age differences in learning and memory of prose is growing, but the wide array of results

from these studies is contradictory and confusing. While many researchers have reported age deficits on prose learning tasks (e.g. Cohen, 1979; Gordon & Clark, 1974; Taub, 1975, 1976; Taub & Kline, 1978), others have used similar tasks and found no age deficits (Harker, Hartley, & Walsh, 1982; Meyer & Rice, 1981; Taub, 1979). Much of this variation in findings can be explained by the critical learner variables of verbal ability and education. Meyer & Rice (in press) found clear and large age deficits in prose learning for older adults with average vocabulary test scores and little or no high school education. However, for high verbal ability, college educated older adults, the magnitude of age deficits in learning appears small or non-existent. In this study we are using expert readers in all age groups and thus expect to find little or no differences among age groups in measures of quantity of recall.

With respect to the question of age differences in recall strategies and recall organization, earlier work has suggested that even older adults with high verbal ability may be less sensitive to the hierarchical organization of prose passages (Meyer & Rice, 1981). We found that adults over 65 exhibited less of a "levels effect" in their recall protocols than did young and middle-aged subjects. The present study will provide a wider data base with which to examine this aging issue.

Description of the Study

In the present study we examine the effects of the text variables described above on readers' strategies in a prose

recall task. Our central argument concerns the effects of emphasis plans, and claims that the emphasis plan used by the author influences the processing strategy employed by the reader and thus affects the organization of the recall of the passage. In particular we propose to show that normal emphasis plans encourage the use of the structure strategy and thus produce recalls which follow the author's organizational plan and show the 'levels effect' which has been almost universally found in prose recall studies (Kintsch & Keenan, 1973; Kintsch & Van Dijk, 1978; Meyer, 1975; Meyer & McConkie, 1973). The levels effect, in which information high in the hierarchical structure of the passage is better recalled than information low in the structure, is taken as evidence that the reader is sensitive to the relative importance of the ideas in a passage as it is organizaed by the author. In contrast, differential emphasis plans encourage the use of other, reader-generated processing strategies, and produce recalls with little or no levels effect.

Methods:

Materials. Passages on two topics were used in the study: the Supertanker passages were written with a response: problem solution organizational plan and the Railroad passages were written with a comparison organizational plan. Because the Railroad passage included a brief history of railroad development, an alternate collection: time/order structure was also a possible organizational plan for this passage. The two passages were identical in length (388 words), number of levels in the

content structure (9), and number of idea units (244).

To vary the text dimensions of emphasis and details, five versions of each topic were written. Two followed a normal emphasis plan by signaling the superordinate logical structure of the text; one of these versions contained 22 specific names, dates and numbers at the lowest level in the content structure and the other did not. For the version without specific details general terms were substituted (i.e. "thousands" for "200,000" and "years ago" for "1975"). Two versions of the passages followed a differential emphasis plan; they did not signal the logical structure of the text and did contain specific details. One of these two versions signaled these details with 'pointer words (i.e., "disastrous year of 1967"). A final version of each passage used no explicit emphasis plan and signaled neither the logical structure nor the details. Appendix A provides paraphrases of the high and low level information in each passage along with the signals used.

Based on the general processing model described above in Figure 1, it is possible to make passage-specific models of the processing of the different versions of the Supertanker and Railroad passages. These appear in Figures 2 (for Supertankers) and 3 (for Railroads). For the Supertanker text, subjects reading passages written with both normal (with-signaling) and differential (without-signaling) emphasis plans are expected to arrive at a problem/solution organizational plan for the passage, though with more difficulty for those with differential plans. On the other hand, the Railroad passage presents a more

interesting situation in which subjects reading versions with differential emphasis plans may turn to a collection: time/order plan rather than the author's comparison plan. These issues are discussed more fully below.

Insert Figures 2 & 3 about here

Subjects. The subjects were 149 men and women, 50 in each of two age groups: 18-32; 40-54; and 49 subjects in the group aged over 62. Subjects were designated as expert readers on the basis of vocabulary scores; the mean Quick Word Test (Borgatta & Corsini, 1964) score for each group was approximately equal to a WAIS scaled score of 16 (see Meyer & Rice, in press, for regression lines between Quick and WAIS scores). Table 1 gives mean vocabulary scores, years of education and age for the three groups. This group of expert readers was a subset from a group of over 500 subjects tested in a series of related studies. Subjects were volunteers from the local community and were paid $4/hour for their participation.

Insert Table 1 about here

Procedures. All subjects read and recalled in writing one of the five versions on both the Supertanker and Railroad topics. Within each age group, ten subjects were randomly assigned to each of the five conditions of text dimension variations; topic order was counterbalanced. Subjects were

instructed to read the passages at their normal reading speed and to write everything they could remember from the passage in sentences and paragraphs.

The recall protocols were scored for presence or absence of the 244 idea units in the content structure of each passage (Meyer, 1975). The number of idea units recalled from high (levels 1-4), mid-high (level 5), mid-low (level 6) and low (levels 7-9) in the structure were tallied to measure the levels effect (each category contained approximately 60 idea units). For analysis purposes these tallies were converted to proportion of units recalled in each category. For some analyses the categories were reduced to high (levels 1-5) and low (levels 6-10) for the sake of simplicity. Also tallied were the number of logical relationships recalled (total of 14 possible). Recall protocols were also assessed for their organizational plan or top-level structure (Meyer, Brandt & Bluth, 1980; Meyer, in press).

Results:

Normal vs. Differential Emphasis Plans:

In the following analyses the two normal emphasis versions of each passage are contrasted with the two differential emphasis versions. The version with no emphasis plan (no signals and no details) is not considered until later. These analyses examine the effects of the authors' emphasis plans on the organizational plans of the recalls, on the "levels effects"

exhibited by the recalls, and on the number of logical relations appearing in the recalls. Because of significant passage effects, data from the two passages are analyzed separately.

Organizational Plans (Top-Level Structures). The organizational plans of the recalls produced by subjects reading passage versions with normal or differential emphasis plans are given in Table 2. For the Supertanker passage, the organizational plans of the recall protocols have been classified into two groups: same as author (i.e. a problem/solution organizational plan) and other. The other category includes both default/list organizations and other reader-generated organizational plans, but because of the small numbers of these it was not feasible to show them separately. When data from the three age groups are combined, the relationship between the author's emphasis plan and the reader's organizational plan is significant at the .01 level (χ^2=6.67). While the majority of readers used the author's problem/solution plan, those who did not were much more likely to have read a version with a differential emphasis plan. Data for each age group are displayed. The trends are similar for each group, though only the oldest age group shows a significant chi-square (4.81, $p<.03$) when taken alone.

