DOCUMENT RESUME

ED 209 646 CS 006 357

AUTHOR Townsend, Michael A. R.
TITLE Flexibility of Schema Shifting in Good and Poor Readers.
PUB DATE Apr 81
NOTE 25p.; Paper presented at the Meeting of the Society for Research in Child Development (Boston, MA, April 2-5, 1981).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Cognitive Processes; *Discourse Analysis; Grade 3; Primary Education; *Reading Comprehension; Reading Difficulties; *Reading Research; Reading Skills
IDENTIFIERS *Schemata; Schema Theory

ABSTRACT

The schema theory of reading comprehension holds that an active interplay exists between the reader's cognitive structures (schemata) relevant to a text and the text itself. A study examined whether children varying in reading comprehension ability showed differences in the deployment of cognitive structures--specifically, whether good and poor readers showed similar flexibility in shifting between familiar schemata. Twenty good and twenty poor third grade readers listened to two short passages about familiar daily activities. Comprehension of the second passage demanded a shift in schemata, and only half the children were explicitly cued to that shift. Analyses of free recall and interview responses indicated that although good readers recalled more information, there was similar flexibility of schemata shifting for both good readers and poor readers. (FL)

Flexibility of Schema Shifting in good and poor readers

Michael A.R. Townsend

University of Auckland

Running head: Flexibility of Schema Shifting

All correspondence should be directed to Michael A.R. Townsend, Child Study Centre, Education Department, University of Auckland, New Zealand.

The present research was designed to determine whether children varying in reading comprehension ability evidence differences in the deployment of cognitive structures. The study stems from the recent theoretical formulations emphasizing reading as a schema based "top down" process (Anderson, 1977; Rumelhart & Ortony, 1977; Rumelhart, 1980). In brief, this process assumes an active interplay between the reader's cognitive structures (schemata) relevant to the text, and the text itself. The importance of schemata in prose comprehension has been dramatically emphasized in studies showing that schemata function to (a) assimilate the thematic constituents of text into a meaningful representation (e.g. Bransford & Johnson, 1972; 1973), (b) allow for enrichment of the text through elaboration and inference (e.g. Bransford & Franks, 1971; Schweller, Brewer & Dahl, 1976), and (c) guide the specific interpretation given to the text (e.g. Sulin & Dooling, 1974; Schallert, 1976; Anderson, Reynolds, Schallert & Goetz, 1977). While these three functions are concerned with the encoding stage of memory, recent work by Anderson & Pichert (1978) on perspective taking has shown that schemata can also serve a retrieval function. Developmental studies have shown that the "top down" constructive view of comprehension applies to children as well as adults (Brown, 1975; 1980; Brown, Smiley, Day, Townsend & Lawton, 1977; Paris & Lindauer, 1977).

The schema interaction view of comprehension suggests that low reading comprehension ability on grade appropriate reading material is a function of inadequate schema development, or, given adequate schema development, inadequate utilization of the schemata. There is support for both inadequate schema development and inadequate schema utilization in

poor comprehension performance. For example, Pearson, Hansen and Gordon (1979) found that comprehension of a technical passage about spiders was a function of whether children had developed a weak or strong schema for spiders. And the utilization of schematic knowledge to construct additional contextual relationships has been shown to improve with age (e.g. Paris & Upton, 1976) and reading ability (e.g. Smiley, Oakley, Worthen, Campione & Brown, 1977; Wilson, 1979). A largely unexplored aspect of schema utilization concerns the ability to control moment to moment activation and deactivation of schemata as they become relevant and irrelevant to text comprehension.

This study examined the ability of good and poor readers to make appropriate schema shifts to accompany shifts in passage theme. It follows from the interactive view of reading that as the context of the prose changes so must the schemata if comprehension is to be maintained. An appropriate schema must first be activitated to deal with the incoming information, but when the theme of the information changes there must be a corresponding change in schemata. Failure to shift schemata at appropriate moments will result in the reader using an inappropriate schema to comprehend the text. The use of an inappropriate schema has been shown to reduce comprehension of both sentences (Johnson, Doll, Bransford & Lapinski, 1974) and prose passages (Townsend, 1980). Thus, being able to shift schemata flexibly is an important aspect of the reading process where there are changes in context. Do good and poor readers show differential flexibility in utilization of their schematic knowledge? To ensure that any differences between good and poor readers were not attributable to inadequacy of prior knowledge or to differences in decoding ability, the passages for this study were orally presented stories about highly familiar daily activities.

