Technical Report No. 45

Effects of Controlled, Primerese Language on the Reading Process

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December, 1990

Abstract

A number of observers have argued that the "controlled" language of beginning reading texts actually hinders children more than it helps them. This argument is supported by linguistic analyses of the differences between "primerese" and more natural language, together with evidence that fluent readers anticipate what lies ahead in a text by drawing upon their knowledge of language in "top-down" processing. Further support comes from past research on the effects of various text differences on reading, but much of that research has focussed on specific products of reading (e.g., comprehension or subsequent word recognition) instead of the process itself, and some of it has not fully isolated differences in language per se from other sources of variance in reading. In the present study, 4 primerese stories from basal readers were rewritten by changing the language to make it less controlled and more natural, and the effects of these changes were examined with regard to several aspects of oral reading, along with comprehension. In a 2x2 factorial design, 60 first graders were randomly assigned to groups that read either the original or the rewritten versions of the stories, and they were also divided into high and low groups on a test of their ability to recognize individual words from the stories. Regardless of text version, the children with higher word recognition scores were found to read at significantly faster rates and to make fewer word miscues. Compared with those who had lower word recognition scores, their word miscues were more likely to be syntactically appropriate and were less likely to be graphically similar to the printed word. In general, the language differences between original and rewritten versions did not significantly affect reading rate, word miscue rate, or proportion of graphically similar miscues. However, the children who read the rewritten versions tended to have significantly higher proportions of word miscues that were syntactically appropriate or that preserved meaning. They also made fewer punctuation miscues and gave more correct answers to comprehension questions. These results suggest that primerese language discourages knowledge-based, top-down processing, and encourages more text-based, bottom-up processing instead. In addition, text version and word recognition level interacted significantly with respect to word miscue rate and proportion of graphically similar miscues, suggesting that the disadvantages of primerese become more pronounced as young readers develop in their ability to recognize individual words and to process natural language in a fluent, top-down fashion.

Acknowledgments

We wish to thank Linda Webster, Judy Jones, and Sharon Trattner for helping to collect, transcribe, and code the miscue data. We also thank Robin Lakoff and Wallace Chafe for their consultations. The research was supported by the National Council of Teachers of English Research Foundation and the Committee on Research of the University of California at Berkeley.

EFFECTS OF CONTROLLED, PRIMERESE LANGUAGE ON THE READING PROCESS

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For the past half century, millions of American children have received beginning reading instruction based on "controlled" texts in which words from a restricted vocabulary are used repeatedly in brief passages composed of short sentences. Although such controls are intended to make learning to read easier, critics have contended that they may actually make reading more difficult, because they result in a kind of "primerese" language that is at odds with what children already know about more natural language (Beck, McKeown, & McCaslin,1981; Goodman, 1986; Gourley, 1978; Shuy,1981). Basically, the argument against conventional controls, in theory, is that the linguistic features of primerese disrupt the process by which children spontaneously bring their knowledge to bear on the act of reading, thereby impeding their progress in becoming fluent readers. However, the validity of this argument has not yet been adequately assessed. Linguistic analyses of primerese, together with current ideas about the process of reading, suggest a number of ways in which controlled texts might be problematic, but they do not tell us how children actually respond when given such texts to read. The case against primerese does find some empirical support in past research on the ways in which specific aspects of children's reading are affected by specific text features associated with primerese, but those studies are rather limited in scope and sometimes flawed in methodology, so that their results are rather ambiguous. Our purpose here is to examine the effects of primerese language on children's reading in a study that builds upon past research but also overcomes its limitations by taking a broader perspective on the reading process and on the features that distinguish primerese from more natural language.

The Primerese Language of Controlled Texts

The repeated use of words from a restricted vocabulary in controlled texts often results in usage that seems unnatural or unmotivated from a semantic or pragmatic standpoint. That is, a particular word may be used to convey a meaning that would usually be expressed by some other word, or it may be repeated in places where the repetition serves no communicative purpose. The requirement that sentences be short, together with word repetition, generally precludes the use of complex sentence structures and intersentential ties of the sort that would normally mark relationships between predications and make a text cohesive. Thus, instead of a compound predicate, for example, one finds two simple sentences with the same subject, and the subject is reinstated by repetition of a noun phrase rather than use of a pronoun. The effort in controlled stories to keep things short and "simple" seems also to have such structural consequences as overreliance on dialogue to carry the narrative, and on pictures to provide a context for the dialogue. Sometimes such basic story elements as a setting or a conflict and resolution are badly degraded or omitted altogether.