Insert Table 2 about here

The Railroad passage produced similar results. For this passage three categories of organizational plans for the recalls

were identified: same as author (comparison), timeline (collection: time/order), and other. The relationship between author's emphasis plan and the reader's organizational plan is again significant (χ^2=8.33, p<.03), with the large majority of the alternate time/order organizations occurring under the differential emphasis condition. Again, the data for each age group show similar trends, though this time it is the middle age group which has the significant chi-square (11.08, p<.01) when taken alone.

Levels Effect. Figure 4 shows the proportion of idea units recalled from the high and low levels of the content structure of each passage under the normal and differential emphasis conditions. For these analyses the content structure was divided into halves, with levels 1-5 in each passage being designated as high and levels 6-9 as low. A 2 (emphasis plan) by 3 (age group) by 2 (levels, repeated measure) analysis of variance was performed for each passage. For the Supertanker passage both emphasis plan (F(1,113)=3.97, p<.05) and levels (F(1,113)=139.52, p<.001) main effects were significant. The emphasis plan/levels interaction was also significant at the .001 level (F(1,113)=12.90). The same effects were significant for the Railroad passage: emphasis plan (F(1,113)=4.32, p<.04), levels (F(1,113)=28.16, p<.001), and the emphasis plan/levels interaction (F(1,113)=39.24, p<.001). No age main effects or age interactions were significant for either passage.

Insert Figure 4 about here

Perusal of Figure 4 makes it clear that the levels effect (superior recall of information high in the content structure) is degraded under conditions of differential emphasis for both passages. This is particularly true for the Railroad passage, where the levels effect disappears completely under the differential emphasis condition.

Logical Relations. The number of logical relationships recalled from each passage under the normal and differential emphasis conditions is given in Table 3. These data were analyzed with a 2 (emphasis plan) by 3 (age group) analysis of variance. A total of 14 logical relationships was available for recall in each passage. For both passages the main effect of emphasis plan was significant at the .001 level (Supertankers: $F(1,113)=11.14$; Railroads: $F(1,113)=34.09$). Subjects reading passage versions with normal emphasis plans recalled more of these logical relationships. No age main effects nor age interactions were significant for either passage.

Insert Table 3 about here

Details and Alternate Organizational Plans:

Figure 5 presents a more complete view of the effects of the various passage manipulations on the proportion of idea units recalled from different levels in the content structure of each passage. The proportion of idea units recalled in the four categories of levels is displayed for each of the five versions

of both of the passages. These data were analyzed with a 5 (passage version) by 3 (age group) by 4 (levels, repeated measure) analysis of variance procedure. When analyzed in this fashion, there are significant main effects for levels for each passage (Supertanker: $F(3,402)=104.76$, $p<.001$; Railroads: $F(3,402)=8.62$, $p<.001$), and for the levels/passage version interaction (Supertanker: $F(12,402)=4.36$, $p<.001$; Railroads: $F(12,402)=10.84$, $p<.001$). The passage version and age main effects are not significant at .05 or better, nor are any age interactions.

Insert Figure 5 about here

Figure 5 illustrates some interesting contrasts between the passages. These contrasts, in turn, have some important things to say about the effects of details and organizational plans on readers' strategies. In the Supertanker passage, the two versions with normal emphasis patterns (those to the left of the page) show a much clearer levels effect than do the other versions. The version with no emphasis plan clearly falls in with those with a differential emphasis plan. The gradual degrading of the levels effect as we move from left to right across the page is in line with our expectations based on the processing models presented earlier.

On the other hand, the Railroad passage shows a different pattern. For this passage it is the versions with specific details which are strikingly different from those without. The

two versions without specific details (the leftmost and middle on the page) both show levels effects, though to different degrees. The versions with details exhibit very little or even reversed levels effects.

The reason for the differential effect of these manipulations for the two passages appears to lie in differences among organizational plans, and in the potential for a time/order plan in the Railroad passage. The Supertanker text is a typical expository text; it presents logic to inform and persuade. However the railroad text is a history with superordinate causal and descriptive relations and a comparison top-level structure. Histories fall under a narrative discourse type. By signaling the logical relations in the railroad text and taking away the specific details, particularly dates, we emphasize the logic and may force a narrative into an expository format. By taking away the signals and leaving the details, the subjects may now process the text with their narrative schema, a collection of events on a time line.

The use of a time line for processing the railroad passage reorders the entire content structure of the passage. Figure 6 illustrates this reordering. In the expository schema, the dates are at the lowest level of the text. For the time line schema, the dates and their related ideas move to the top of the structure. Thus the lowest levels in the original structure become high levels under the new structure. Based on the data

---

Insert Figure 6 about here

---

in Figure 5, the with-signals and with-specific details version of the Railroad passage appears to occupy a sort of in-between position with respect to this reordering. Both the comparison and time line organizational plans are vying for the reader's attention. This is the one place where there appears to be a potential age difference. While the young and middle groups show little levels effect for this version, the oldest group continues to exhibit the effect.

Evidence that subjects are indeed changing their processing strategies in the presence of the specific details in the Railroad passages comes from the organizational plans of their recalls. Table 4 shows the relationship between the organizational plan of subjects' recall the the presence of specific details. When data from the age groups are combined, a clear relationship between details and the use of time lines is evident (χ^2=11.23, p<.005). The relationship is significant for both the young and middle groups as well (young: χ^2=6.90, p<.05; middle: χ^2=6.35, p<.05), though not for the old. The versions with specific details encourage the use of the alternate time line organization as well as other reader-generated organizations.