The task involved the consecutive presentation of two previously cued but ambiguous passages. It was expected that difficulty in spontaneous deactivation of schematic knowledge relevant to the first passage followed by activation of schematic knowledge relevant to the second passage would be reflected in decreased recall of the second passage, especially for the information immediately following the change in passage topics. Furthermore, such difficulty in schema shifting should also be evident in a sentence verification task. A high degree of schema interaction should result in accurate recognition of sentences taken from the passage, strong false recognition of sentences semantically congruent with passage sentences and sentences thematically congruent with the passage topic, and strong rejection of semantically incongruent and thematically irrelevant sentences. A lower degree of schema interaction should result in less accurate recognition of actual passage sentences and, more importantly, fewer false recognition responses to semantically congruent and thematically congruent sentences. Similarly, sentences which violate the deep structure (i.e. semantically incongruent and thematically irrelevant sentences) should not be as strongly rejected under conditions of reduced schema interaction. Thus, any differences between good and poor readers in schema utilization should be apparent in both free recall and in a sentence verification task.

METHOD

Subjects

The subjects were 40 third grade children from a semi-rural elementary school in upstate New York whose reading ability was assessed by the Metropolitan Achievement Test (MAT) of reading and by judgements made by the school reading specialist. The poor reader group (n = 20) was pragmatically defined as those children already identified by the reading specialist as

being in need of and receiving resource room remedial reading instruction. These children (13 males and 7 females) had MAT grade equivalent scores in reading ranging from 1.50 to 2.80, with a mean of 2.06 and a standard deviation of .282. The good reader group (n = 20) was comprised of children classified by the reading specialist as making "good progress" in reading from the same classrooms as the poor readers. Thus, good readers were not necessarily chosen on the basis of reading excellence but were randomly selected from the children making good (i.e. adequate) progress. These children (10 males and 10 females) had MAT grade equivalent reading scores ranging from 2.9 to 8.9, with a mean of 4.71 and a standard deviation of 2.14. No child with a physical disability participated in this study.

Half of the children in each reader group were randomly assigned to the Cued Shift Condition, while the remaining children were assigned to the Uncued Shift Condition.

Materials

Two passages concerning topics for which high level schemata are presumed to exist were constructed and titled "Making Toast" and "Cleaning Your Teeth." Neither passage explicitly mentioned the topic and both remained unspecified as in the Bransford and Johnson (1972) passage about "Washing Clothes." The two passages were constructed to retain the temporal sequence associated with each topic. Each passage was 62 words long and was consistent with the grammatical and semantic constraints of spoken English. Here is the Making Toast passage:

> You take the pieces out of the bag. You place the pieces in the slots at the top. The knob is in the "up" position at first, but you have to push the springs down. It seems to

take a long time. There is an unmistakable sound when the pieces are ready. There may be a bell or a sharp click.

Each passage contained ten idea units, which were identified independently and then in conference by three judges, using Bransford and Johnson's (1973) definition of idea units as "individual sentences, basic semantic propositions or phrases" (p. 393). The independent assessments resulted in 90% agreement on the separation of idea units; the disagreements were resolved by consensus. Audio tape recordings were made of an adult female reading the passages at approximately two words per second.

The sentence verification task involved ten sentences for each passage. Two sentences were REPEAT sentences from the passage (e.g. You place the pieces in the slots at the top). Two sentences were SEMENTICALLY CONGRUENT with sentences in the passage (e.g. You take the bread out of the wrapper). Two sentences were THEMATICALLY CONGRUENT with the passage topic (e.g. You set the dial for dark or light toast). Two sentences were SEMANTICALLY INCONGRUENT with sentences in the passage (e.g. You can't tell when the pieces are ready). Finally, two sentences were IRRELEVANT to the passage sentences and theme (e.g. A weight is added to the bottom for balance). The ten sentences for each passage were arranged in random order.