These features of primerese have led to the charge that conventional controls on vocabulary and sentence length are counterproductive. On linguistic and psycholinguistic grounds, it has been argued that, rather than simplifying matters, the controls actually increase the complexity of the young reader's task in determining what a text says and what it means (Goodman, 1986; Gourley, 1978; Shuy, 1981; Smith, 1982). The idea that shorter sentences are easier to read seems consistent with findings from research on readability, but serious questions have been raised about the validity of using such research as a guide for designing highly readable texts (Bruce, Rubin, & Starr, 1981; Davidson, 1984; Shuy,1981). Finally, while the extensive use of illustrations with controlled texts does, in some sense, compensate for the oddities of primerese language, it has also been criticized on the grounds that picture dependency can make a text more difficult to follow, in contrast

with the decontextualized language of more natural, self-contained texts (Elster & Simons, 1985; Simons 8i Elster,1990).

The Reading Process and Learning to Read

The critics of text controls have based their arguments not only on differences between primerese and more natural language, but also on current ideas about the ways in which readers normally process written language, and about what is involved in learning to read. Controlled texts were first introduced in an era when the reading process was conceived largely in linear, "bottom-up" terms, such that the reader was thought first to identify a succession of individual words which could then be integrated into larger units for comprehension on the basis of skills acquired primarily from previous experience with oral language. From this view, the principal task in learning to read was that of attaining the ability to recognize individual words, either as visual wholes or as strings of letters to be sounded out. Today, however, reading is understood as a much more recursive and interactive process, in which readers draw extensively upon their linguistic and world knowledge to engage in "top-down" processing, not only for the purpose of interpreting the words they have already recognized, but also to anticipate what lies ahead in the text (Goodman, 1967, 1977; Rumelhart,1976). Reading researchers still disagree over the extent to which mature readers use top-down processes to recognize individual words-as opposed to using bottom-up processes that have become highly automatic (Stanovich,1980}— but there seems to be more general agreement that top-down processes are centrally involved in comprehension (Smith, 1982; Stanovich, 1980). For younger readers, top-down processes seem clearly to be involved in word recognition too, as evidenced, for example, by some of the miscues children make when reading aloud (Simons & Amnion, 1989; Weber, 1970). Furthermore, recent efforts to improve underdeveloped reading comprehension skills among older children suggest that the orchestration of top-down processes in the act of reading is as much a part of learning to read as the attainment of bottom-up automaticity in word recognition (Palincsar & Brown, 1983).

These considerations regarding the process of reading and learning to read lend credence to the charge that conventional text controls and primerese language are counterproductive. If young readers attempt to draw upon their knowledge of natural language when reading primerese, their anticipations will often prove to be wrong. And if they do not draw upon their previous knowledge, they will not be fully engaged in the act of reading.

Past Research on Text Language and Children's Reading

Analyses of the miscues children make when reading controlled texts suggest that the features of primerese do pose problems for them. For example, Gourley (1984) found miscues associated specifically with repeated noun phrases, with lack of sentence connectives, and with other primerese features. We have noted in our own research that many primerese miscues have the effect of simply "editing" the printed text by changing the wording or punctuation to make it more natural (Simons & Amnion, 1988, 1989). If children just passed over such miscues without further ado, they might seem quite benign. But children often go back to "correct" their editing miscues, so there does stem to be some disruption of the reading process, even from relatively minor discrepancies between what young readers anticipate and what they find in primerese texts. Moreover, we have also noted that many other primerese miscues go beyond mere editing to changes in meaning, and these more serious miscues seem likely to have adverse effects on comprehension, especially if left uncorrected. Such concerns over the potentially disruptive effects of primerese language are heightened by results from a recent experiment in which Amsterdam, Ammon, and Simons (1990), using materials from the present study, found that primerese interfered with children's ability to reproduce not only the form but also the content of story segments that were presented orally in an elicited imitation task.