Insert Table 4 about here

Discussion

The results clearly support our argument that the text variable of emphasis plan affects the organization of readers' recall of a text. The data also provide evidence for our contention that the text variables influence the reader's strategy for the processing of a passage. The contingency analysis of author's emphasis plan by reader's organizational plan showed that subjects are more likely to discover and use the author's structure, that is to use a structure strategy in their processing, under normal emphasis plan conditions than under differential emphasis plans. Further evidence that the normal emphasis plans encourage use of the structure strategy comes from the analysis of the levels effects produced in recall protocols under normal and differential emphasis plans. The levels effect is a sort of measure of how well the reader's assignment of importance to ideas in the text corresponds to the author's. Subjects show a significantly better recall of ideas high in the author's structure as compared to recall of ideas low in the structure when the author's emphasis plan coincides with and reinforces the organizational plan of the text. Conversely, emphasis plans which are in conflict with the organizational plan of the text encourage the use of other reader-generated strategies or require the reader to fall back on a default/list strategy. In this case the levels effect is reduced or even reversed. This is particularly true when an alternate organizational plan is readily available, as the time/order plan is in the case of the Railroad passage.

More evidence that subjects are making more use of the

structure strategy under normal emphasis plans comes from the recall of logical relationships. An important component of the structure strategy is the search for the logical relationships which bind together the larger pieces of the text. More of these relationships are recalled under normal emphasis conditions than under differential enphasis conditions. This suggests more successful use of the structure strategy under these conditions.

The overall superiority in quantity of recall for passages with normal emphasis patterns is also in line with our contention that such passages encourage use of the structure strategy, which is postulated to be the most efficient strategy for accuracy in recall. This increase in quantity of information recalled was not predicted for this study, based on earlier findings (Britton, Glynn, Meyer, & Penland, 1982; Meyer, 1975; 1979; Meyer, Brandt & Bluth, 1980), but is not unprecedented. Marshall & Glock (1978-1979) also found superiority in total recall from signaled passages with junior college students.

Some indication of the complexity of the interaction between text variables and reader strategies is given through the analysis of recall of the various versions of the Railroad passage. Here we saw that not just the emphasis plan, but the presence of specific details may suggest to the reader an alternate strategy under which the reader uses a different schema from the author's to organize recall of the passage. For the Railroad passage, the presence of specific dates and the general historical content of the passage caused many readers to

abandon the author's comparison organizational plan in favor of a narrative, time/order organization. Thus, the repertoire of organizational plans available to the reader through his prior experience is also an element in the interaction (see Meyer & Rice, 1982, for a more complete discussion of this issue).

The lack of differences in recall performance among the different age groups is in line with our expectations for these samples of expert readers (see Meyer & Rice, in press). With respect to our question about the relative sensitivity of older adults to the hierarchical organization of text, this study provides little evidence to suggest a deficit in this area. These findings do not necessarily contradict those of Meyer & Rice (1981), however, since the passage used in that study is most like the Supertanker version without signals and with specific details which shows a similar, though not statistically significant pattern, in this study. The findings do point up the complexity of the factors involved in making generalizations about differences between age groups.

In summary, while the structure strategy appears to be the dominant strategy employed for prose processing by the groups of expert readers in this study, the use of the structure strategy is enhanced by passages with normal emphasis patterns. Differential emphasis plans, on the other hand, encourage the use of idiosyncratic strategies or of the default strategy. In addition, the presence or absence of specific details was found to affect the processing strategy used by the reader. In particular, the presence of certain kinds of details (e.g., dates) sup-

ports the reader's postulation of certain kinds of organizational plans (e.g. time/order plans) and encourages their use in recall. In general, differences among age groups were minimal. This is in line with our expectations for this group of expert readers (see Meyer & Rice, in press).

The implications of this work extend into several areas. For the teaching of writing, it is clear that the author needs to operate with a clear organizational plan and to be certain that her emphasis plan is in correspondence with the organization. For the teaching of reading, the use of the structure strategy can be taught to improve comprehension and recall. With respect to aging, the work can be used to support the contention that cognitive functioning can be maintained at a high level well into the oldest age groups.

References

Britton, B. K., Glynn, S., Meyer, B. J. F., & Penland, M. Use of cognitive capacity in reading text: Effects of variations in surface features of text with underlying meaning held constant. Journal of Educational Psychology, 1982, 74, 51-61.

Borgatta, E. F., & Corsini, R. J. Manual for the Quick Word Test. N.Y.: Harcourt, Brace, & World, 1964.

Cohen, G. Language comprehension in old age. Cognitive Psychology, 1979, 11, 412-429.

Gordon, S. K., & Clark, W. C. Application of signal detection theory to prose recall and recognition in elderly and young adults. Journal of Gerontology, 1974, 29, 64-72.

Harker, J. O., Hartley, J.T., & Walsh, D. A. Understanding discourse--a life-span approach. In B. A. Hutson (Ed.), Advances in reading/language research (Vol. 1). Greenwich, Conn.: JAI Press, 1982.

Kintsch, W., & Keenan, J. M. Reading rate as a function of number of propositions in the base structure of sentences. Cognitive Psychology, 1973, 6, 257-274.

Kintsch, W., & van Dijk, T. A. Toward a model of text comprehension and production. Psychological Review, 1978, 85, 363-394.

Marshall, N. & Glock, M.D. Comprehension of connected discourse: A study into the relationships between the structure of text and information recalled. Reading Research Quarterly, 1978-1979, 14, 10-56.

Meyer, B. J. F. The organization of prose and its effects on memory. Amsterdam: North-Holland Pub. Co., 1975.

Meyer, B. J. F. The structure of prose: Effects on learning and memory and implications for educational practice. In R. C. Anderson, R. Spiro, & W. Montague (Eds.), Schooling and the acquisition of knowledge. Hillsdale, N.J.: Erlbaum, 1977

Meyer, B. J. F. Organizational patterns in prose and their use in reading. In M. L. Kamil & A. J. Moe (Eds.), Reading research: Studies and applications. Clemson, S.C.: National Reading Conference, Inc., 1979, 109-117.

Meyer, B. J. F. Basic research on prose comprehension: A critical review. In D. F. Fisher & C. W. Peters (Eds.), Comprehension and the competent reader: Inter-specialty perspectives. New York: Praeger, 1981.

Meyer, B. J. F. Text dimensions and cognitive processing. In H. Mandl, N. Stein, & T. Trabasso (Eds.), Learning from texts. Hillsdale, N.J.: Erlbaum, in press.

Meyer, B. J. F., Brandt, D. M., & Bluth, G. J. Use of the top-level structure in text: Key for reading comprehension of ninth-grade students. Reading Research Quarterly, 1980, 16, 72-103.

Meyer, B. J. F., & McConkie, G. W. What is recalled from prose after hearing a passage? Journal of Educational Psychology, 1973, 65, 109-117.