An interview questionnaire of six questions was also constructed. Three open-ended questions asked the children to name the titles of the passages and to say whether they did those things at home, to describe how they knew the change in passage topic had occurred, and to note any particular words that alerted them to the topic shift. Three other questions

asked the children how easily the passage shift was perceived, when the shift was first noticed and how much difficulty the passage shift caused. Responses to these three metacognitive questions were restricted to five continuous categories; for example, the child could respond that the passage shift was noticed (1) very easily, (2) fairly easily, (3) not very easily, (4) it was very hard, or (5) not at all.

Procedure

All children were tested individually away from the classroom. They were told that they were going to hear a tape recording of two passages which they must try to understand and remember in order to be able to tell them back afterwards. The children first listened to, and recalled, a practice passage (a 94 word decontextualized passage called "Raiding the Refrigerator"). Then they heard the experimental passages.

Children in the Cued Shift Condition were explicitly cued to the shift in passages by presenting the title (twice) for each passage just prior to hearing the passage. Children in the Uncued Shift Condition were given (twice) the titles for both passages prior to hearing the first passage, and then the passages were presented with no pauses between them. Thus, in the Uncued Shift Condition Comprehension of the second passage was dependent upon perceiving the change in topic and making the appropriate schema shift to maintain consistency with the text. The order of passages was counterbalanced across the reader groups and shift conditions.

Following a 30 second delay, children were given recall instructions which stressed that they try to use the same words that were on the tape but that they use their own words if they could remember an idea but not the exact words. After recall the experimenter read the verification sentences

and the child was asked to respond "yes" or "no" to the question, "Did you hear this sentence on the tape?" For each sentence the child was also asked whether he or she was "sure" or "unsure" of having heard or not heard the sentence. The verification sentences for each passage were presented in the order of the passages. At the completion of the sentence verification task all children in the Uncued Shift Condition were asked the interview questions concerning how easily the passage shift had been noticed.

Testing time was approximately 20 minutes per child and each child could select a candy bar for participating in the study.

RESULTS

Free Recall. The tape recorded recall protocols were transcribed and then scored for any meaning preserving approximation of idea units. Interrater reliability of scoring across two raters was .964 and intrarater reliability across a randomly selected sample of 25% of protocols scored on two occasions was .988.

An initial 2 (Sex) x 2 (Passage Theme -- Toast/Teeth) unweighted means mixed design analysis of variance of free recall revealed no effects due to sex ($F = .09$), passage theme ($F = 2.43$), or their interaction ($F = .794$), $F_{crit}(1, 38)$, $p = .05 = 4.10$. Thus, the following analyses are collapsed across the variables of sex and the theme of the passage.

The major analysis of free recall was a 2 (Reader Group -- Good/Poor) x 2 (Shift Condition -- Cued/Uncued) x 2 (Passage Position -- First/Second) mixed analysis of variance. The between subjects factors were Reader Group and Shift Condition, while the within subject factor was Passage Position.

There were significant main effects for Reader Group, F (1, 36) = 5.50, $p < .05$, Shift Condition, F (1, 36) = 14.23, $p < .01$, and Passage Position, F (1, 36) = 4.20, $p < .05$. From Table 1 it can be seen that higher recall scores were associated with good readers, the cued shift condition, and the first passage position. The Passage Position x Shift Condition interaction was significant, F (1, 36) = 20.34, $p < .01$, and simple effects analyses revealed that recall of the second passage in the uncued shift condition (M = 2.35) was significantly lower than recall of the first passage in the uncued shift condition (M = 3.95), F (1, 36) = 10.76, $p < .01$, and significantly lower than recall of the second passage in the cued shift condition (M = 5.30), F (1, 36) = 14.50, $p < .01$. First passage recall was not significantly different for the two shift conditions (F = .94) and recall did not differ as a function of passage position in the cued shift condition (F = 1.51). The Reader Group x Shift Condition (F = .51), Reader Group x Passage Position (F = .67), and Reader Group x Shift Condition x Passage Position (F = .17) interactions were not significant. In summary, children cued to the passage topic shift showed no difference in recall of the two passages, but there was a decrement in second passage recall for children not explicitly cued to the passage shift. This pattern was not influenced by reading ability. The recall of poor readers, while being lower than that of good readers, did not indicate additional difficulty in making appropriate schema shifts to accompany the passage shift.