However, the finding that specific miscues seem to stem directly from the peculiar features of controlled texts does not necessarily demonstrate that the controls are generally counterproductive. It is conceivable that the suspected disadvantages of text controls are outweighed by certain advantages, and that the advantages would become apparent if we looked at other aspects of children's reading, in direct comparisons between primerese and more natural texts. There is already a history of research on text differences of the sort that distinguish controlled, primerese texts from more natural ones. Some early studies by Gates examined differences in first grade reading achievement as a function of variations in the rate at which new words were introduced in reading texts (Gates, 1931; Gates & Russell, 1938a,b). On tests of word recognition and paragraph comprehension it was generally found that vocabulary controls promoted better reading achievement only for students who were lower in I.Q. or reading readiness, and only if the controls were not too severe. Moreover, the more highly controlled texts were clearly counterproductive for students who were higher in ability. Subsequent investigations by Gates (1961, 1962) demonstrated that children in grades 2 and 3 were capable of recognizing many words they had not already encountered in controlled readers.

More recent research by Bridge, Winograd, and Haley (1983) suggests that first graders learn to recognize more words by reading uncontrolled, "predictable" texts than by reading controlled, primerese texts. Other studies have found improved comprehension and recall by children in grades 1 to 3 when stories typical of controlled basal readers were rewritten to make them more coherent or better formed as stories (Beck, Omanson, & McKeown, 1982; Beck, McKeown, Omanson, & Pople, 1984; Brennan, Bridge, & Winograd, 1986; Feldman,1985). With regard to miscues in oral reading, Gourley (1984) found that some of the miscues she observed frequently with primerese all but disappeared when more natural language was used instead.

The studies cited here have employed a variety of relevant text manipulations and dependent measures. By and large, they cast doubt on the utility of conventional text controls. However, they are also problematic in several respects. Some of them focus on just one of the text features associated with primerese, such as vocabulary controls (Gates, 1931) or malformed stories (Brennan et a1.,1986; Feldman,1985), rather than assessing the effects of primerese language as a whole. At the same time, some of them do not fully isolate the language features of interest from other differences between texts, such as differences in content (Brennan et al.,1986). In some instances, text differences may have been confounded with non-text variables as well, such as differences between subjects or teachers (Bridge et al., 1983). As for the kinds of dependent measures that have been employed, most studies have examined products of reading rather than the reading process, looking only at gains in ability to recognize words or comprehend passages (Bridge et a1., 1983; Gates, 1931), or at comprehension or recall of the immediate text (Beck et al.,1982; Beck et x1.,1984; Feldman, 1985; Brennan et al.,1986). Research on miscues gets closer to the reading process, but to date it has done so in a rather restricted way by attending only to selected kinds of miscues (Gourley, 1984; Simons & Ammon, 1988,1989). Finally, some researchers have not considered the role of individual differences in reading ability when examining the effects of text differences.

Overview of the Present Study

In order to compare beginning reading texts that differed only in language and not in content, we chose some primerese texts from controlled basal readers and rewrote them to be more like natural prose. Moreover, our rewriting entailed making changes in several of the linguistic features that characterize primerese, so that we could assess the overall effect of primerese on the reading process. It seemed unlikely that the changes in language would make much difference unless children were already capable of reading the texts without a great deal of assistance. Even then, it, seemed likely that the effects of text differences might vary with differences in ability. Therefore, we constructed a list of words from the texts for the purposes of selecting subjects with

adequate word recognition ability and assigning them to high and low ability groups. To control other sources of variance in reading performance, such as differences between school populations, teachers, or reading programs, we randomly assigned children to the original and rewritten text versions *within* each of several first grade classrooms.

In assessing the effects of language differences between the original and rewritten texts, we attempted to examine the reading process in a relatively direct and comprehensive fashion by focussing particularly on miscues in oral reading, and by including in our analysis all of the miscues that occurred. Our goal, however, was not simply to look at overall miscue rates but also to distinguish different kinds of miscues that might shed light on the character of the reading process under different text conditions. For example,, a higher incidence of miscues that were syntactically appropriate, or that preserved meaning, might indicate greater use of context in top-down processing with one version of a text than with the other. Conversely, a higher incidence of miscues that were graphically similar to the words in the text would presumably indicate more attention to print, in bottom-up processing. In addition to such "word" miscues, we also distinguished miscues in punctuation, which might indicate difficulty in apprehending the sentence structures represented in the text. Finally, to gain a more complete view of the reading process, we examined reading rate and comprehension of the texts as well.