Meyer, B. J. F., & Rice, G. E. Information recalled from prose by young, middle, and old adults. Experimental Aging Research, 1981, 7, 253-268.

Meyer, B. J. F., & Rice, G. E. The interaction of reader strategies and the organization of text. Text, 1982, 2, 155-192.

Meyer, B. J. F., & Rice, G. E. Learning and memory from text across the adult life span. In J. Fine & R. O. Freedle (Eds.), Developmental studies in discourse, Norwood, N.J.: Ablex, in press.

Taub, H. A. Mode of presentation, age, and short-term memory. Journal of Gerontology, 1975, 30, 56-59.

Taub, H. A. Method of presentation of meaningful prose to young and old adults. Experimental Aging Research, 1976, 2, 469-474.

Taub, H.A. Comprehension and memory of prose by young and old adults. Experimental Aging Research, 1979, 5, 3-13.

Taub, H.A. & Kline, G. E. Recall of prose as a function of age and input modality. Journal of Gerontology, 1978, 33, 725-30.

Table 1. Descriptors for the Three Age Group Samples

		Age Group		
		Young (18-32) N=50	Middle (40-54) N=50	Old (>62) N=49
Descriptors:				
Age in Years	Mean	25.1	47.4	68.6
	s.d.	4.32	4.47	4.25
Years of Education	Mean	16.2	16.4	16.2
	s.d.	2.20	2.52	2.14
Quick Vocabulary Score	Mean	65.0	77.7	81.8
	s.d.	12.88	7.83	8.57
Equivalent WAIS Score (a)		70	72	73

(a) See Meyer & Rice (in press) for regression lines between Quick and WAIS for different age groups.

Table 2. Organizational Plans of Recalls from Passage Versions with Normal or Differential Emphasis Plans.

Emphasis Plan of Version Read	Supertanker Passage: Organizational Plan of Recall: Same as Author	Supertanker Passage: Organizational Plan of Recall: Other	Railroad Passage: Organizational Plan of Recall: Same as Author	Railroad Passage: Organizational Plan of Recall: Time Line	Railroad Passage: Organizational Plan of Recall: Other
All Age Groups:					
Normal:	56	3	48	5	5
Differential:	46	14	36	17	7
	χ^2=6.67, p<.01			χ^2=8.33, p<.02	
Young:					
Normal:	19	1	14	2	4
Differential	16	4	12	3	5
	n.s.			n.s.	
Middle:					
Normal:	19	1	18	2	0
Differential:	18	2	8	11	1
	n.s.			χ^2=11.08, p<.01	
Old:					
Normal:	18	1	16	1	2
Differential:	12	8	16	3	1
	χ^2=4.81, p<.03			n.s.	

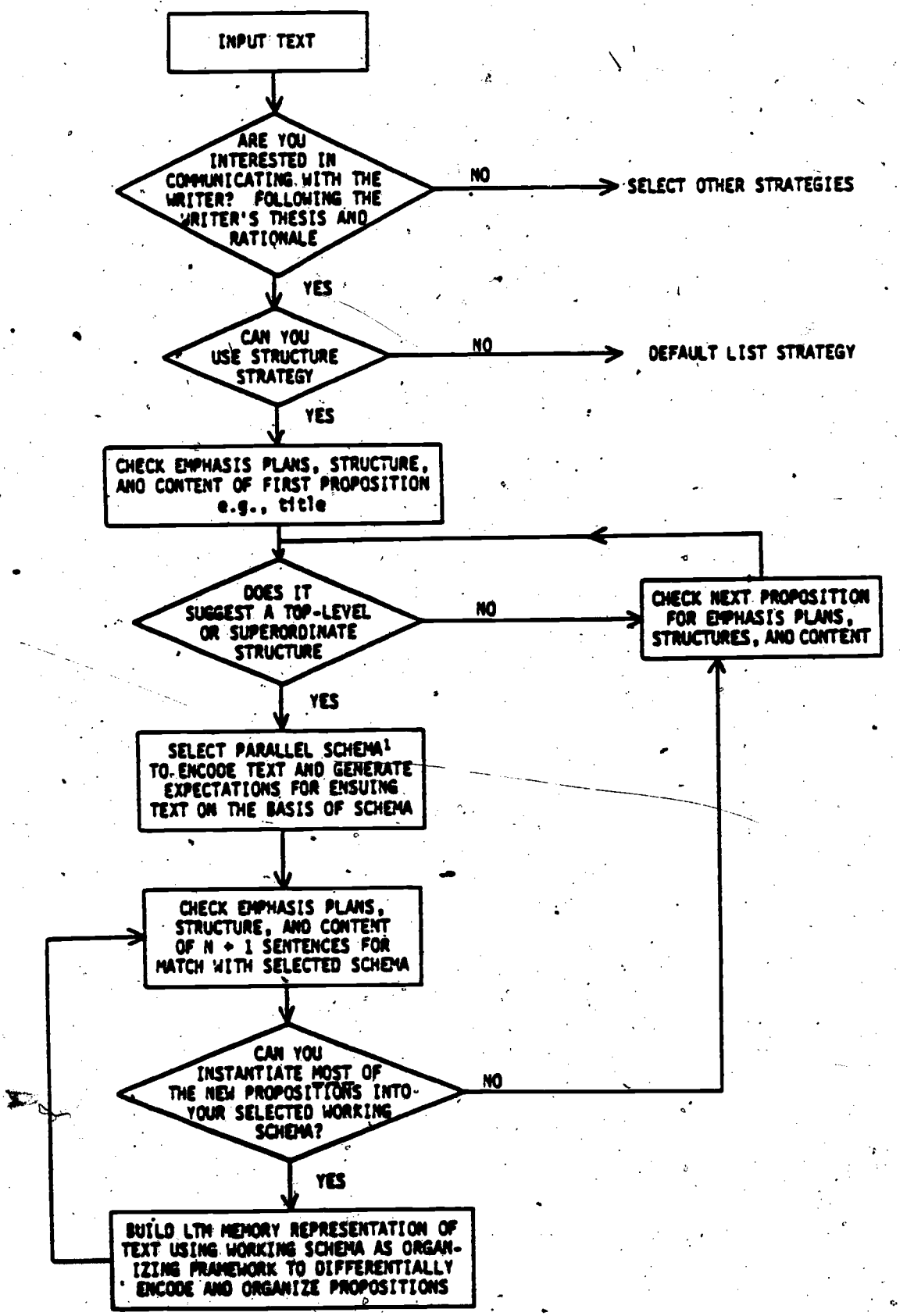
Table 3. Number of Logical Relationships Recalled from the Passage Versions with Normal and Differential Emphasis Plans