Although the previous analysis confirmed similar difficulty of appropriate schema activiation for both good and poor readers in the uncued shift condition, it was expected that this effect would be most pronounced for the information units immediately following the passage shift (i.e. the information from the beginning of the second passage).

Scores were computed for recall of the information units in the first and second halves (5 idea units each) of each of the passages. These free recall scores were then subjected to a 2 (Reader Group) x 2 (Shift Condition) x 2 (Passage Half -- First/Second) mixed analysis of variance for each passage position, with Passage Half being a repeated measures factor. In the analysis of the first passage significant effects were found for Reader Group, F (1, 36) = 7.82, $p < .01$, and Passage Half, F (1, 36) = 34.74, $p < .01$. Good readers (M = 5.0) recalled more than poor readers (M = 3.65) and recall was higher in the first half (M = 2.88) than the second half (M = 1.45). Simple effects analyses indicated that the decline in recall across passage halves was significant for both shift conditions. The main effect for Shift Condition was not significant, nor were any of the interactions. In the analysis of the second passage there was a significant main effect for Shift Condition, F (1, 36) = 23.71, $p < .01$, while the main effect for Passage Half just failed to reach conventional significance, F (1, 36) = 4.08, $p < .10$ (F_{crit}, .05 = 4.12). The main effect for Reader Group was not significant and reading ability did not interact with the other variables in the analysis. The Shift Condition x Passage Half interaction effect was significant, F (1, 36) = 4.63, $p < .05$. The means for this interaction, contrasted with the means from the first passage analysis, are shown in Table 2. Simple effects analyses showed that recall was higher in the cued shift

Insert Table 2 about here

condition than in the uncued shift condition for both passage halves and that recall declined from the first half of the passage to the second half in the cued shift condition. Recall was uniformly low across both passage halves in the uncued shift condition.

This failure to replicate the decline in recall found in both shift conditions on the first passage and the cued shift condition on the second passage indicates that difficulty in schema shifting markedly affected recall of the information immediately following the passage topic change; furthermore, the children did not recover from their initially impaired comprehension as the passage progressed. Reading ability did not interact with any of the other variables in these analyses, again indicating that good and poor readers appear to be similarly affected by task conditions that require the spontaneous activation and deactivation of appropriate schemata.

Sentence Verification. Scores on each of the five sentence types could vary from 4 ("yes" responses to all four sentences across both passages) to 8 (all "no" responses) for each child. A 2 (Reader Group) x 5 (Sentence Type) mixed analysis of variance revealed a significant effect for Sentence Type, F (4, 152) = 56.43, $p < .01$. The Reader Group (F = .002) and Reader Group x Sentence Type interaction (F = 1.99) effects were not significant.

Insert Table 3 about here

As may be seen from Table 3, children easily recognized the REPEAT sentences and easily rejected the IRRELEVANT sentences. A Scheffe test revealed that the IRRELEVANT and SEMANTICALLY INCONGRUENT sentences received stronger rejection scores than the THEMATICALLY CONGRUENT and SEMANTICALLY CONGRUENT sentences, F (4, 152) = 127.13, $p < .01$, even though none of these sentences had been heard previously. The SEMANTICALLY CONGRUENT and THEMATICALLY CONGRUENT sentences received higher scores than the REPEAT sentences, F (4, 152) = 11.68, $p < .05$, but the only significant

pairwise comparison among these three sentence types was between the REPEAT and THEMATICALLY CONGRUENT sentences, F (4, 152) = 19.14, $p < .01$. Thus, children confused sementically congruent sentences with original sentences, but could increasingly distinguish sentences which were generally related to the passage theme, semantically incongruent with relations expressed in the passage, and irrelevant to the passage theme.