METHOD

Subjects

The data for this study were provided by 60 first graders out of a total population of 134 predominantly white, lower-middle class children from five classrooms in two suburban communities. At the outset, 22 children were excluded from the sample because their teachers had identified them as very low readers, or as students learning English as a second language. The remaining children were included in the study if they passed a criterion of at least 30 words read correctly on the word recognition test described below. Forty-two children passed this criterion when the test was first ‘ administered in January and February, and another 22 passed when the test was readministered in March and April. Data from 4 children who participated in the experiment could not be used because of recording failures and other complications. The remaining 60 children had a mean grade equivalent score of 2.3, ranging from 1.3 to 4.1, on the comprehension subtest of the Stanford Achievement Test at the end of the school year.

The reading instruction experienced by children in all of the classrooms was based largely on basal readers. About two months before we began collecting the present data, we asked the teachers to read trade books to their students at least once a week, to insure that the children all had had some exposure to natural, uncontrolled written language.

Design

Once children passed the word recognition criterion they were matched in pairs with other children from the same class on the basis of their word recognition scores. The members of each pair were then randomly assigned to read either the original versions of four primer stories or the versions that we had rewritten. The median word recognition score was used to divide each of these treatment groups into subgroups that had either low (30 to 46) or high (47 to 65) word recognition scores, resulting in a 2x2 (text version x word recognition level) design with 15 subjects in each cell.

Materials

Word recognition test. The word recognition test consisted of 65 words graded in difficulty from short, monosyllabic, frequently occurring words to less frequent, polysyllabic words. It included most of the content words common to all the original stories, plus selected words found only in specific stories, together with most of the "new" words that were added when the stories were rewritten.

Stories. Selections from the first grade texts in several basal reading series were examined in an effort to identify selections that already had the basic elements of a story, i.e., a beginning, middle, and end, a protagonist who tries to achieve a goal, etc. We found that very few selections met these minimal criteria. From the limited set of stories available, we chose three fables and one original story of the sort that average first graders would normally read in the middle of the year or later. The fables were called "Rabbit and Turtle" (Clymer & Parr, 1976), "Lion and Mouse" (Clymer, Pair, Gates, & Robison, 1976), and "Bad Wish" (Raskin, 1984), the last one being the story of the fisherman and his three wishes. The other story, "Look Out" (Hershman, 1984), was about a truck and a bump in a road, and people's efforts to fix the road.

All four of these selections had characteristics associated with controlled, primerese texts: frequent repetition of words in ways that seemed inappropriate with regard to meaning or discourse context; short simple sentences that were poorly linked by cohesive ties (other than repetition); inadequate narrative structure cues; and overdependence on illustrations or reader knowledge to fill in missing content. In order to make the language of the stories more natural, and to make the content clearer and more explicit, we rewrote the stories by making the kinds of changes illustrated in Table 1 and summarized below. Basically, we:

1. *Eliminated unnatural wording and unmotivated repetition* by substituting or deleting words, or by combining sentences.

2. *Increased cohesion* by pronominalizing repeated noun phrases; by combining sentences; and by marking relationships between sentences and clauses with conjunctions.

3. *Increased narrative structure* by adding conventional openings and closings, as well as transitions between episodes; by changing dialogue to narrative description where that seemed more appropriate; by reordering sentences where the original order seemed illogical; and by changing some dialogue carriers to their more common written forms.

4. *Made information more explicit* by adding it to the text where its absence seemed problematic.

Table 1
Examples of Changes Made in Rewriting Original Versions of Stories

Original Version	Rewritten Version
Examples Involving Changes 1&2+	
But it was too late! The truck was on the bump. The bump made the truck go up.	But it was too late! The truck hit the bump and up it went.
This road is not good. This road has a bump. This road has a hole too.	This road is no good. It has a bump and it has a hole too.
Examples Involving Changes 3&4	
[Picture shows Lion in net.] Lion said, "Help! Help! I want to get away from here, But I can't."	When Mouse met Lion again, Lion was in a net and he could Not get out. "Help! Help!" said Lion.
[Picture shows man and woman In fishing boat with large Fish in net.] "Look, a fish!" said the man.	One night a man and a woman Were in a small boat And they caught a fish. "Look!" said the man.