		Supertanker Passage		Railroad Passage	
		Emphasis Plan		Emphasis Plan	
		Normal	Differential	Normal	Differential
Age Group:					
Young	Mean	9.2	8.8	6.6	4.9
	s.d.	2.52	2.31	2.52	2.20
	N	20	20	20	20
Middle	Mean	10.3	8.5	6.9	3.5
	s.d.	1.87	1.73	2.83	1.96
	N	20	20	20	20
Old	Mean	9.4	7.4	6.3	3.6
	s.d.	2.27	2.89	2.81	2.06
	N	19	20	19	20
Emphasis Plan Effect:		$F(1,113)=11.14$, $p=.001$		$F(1,113)=34.09$, $p<.001$	

Table 4. Organizational Plans of Recalls from Railroad Passages With and Without Specific Details.

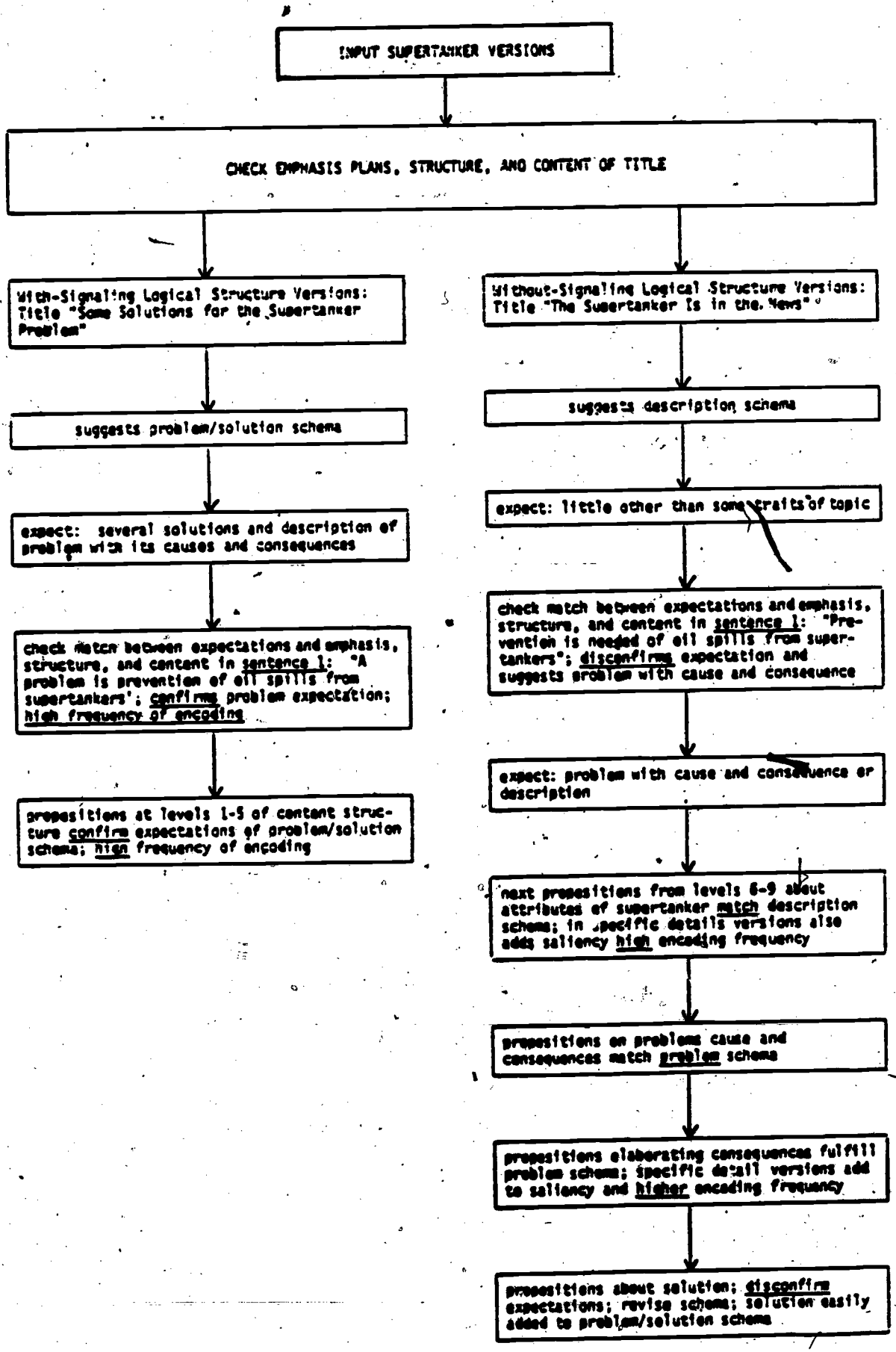
Version Read	Organizational Plan of Recall: Same as Author	Time Line	Other
All Groups:			
Specific Details	57	21	12
General Details	52	4	3
		χ^2=11.53, p<.005	
Young:			
Specific Details	17	5	3
General Details	18	0	2
		χ^2=6.90, p<.05	
Middle:			
Specific Details	16	13	1
General Details	17	2	1
		χ^2=6.35, p<.05	
Old:			
Specific Details	24	3	3
General Details	17	2	0
		n.s.	