It was expected that children would reject the SEMANTICALLY INCONGRUENT sentences as readily as the IRRELEVANT sentences since neither sentence type maintained consistency with the semantic relations expressed by the passages. However, the difference between these two sentence types was significant, F (4, 152) = 10.23, $p < .05$. This significance was partly a function of the very small variance on the IRRELEVANT sentences (only 7 out of 40 children had less than "perfect" scores) and partly a function of the fact that the sentences that were written to be semantically incongruent with actual passage sentences might be viewed as being congruent with the theme of the passage when viewed from another perspective. For example, the sentence "It doesn't take long for the toast to finish" is semantically incongruent with the relations expressed by the passage sentence "It seems to take a long time" but both sentences may be true about making toast, depending on the circumstances.

Although effects associated with reading ability did not appear in the overall analysis of the sentence verification task, they did appear in more complex analyses of each sentence type. The scores for each sentence type were treated independently in a 2 (Reader Group) x 2 (Shift Condtion) x 2 (Passage Position) mixed analysis of variance. In the analysis of REPEAT sentences there were significant main effects for Reader Group, F (1, 36) = 4.96, $p < .05$, and Passage Position, F (1, 36) = 6.36, $p < .05$, as well as a significant Reader Group x Passage Position interaction effect,

F (1, 36) = 6.36, $p < .05$. Simple effects analyses of the interaction revealed that the good readers were accurate in their recognition of actually heard sentences across both the first passage position (M = 2.35) and the second passage position (M = 2.35). However, the poor readers were more accurate in recognizing first passage sentences (M = 2.40) than in recognizing second passage sentences (M = 3.0), F (1, 36) = 12.72, $p < .01$. The three way interaction effect was not significant, indicating that the somewhat impaired ability of poor readers to recognize actual sentences from the second passage was independent of whether the second passage was explicitly cued or not.

In the analysis of SEMANTICALLY CONGRUENT sentences there was a significant effect for Passage Position, F (1, 36) = 13.60, $p < .01$, and significant Reader Group x Passage Position, F (1, 36) = 4.55, $p < .05$, and Passage Position x Shift Condition, F (1, 36) = 4.55, $p < .05$ interaction effects. Simple effects analyses of the Reader Group x Passage Position interaction revealed that good readers were more likely to falsely recognize semantically congruent information associated with the first passage (M = 2.30) than the second passage (M = 3.05), F (1, 36) = 16.94, $p < .01$. Poor readers had similar scores across both passages (M = 2.6 and M = 2.8 for the first and second passage positions respectively). There were no significant differences between reader groups at either passage position. Simple effects analyses of the Passage Position x Shift Condition interaction revealed significantly greater rejection of the sentences in the second passage (M = 3.15) than in the first passage (M = 2.40) in the uncued shift condition F (1, 36) = 16.94, $p < .01$). This difference across passage positions was not evident in the cued shift condition (M = 2.40 and M = 2.70 for the first and second passage positions respectively), and the differences between shift

conditions were not significant at either passage position. The higher rejection scores of semantically congruent sentences associated with the second passage in the uncued shift condition are indicative of reduced schema interaction with the text. This pattern of schema interaction was independent of reading ability, suggesting similar patterns of schema interaction for good and poor readers across shift conditions.

The analyses of THEMATICALLY CONGRUENT and SEMANTICALLY INCONGRUENT sentences revealed no significant main effects or interactions. Good and poor readers responded to these sentences in a similar way regardless of their treatment conditions. The analysis of the IRRELEVANT sentences revealed a significant main effect for Shift Condition, $F(1, 36) = 5.16$, $p < .05$, with stronger rejection scores being given in the cued shift condition ($M = 7.95$) than in the uncued shift condition ($M = 7.50$) across both passages. However, the assumption of homogeneity of the variances was violated in this analysis because of the almost perfect performance in the cued shift condition (where 79 out of 80 sentences were rejected as unheard).