+Types of changes:

1. Eliminate unnatural wording and unmotivated repetition.
2. Increase cohesion.
3. Increase narrative structure.
4. Make information more explicit

Table 2 shows a number of quantitative language differences between the original stories and the rewritten versions. In general, it can be seen that the rewriting did not markedly affect the lengths of the texts in total words, but it did increase the number of different words— both in absolute terms and in relation to total words-and it also made for fewer but longer sentences.

Comprehension questions. Comprehension of the selected texts was assessed by means of 11 questions about each story. Most of the questions were factual ("where did the animals decide to run?" "what did Mouse do to help Lion?"), but some were more general and required evaluation of characters' behavior ("why did Mouse help Lion?" "How did they feel when she fixed the road?").

Table 2
Quantitative Language Differences Between
Original (0) and Rewritten (R) Versions of Stories

Story	Version	Word Tokens	Word Types	Types/ Tokens	Sentences	Words/ Sentences
RT	O	121	30	.25	26	4.7
	R	135	57	.42	19	7.1
LM	O	195	50	.26	38	5.1
	R	215	69	.32	35	6.1
LO	O	187	63	.34	41	4.5
	R	161	63	.39	25	6.1
BW	O	248	50	.20	52	4.8
	R	247	66	.26	45	5.5

Procedures

All testing was done individually by graduate research assistants, and all testing sessions were tape recorded. When the word recognition test was administered in the initial session, children read the words on the list until they missed 5 in a row, at which time sequential reading was discontinued and they were simply asked if they could read any of the remaining words.

Children selected for further participation read each of the four stories in four separate sessions over a two-week period, generally within a month after passing the word recognition test. The order of the stories was the same for all subjects: "Rabbit and Turtle" (RT), "Lion and Mouse" (LM), "Look Out" (LO), and "Bad Wish" (BW). In each session, subjects were asked to read the story aloud two times, in case one warm-up reading might be needed before the effects of text version could be observed. At the outset, the researcher raised a motivating question ("Read to find out how the hole gets fixed") which the child was asked to answer after the first reading, as a preliminary test of comprehension. The first reading was not interrupted by the researcher unless tie subject skipped a line or more of text, or paused for more than 5 seconds on any word, in which case the researcher pronounced the word. Before the second reading, subjects were told that the researcher would no longer help them with words, and that they should try to read difficult words themselves, or else skip them and go on. After the second reading of each story, subjects were asked the 11 comprehension questions.

Coding of Data

Children's oral readings were treated in a two-stage process. First, the tape recording of each reading was reviewed, and all deviations from the printed text were transcribed onto a copy of the text in question, using a modified version of the system developed by Simons and Chambers (1981). Then the transcribed deviations were coded in terms of a number of miscue categories (see below). Where subjects miscued more than once in attempting to read the same word, only the initial response was coded. Each reading was

transcribed and coded a second time for the sake of accuracy. As a further check on reliability, the readings of three subjects were coded independently by two coders and no significant discrepancies were found.

Responses to comprehension questions were simply scored as to whether or not they were correct, i.e., consistent with the text.

Dependent Measures

The recordings and coded transcripts from the reading sessions yielded the following dependent measures:

1. *Reading rate*— the mean number of words read per minute.

2. *Word miscue rate*— the mean number of "word" miscues per 100 words, i.e., instances in which the subject produced something other than the appropriate printed word, including substitutions, omissions, insertions, and nonsense words.

3. *Proportion of word miscues that fit syntax*— based on the number of word miscues that were grammatically acceptable given the preceding context.

4. *Proportion of word miscues that preserved meaning*— based on the number of word miscues that approximated the semantic intent of the passage, including paraphrases, changes in tense and number, and minor changes in function words.

5. *Proportion of word miscues that were graphically* similar— based on the number of word miscues that resembled the beginning or end of the printed word.

6. *Punctuation miscue rate*— the mean number of instances per 100 words in which the subject's intonation deviated significantly from what the printed punctuation called for.

7. *Proportion of comprehension questions correct*— based on the total number of scorable comprehension responses, i.e., excluding occasional instances in which faulty testing procedures or ambiguous responses rendered items unscorable.