List of Figures

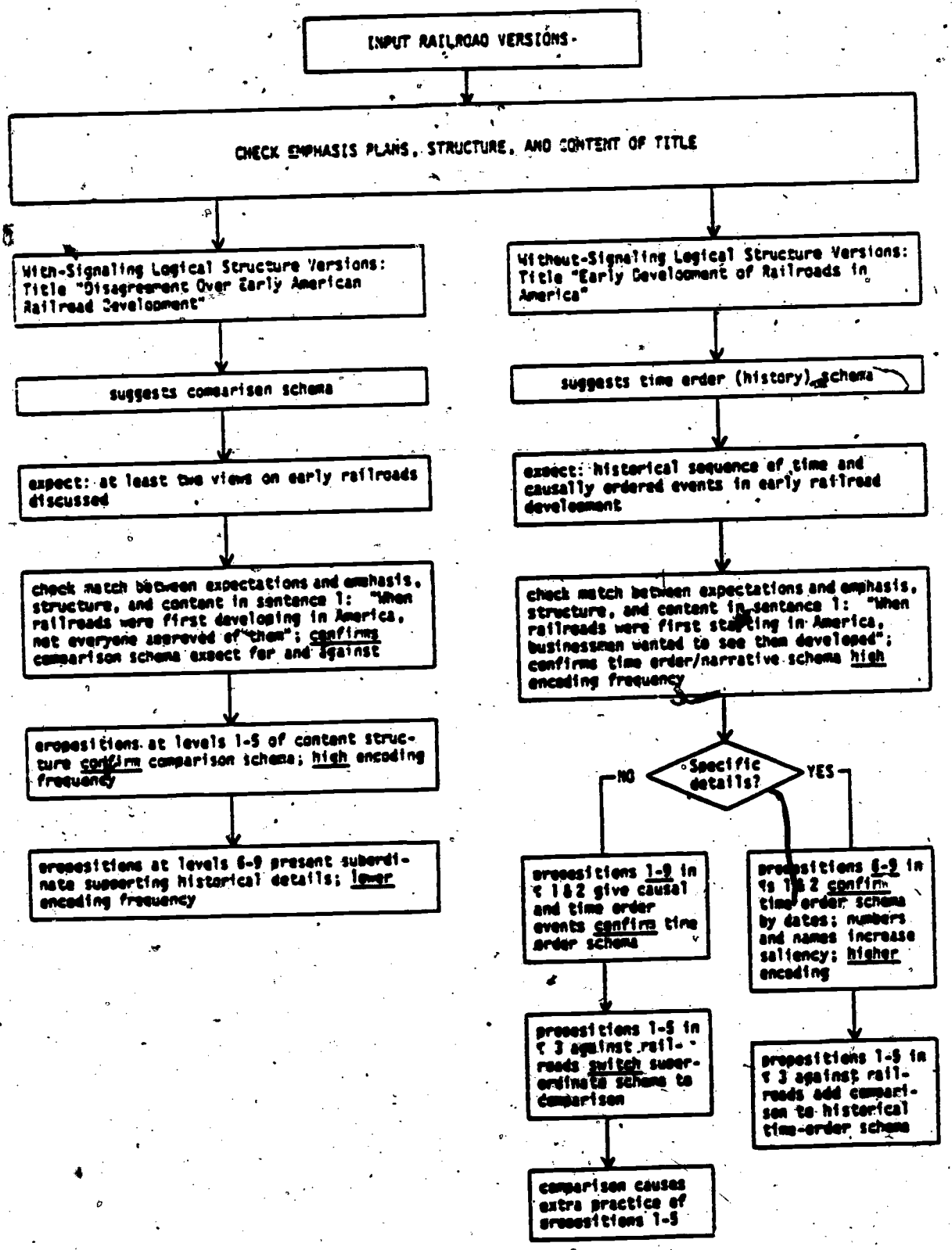


[1]Type of schema selected here influences processes of selection and buffer rehearsal.