A similar set of analyses were carried out on the combination of the "yes" and "no" responses with the "sure" and "unsure" measure of certainty (see Brown, et al., 1977). The results will not be reported here since (a) the analyses revealed essentially the same results as just described for the verification task, and (b) the author was not convinced that all children used the certainty measure in the same way. Although all children appeared confident in using the "sure" category for both "yes" and "no" responses, some children appeared confused in using the "no-unsure" combination. The "unsure" category was not used frequently, with 82% of the poor readers' responses and 85% of the good readers responses being

"sure" judgements.

Additional Analyses. While the foregoing analyses were the major analyses planned for the study, several additional analyses were made of the children's performance. The first such analysis was of theme referent disambiguations. Since the passages were decontextualized in the sense of having all theme relevant content words (e.g. bread, toaster, tooth-brush, tooth-paste) removed, it could be expected that a higher degree of schema interaction with the text passages would be reflected in a greater tendency to produce thematic disambiguations of the theme referents in recall. All free recall protocols were scored for disambiguations of theme relevant words and these were analyzed in a 2 (Reader Group) x 2 (Shift condition) x 2 (Passage Position) mixed analysis of variance. No main effects or interactions reached significance.

At least one disambiguation was produced by all poor readers (with a mean of 2.28 disambiguations across both passages) and 85% of the good readers (M = 2.55). Unlike the analysis of free recall, theme referent disambiguations did not show a Shift Condition x Passage Position interaction which would indicate poorer comprehension (and reduced schema activation) of the second passage in the uncued shift condition. The theme referent disambiguations may have been simply a function of output editing for simplicity by the children.

Finally, the responses of the children to the interview questions were analyzed. Every child could remember the titles of the passages following recall and the verification task, and all admitted being very familiar with making toast and brushing their teeth at home. Responses to the other open ended questions were not revealing, except for the

tendency of children to claim that they were alerted to the shift in passage topics by words such as "toast" or "tooth-brush" (words that were not present in the text) early in the second passage. Separate analyses were made of the responses to the three questions concerning how easily and at what point the change in passage topic was perceived. Although poor readers tended to express more difficulty with the change and to perceive it later than good readers, t-test analyses failed to indicate any reliable differences. Eight of the ten good readers and nine of the ten poor readers in the uncued shift condition stated that they had noticed the passage change at least "not very easily." The effect of activation of an inappropriate schema was highlighted by the finding that three good readers and four poor readers reported not even hearing the second passage in the uncued shift condition. Inspection of the recall protocols for these seven children showed that at the time of recall they typically made a spontaneous comment such as "The toast one (second passage) wasn't on the tape" or "Anyways , I thought there was going to be another story." This unnoticed passing of the second passage was dramatically reflected in recall scores. For these seven children the proportion of second passage recall to first passage recall was .26, whereas for the remaining 13 children in the uncued shift condition who recognised the change in passage theme the proportion increased to .71. (Incidentally, the proportion of second passage recall to first passage recall was 1.13 in the cued shift condition.) Of course, these responses and associated analyses should be viewed with some caution given their self report nature and the difficulties inherent in young children's reflections about their metacognitive knowledge.

DISCUSSION

There is a major debate in the reading literature concerning whether the comprehension differences between good and poor readers result from qualitative differences in the way these groups process information. Recent cognitive research emphasizes the importance of the role of prior knowledge in comprehension and it has been suggested, for example, that good readers are superior in their ability to utilize contextual information. A number of studies support this point of view (e.g. Goodman & Burke, 1973; Isakson & Miller, 1976; Samuels, Begy and Chen, 1976) although the issue is by no means settled (see, for example, Biemiller, 1970; 1979; Juel, 1980). The current study sought to determine whether good and poor readers in the early school years show differential flexibility in their ability to appropriately employ their cognitive structures relevant to a reading task. The task involved recalling two passages under conditions in which comprehension of the second passage required a shift in schemata, and only children in the cued shift condition were prompted to the moment of the shift. The mechanism for shifting schemata when there is a change in text theme involves recognizing that incoming information is not being instantiated by the currently activated schema, and then beginning a search for another schema (which in this case was disclosed in advance) to account for the information.