Approach to Quantitative Analysis

Although a matched-pairs design was employed in assigning subjects to text versions, two principal considerations made the use of matched-pairs statistical procedures undesirable. First, it was not always possible to match all pairs on word recognition as closely as we had wished, within the same classroom. Second, there were several points at which data were missing for one or the other member of a particular pair. In some cases, these missing data resulted from such problems as failure to obtain a useable recording of the reading session in question. More, commonly, however, the data were missing because the subject had gone through a particular reading of a particular story without committing any word miscues, so that no scores could be assigned on the measures that were defined as proportions of total miscues. Had we used statistical procedures appropriate for matched pairs, the occurrence of missing data for one member of any pair would have made it necessary for us to omit the second member of the pair from the analysis in question, even when relevant data from the second member were available. Thus, in order to use all of the available data, we have

treated text version as a betweensubject factor that is crossed with word recognition level in a 2x2 factorial design for the analyses of variance reported below.

The occurrence of missing data is also problematic for analyses of such withinsubject factors as differences between stories, or between first and second readings of the same story. But statistical tests of these factors are not of primary importance with regard to our research questions anyway, so we focus here on separate 2x2 analyses of variance for each reading of each story. Because the overall number of these analyses is quite large-eight ANOVA's for each of the dependent measures but one we are concerned principally with those effects that were statistically significant for at least two of the four stories. Moreover, in interpreting the results, we emphasize the *pattern of* findings across dependent measures, rather than the findings for any one measure. Most *of* the analyses of variance we performed did not reveal significant interactions *of* text version by word recognition level. Consequently, the data are generally displayed only in terms *of* the main effects of those two factors. Other, supplementary analyses are described below with the results. All statistical tests were two-tailed.

RESULTS

In reporting results from the quantitative analyses that were performed on our various dependent measures, we generally examine the main effects of word recognition level first, to establish whether the measure in question is sensitive to an independent variable that might normally be expected to affect children's reading, i.e., their ability to recognize individual words in the stories to be read. Then we turn to the results that are of primary interest, i.e., the main effects of text version, together with any interactions of text version and word recognition level that were statistically significant

Reading Rate and Word Miscue Rate

The means displayed in Table 3 show the main effects of word recognition level and text version on reading rate. It is clear that the subjects with high word recognition scores consistently read at significantly faster rates than those with low word recognition scores, averaging about 35-40 more words per minute. With regard to text version, there was a general tendency for the rewritten versions of the stories to be read at slightly slower rates than the original versions, but none of these version differences were statistically significant

The main effects of word recognition level and text version on rates of word miscues are shown in Table 4. As expected, the high word recognition group consistently made fewer word miscues, on average, across all readings. As for text version, significantly more miscues occurred on the rewritten version in both readings of RT, but no significant differences were observed for any other story. Thus, there does not seem to have been a general tendency for subjects reading the rewritten version to have been more miscue-prone. However, text version did interact significantly with word recognition level for the first readings of both LM and BW. The means for these interactions are displayed in Table 5. They show that, in comparison with the original version, the miscue rates on the revised version were lower for subjects who had high word recognition scores, but higher for subjects with low word recognition scores.

Table 3
Main Effects of Word Recognition Level and Text Version on Mean Reading Rate (Words per Minute)

	Word Recognition			Text Version	
Story	Reading	Low	High	Original	Rewritten
RT	1	46	81***	67	62
	2	57	91***	76	75
LM	1	47	83***	68	68
	2	62	95***	82	80
LO	1	49	89***	74	70
	2	60	106***	87	85
BW	1	47	83***	69	65
	2	56	99***	83	77

***p<.001.

Table 4
Main Effects of Word Recognition Level and Text Version on Mean Rate of Word Miscues per 100 Words

	Word Recognition			Text Version	
Story	Reading	Low	High	Original	Rewritten
RT	1	3.6	1.7**	1.7	3.6***
	2	3.7	1.5**	1.9	3.4**
LM	1	5.2	2.8**	3.7	4.3
	2	5.3	3.0**	3.9	4.4
LO	1	4.5	2.7**	4.1	3.1
	2	4.1	2.5**	3.6	3.1
BW	1	6.9	3.8**	5.0	5.6
	2	6.5	3.8**	4.6	5.3

*$p<.05$. **$p<.01$. ***$p<.001$.