BEST COPY AVAILABLE



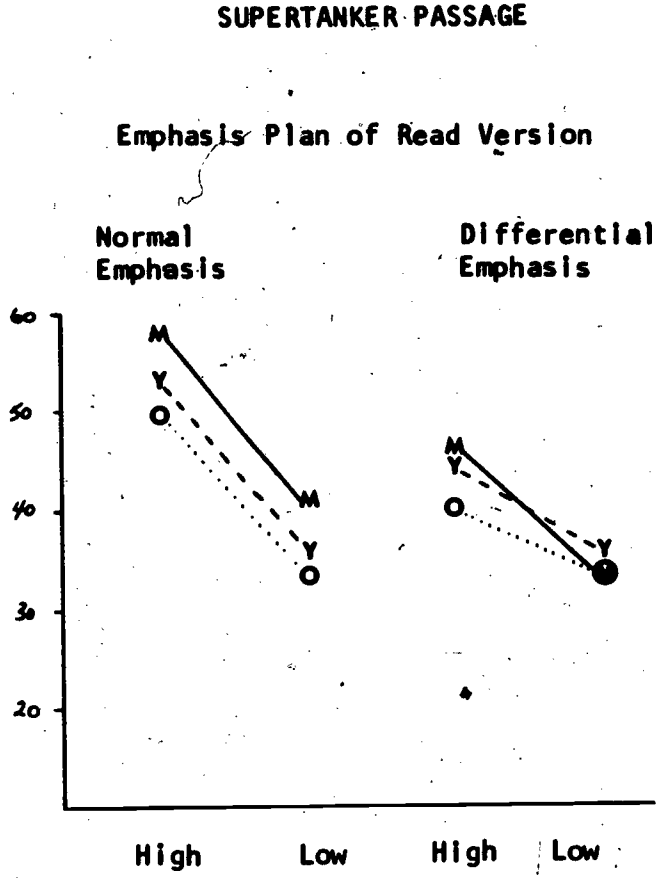
BEST COPY AVAILABLE



BEST COPY AVAILABLE

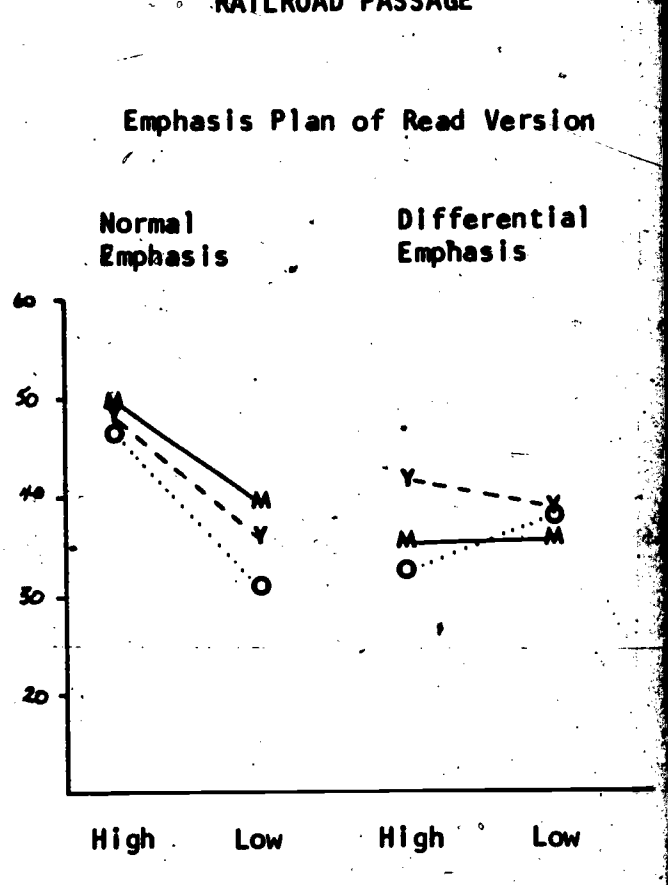
SUPERTANKER PASSAGE

Emphasis Plan of Read Version



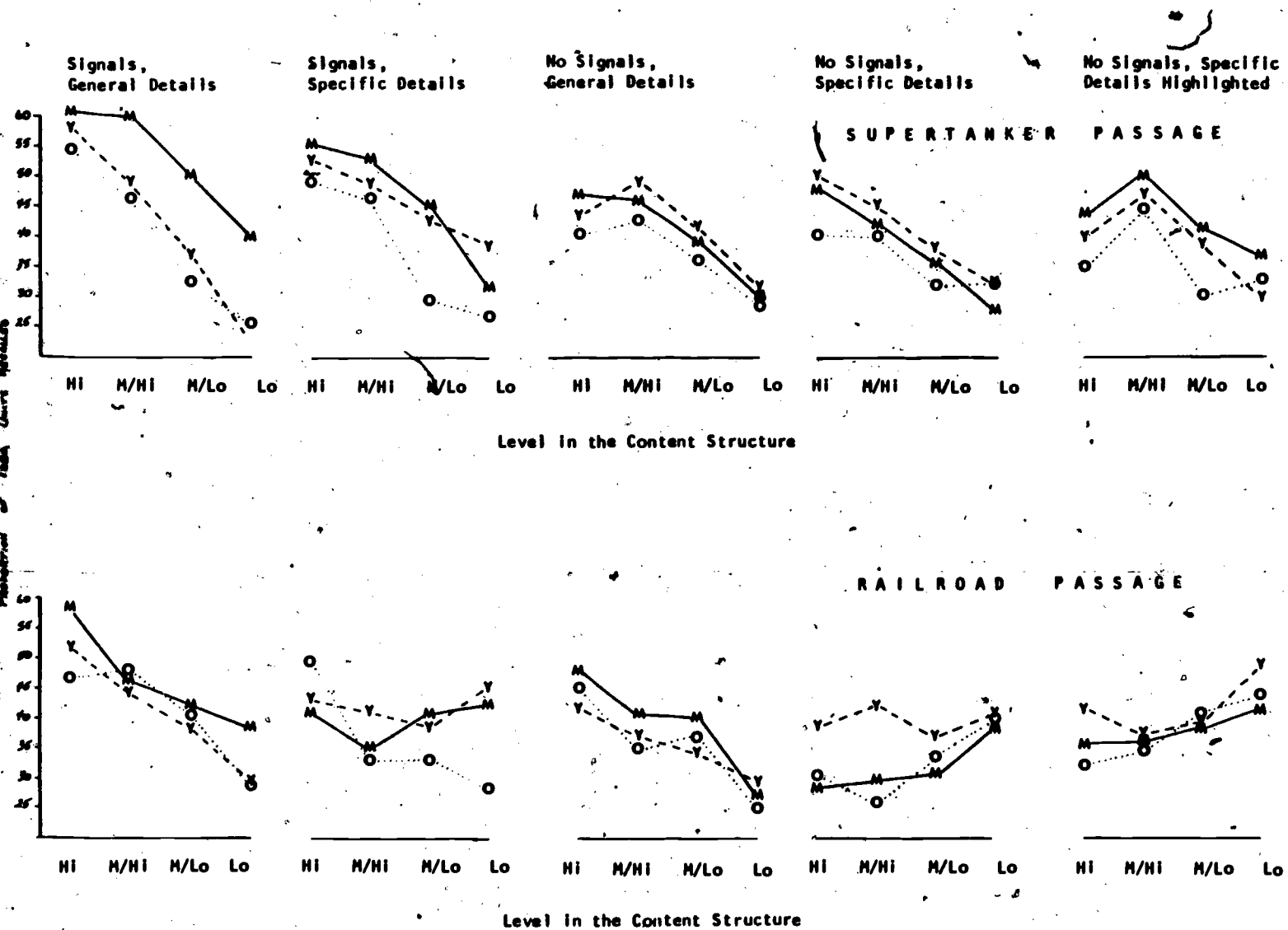
RAILROAD PASSAGE

Emphasis Plan of Read Version

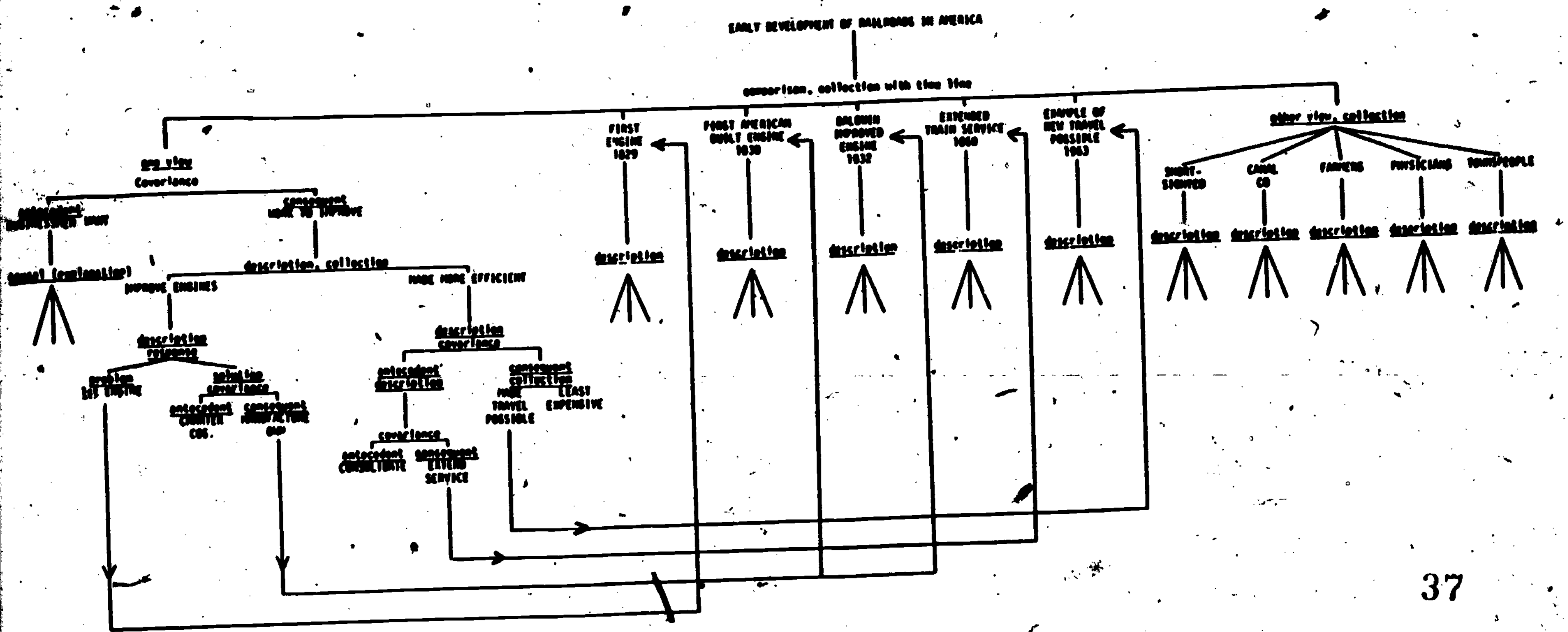


Level in the Content Structure

Key: O = Old Aged
M = Middle Aged
Y = Young



BEST COPY AVAILABLE



BEST COPY AVAILABLE

APPENDIX

High and Low Level Information in the Supertanker Texts with Identification of Signaled High Level Logical Relations

Paraphrase of High Level Information with Signaling of Logical Relations in Italics

A problem is prevention of oil spills from supertankers. *Attributes of a typical* supertanker deal with size and carrying capacity. *The trouble is that* a wrecked supertanker spills oil in the ocean. *As a result of this spillage*, the environment is damaged. *Four examples are given dealing with* resulting destruction, damage from crashes which result in washing ashore, mop ups and findings which led to arrests, and oil spill killings.

Oil spills result from the lack of power and steering equipment to handle emergency situations, such as storms. Supertankers have one boiler to provide power and one propeller to steer the ship.

The solution to the problem is not to halt the use of tankers on the ocean *since* the world's oil supply is carried by supertankers. *Instead, the solution lies in the following three tactics. First*, officers of the supertankers must get top training in how to run and maneuver their ships, *such as that* provided by the tanker simulator at the Maritime Research Center. *Second*, tankers should be built with several propellers for extra control and backup boilers for emergency power. *Third*, ground control stations should be installed at places where supertankers come close to shore *because they* would guide tankers along busy shipping lanes and through dangerous channels. The ground control stations *would not like* airplane control towers which guide airplanes.

Paraphrase of Low Level Information with Specific Details Underlined

(The passage said) a half-million tons of oil, five football fields, the Empire State Building easily in its cargo area. In 1970 near Spain an oil spill from a wrecked tanker exploded into fire. Winds of the force of a hurricane whipped the oil into mist. Several days later black rain from this oil spill (was on) crops and livestock in the neighboring villages. In 1967 the tanker, Torrey Canyon, (was) off the coast of Cornwall; ashore (there were) 200,000 dead seabirds. Nearer to home in July 1975 the United States Coast Guard (saw) acres of oil from the beach at Geiger Key, Florida, north of Key West. Guardsmen (saw) chemical clues. On November 7, 1975 a Greek tanker captain, Vasilious K. Psarroulfs, (had something happen). He failed to report the loss of an estimated 40,000 gallons of oil. Microscopic plant life provide food for sea life and produce 70 percent of the world's oxygen supply.