The results of this study suggest that third grade children find schema shifting difficult, but that it is no more difficult for poor readers than for good readers. The importance of the need to shift schemata to facilitate continuous comprehension was evidenced by the sharp reduction in recall of the second passage in the uncued shift condition. But the analyses of free recall, while finding the expected interaction between passage position and shift condition, failed to indicate any differential

ability in the control and deployment of cognitive structures as a function of reading skill. These analyses, together with the post hoc analyses associated with the verbal interview statements, indicate that commitment to the schema relevant to the first passage may be so strong as to impede shifting to the schema relevant to the second passage. Comprehension can only be facilitated once the first schema is abandoned and the second schema activated. The results of the sentence verification analyses were equivocal with regard to schema activation. Only the analysis of the SEMANTICALLY CONGRUENT sentences showed reduced schema interaction with the second passage in the uncued shift condition, and again this was independent of reading ability. It seems likely that a simple sentence verification task, with the attendant problems of a bi-polar forced choice response made, is not sufficiently sensitive to identify gradations of schema activation.

Schema shifting is an important aspect of prose comprehension and the procedure used in this research seems a fruitful way of examining how prior knowledge is utilized in reading tasks. A comprehensive theory of prose comprehension will require not only that we understand how we comprehend single words, or sentences, or even whole passages, but also how we maintain comprehension in the face of content which requires the precise and appropriately timed activation of schematized knowledge.

References

Anderson, R.C. The notion of schemata and the educational enterprise. In R.C. Anderson, R.J. Spiro and W.E. Montague (Eds.), Schooling and the acquisition of knowledge. Hillsdale, N.J.: Lawrence Erlbaum Associates, 1977.

Anderson, R.C. and Pichert, J.W. Recall of previously unrecallable information following a shift in perspective. Journal of Verbal Learning and Verbal Behaviour, 1978, 17, 1-12.

Anderson, R.C., Reynolds, R., Schallert, D.L. and Goetz, E. Frameworks for comprehending discourse. American Educational Research Journal, 1977, 14, 367-381.

Biemiller, A. Changes in the use of graphic and contextual information as children learn to read. Reading Research Quarterly, 1970, 6, 75-96.

Biemiller, A. Changes in the use of graphic and contextual information as functions of passage difficulty and reading achievement level. Journal of Reading Behavior, 1979, 11, 307-318.

Bransford, J.D., and Franks, J.J. The abstraction of linguistic ideas: A review. Cognitive Psychology, 1971, 2, 331-350.

Bransford, J.D., and Johnson, M.K. Contextual prerequisites for understanding: Some investigations of comprehension and recall. Journal of Verbal Learning and Verbal Behavior, 1972, 11, 717-726.

Bransford, J.D., and Johnson, M.K. Considerations of some problems of comprehension In W.G. Chase (Ed.) Visual information processing. New York: Academic Press, 1973.

Brown, A.L. The development of memory: Knowing, knowing about knowing, and knowing how to know. In H.W. Reese (Ed.), Advances in child development and behavior (Vol. 10). New York: Academic Press, 1975.

Brown, A.L. Metacognitive development and reading. In R.J. Spiro, B.C. Bruce, and W.F. Brewer (Eds.), Theoretical issues in reading comprehension. Hillsdale, N.J.: Lawrence Erlbaum Associates, 1980.

Brown, A.L., Smiley, S.S., Day, J., Townsend, M.A.R., and Lawton, S.C. Intrusion of a thematic idea in children's comprehension and retention of stories. Child Development, 1977, 48, 1454-1466.

Goodman, K., and Burke, C. Theoretically based studies of patterns of miscues in oral reading performance. Final report, Project No. 9-0375, Grant No. OEG-0-9-320725-4268, U.S. Dept. Health, Education and Welfare, 1973.

Isakson, R.L. and Miller, J.W. Sensitivity to syntactic and semantic cues in good and poor readers. Journal of Educational Psychology, 1976, 68, 787-792.

Johnson, M.K., Doll, T.J., Bransford, J.D., and Lapinski, R.H. Context effects in sentence memory. Journal of Experimental Psychology, 1974, 103, 358-360.

Juel, C. Comparison of word identification strategies with varying context, word type, and reader skill. Reading Research Quarterly, 1980, 15, 358-376.

Paris, S.G. and Lindaver, B.K. Constructive aspects of children's comprehension and memory. In R.V. Kail and J.W. Hagen (Eds.), Perspectives on the development of memory and cognition. New York: John Wiley and Sons, 1977.

Paris, S.G. and Upton, L.B. Children's memory for inferential relationships in prose. Child Development, 1976, 47, 660-668.

Pearson, P.D., Hansen, J., and Gordon, J. The effect of background knowledge on young children's comprehension of explicit and implicit information. Journal of Reading Behavior, 1979, 11, 201-209.

Rumelhart, D.E. Schemata: The building blocks of cognition. In R.J. Spiro, B.C. Bruce, and W.F. Brewer (Eds.), Theoretical issues in reading comprehension. Hillsdale, N.J.: Lawrence Erlbaum Associates, 1980.

Rumelhart, D.E. and Ortony, A. The representation of knowledge in memory. In R.C. Anderson, R.J. Spiro, and W.E. Montague (Eds.), Schooling and the acquisition of knowledge. Hillsdale, N.J.: Lawrence Erlbaum Associates, 1977.

Samuels, S.J., Begy, G., and Chen, C.C. Comparison of word recognition speed and strategies of less skilled and more skilled readers. Reading Research Quarterly, 1976, 11, 73-86.

Schallert, D.L. Improving memory for prose: The relationship between depth of processing and context. Journal of Verbal Learning and Verbal Behavior. 1976, 15, 621-632.

Schweller, K.G., Brewer, W.F., and Dahl, D.A. Memory for illocationary forces and perlocutionary effects of utterances. Journal of Verbal Learning and Verbal Behavior, 1976, 15, 325-337.

Smiley, S.S., Oakley, D.D., Worthen, D., Campione, J.C., and Brown, A.L. Recall of thematically relevant material by adolescent good and poor readers as a function of written versus oral presentation. Journal of Educational Psychology, 1977, 69, 381-387.

Sulin, R.A., and Dooling, D.J. Intrusion of a thematic idea in retention of prose. Journal of Experimental Psychology, 1974, 103, 255-262.

Townsend, M.A.R. Schema activation in memory for prose. Journal of Reading Behavior, 1980, 12, 43-53.

Wilson, M.M. The processing strategies of average and below average readers answering factual and inferential questions on three equivalent passages. Journal of Reading Behavior, 1979, 11, 235-245.

Footnotes

A version of this paper was presented at the biennial meeting of the Society for Research in Child Development, Boston, April 1981.

I am grateful to Linda Allen for her assistance in conducting this research.

Table 1

Number of Idea Units Recalled as a Function of Reading Ability, Shift Condition and Passage Position

	Passage Position			
	First		Second	
Group[a]	M	SD	M	SD
Good Readers				
Cued Shift	5.60	1.58	5.90	2.69
Uncued Shift	4.40	1.84	2.70	1.77
Poor Readers				
Cued Shift	3.80	.92	4.70	1.42
Uncued Shift	3.50	1.58	2.00	1.56

[a] $\underline{n}$ = 10 for each Reader Ability x Shift Condition group.

Table 2

Number of Idea Units Recalled as a Function of Passage Position, Passage Half and Shift Condition

	Passage Half			
	First		Second	
Shift Condition[a]	M	SD	M	SD
	First Passage			
Cued	2.95	1.10	1.75	1.25
Uncued	2.80	1.15	1.15	.88
	Second Passage			
Cued	3.15	1.14	2.15	1.53
Uncued	1.15	1.09	1.20	1.01

[a] $\underline{n}$ = 20 for each Shift Condition.

Table 3

Verification Scores on the Five Types of Sentences as a Function of Reading Ability

Sentence Type	Reading Ability			
	Good Readers		Poor Readers	
	M	SD	M	SD
Repeat	4.70	1.03	5.40	.99
Semantically Congruent	5.35	1.09	5.40	1.19
Thematically Congruent	6.00	1.59	5.95	1.19
Semantically Incongruent	7.25	.85	6.85	1.28
Irrelevant	7.85	.49	7.60	.82