About 80 percent (was also stated).

BEST COPY AVAILABLE

High and Low Level Information in Text
Forms with Identification of Signaled
High Level Logical Relations

Paraphrase of High Level Information with
Signaling of Logical Relations in Italics

When railroads were first developing in America, *not everyone approved of them.* Businessmen were *in favor* of developing the early railroad *because* they believed that the railroads had great economic potential. *As a result of this conviction,* businessmen worked to improve rail travel. *For example,* they made improvements in the locomotive engine. They experienced a number of *problems* with the first locomotive. *To solve these problems* businessmen chartered companies *for the purpose* of manufacturing their own locomotives. Two examples were given of manufacturing and building these locomotives.

Another improvement which businessmen instigated was to make railroad travel more efficient. *For instance,* they consolidated and *as a result* extended travel and made it possible for the transport of people and goods. *Another result of consolidation was that* railroads became the form of transportation in the United States for all but very bulky items.

As stated earlier, however, railroad development was not favored by everyone. Various groups of people *opposed* and had other ideas about railroad development. *Specifically,* short-sighted people refused to believe they would ever be (anything). Canal companies made efforts to prevent the railroads from building. Farmers complained of fright and fire. Physicians were afraid for survival. *In addition,* townspeople didn't want their quiet disturbed by steam engines and strangers.

Paraphrase of Low Level Information
with Specific Details Underlined

A locomotive was shipped from England in 1829. The first American-built locomotive, Best Friend, made its trial run one in 1830. This locomotive was designed by Horatio Allen, pulled 40 people in four cars, and it attained the speed of 21 miles an hour. The American-made locomotives which were built by Mathias Baldwin became most widely used. His first locomotive was built in 1832.

(There were) numerous short times and direct railroad service from the Eastern seaboard to the Mississippi River by the middle of the century (for going) hundreds of miles within a few days. Traveling by rail on one of G. M. Pullman's sleeping cars between New York City and Detroit took only four days in 1863. Traveling by water the same trip required 10 days. (It was) least expensive.

Many (thought) railroads were just a supplement for waterways. Lines compete with canals. Some (thought) noise (affects) livestock and that sparks which came from the engines (affect) their fields. A number (thought) human body (affected) by travel at speeds as high as 30 miles an hour. Many New Englanders (were affected).