Table 5
Mean Word Miscue Rates in Significant Interactions of Text Version and Word Recognition Level

Story	Reading	Word Recognition	Text Version	
			Original	Rewritten
LM	1	Low	3.9	6.7
		High	3.5	2.2*
BW	1	Low	5.5	8.1
		High	4.6	3.0*

**p<.05.*

This last finding suggests that, on balance, children with good word recognition skills may have profited from the changes that were made in the rewritten versions of the stories, while those with poorer word recognition skills were more likely to encounter words they could not identify while reading the rewritten versions. Increased difficulty in word recognition seems to have been a problem for all subjects in the case of RT, where supplementary analyses showed that a few of the words that were added to the rewritten version accounted for the increase in overall miscue rate. The data on overall rates of word miscues are difficult to interpret at face value, in any case, because some miscues might be regarded as more serious than others, or as indicative of one approach to reading versus another. Consequently, we turn now to analyses of specific kinds of word miscues.

Proportions of Syntactic, Semantic, and Graphic Miscues

Table 6 contains means for the main effects of word recognition level and text version on the proportion of miscues that were syntactically appropriate for the contexts in which they occurred. In general, a majority of the miscues did fit the syntactic context. This tendency was stronger for subjects with higher word recognition scores, as significant differences were found between the high and low word recognition groups in three of the four stories. With regard to the main effects of text version, two stories showed significantly higher proportions of syntactic miscues for the rewritten version, but another story (RT) showed higher proportions for the original version, and one showed virtually no difference favoring either version.

As shown in Table 7, the proportion of word miscues that preserved meaning was somewhat lower than for those that fit the syntax, running generally just under .50. The high word recognition group consistently attained higher proportions on this variable, but most of the differences between recognition levels were quite small, and only one of them reached statistical significance. More importantly, however, the version differences for proportions of meaning-preserving miscues all favored the rewritten version, and were statistically significant for the first readings of two stories.

Table 6
Main Effects of Word Recognition Level and Text Version on Mean Proportion of Syntactically Appropriate Miscues

		Word Recognition		Text Version	
Story	Reading	Low	High	Original	Rewritten
RT	1	.55	.65	.70	.51*
	2	.65	.71	.75	.59*
LM	1	.49	.69**	.60	.59
	2	.52	.60	.58	.54
LO	1	.62	.64	.55	.70*
	2	.61	.77*	.67	.71
BW	1	.50	.70***	.51	.63
	2	.51	.65*	.51	.65*

**p<.05. **p<.01. ***p<.001.*

Table 7
Main Effects of Word Recognition Level and Text Version on Mean Proportion of Miscues that Preserved Meaning

		Word Recognition		Text Version	
Story	Reading	Low	High	Original	Rewritten
RT	1	.39	.44	.36	.46
	2	.42	.50	.44	.48
LM	1	.42	.46	.37	.52
	2	.43	.45	.38	.50
LO	1	.42	.44	.34	.52*
	2	.42	.51	.38	.53
BW	1	.46	.49	.45	.51
	2	.40	.55*	.41	.53

P<.05.

Finally, Table 8 shows that most miscues tended to be similar graphically to the target word. The proportion of graphically similar miscues was consistently higher for the low word recognition group than for the high word recognition group, with significant differences occurring in three of the stories. On the other hand, the main effects of text version on graphic miscues were mixed. In one case (LO l), a significantly higher proportion of graphic miscues occurred for the original version, but in another case (RT1) there was a significantly higher proportion for the rewritten version.

Table 8
Main Effects of Word Recognition Level and Text Version on Mean Proportion of Graphically Similar Miscues

		Word Recognition		Text Version	
Story	Reading	Low	High	Original	Rewritten
RT	1	.79	.59	.62	.77**
	2	.66	.6 0	.62	.65
LM	1	.75	.62	.71	.64
	2	.65	.61	.62	.64
LO	1	.61	.54	.68	.48*
	2	.64	.45**	.55	.54
BW	1	.68	.54**	.61	.61
	2	.61	.54	.52	.62

**p<.05.* ***p<.01. ***p<.001.*

The remaining differences were generally quite small and were not consistent in direction. However, there were significant interactions of text version and word recognition level in four of the eight analyses of graphically similar miscues, as shown in Table 9. Three of the four interactions appear to be similar in form (RT2, LO 1, and BW 1): for high word recognition subjects, the proportion of graphic miscues was lower with the rewritten version, while for low word recognition subjects, this difference between versions was either reversed or at least eliminated The fourth significant interaction (RT1) did not fit the same pattern, as the subjects high in word recognition produced a higher proportion of graphic miscues with the rewritten than with the original version.

Punctuation Miscue Rate

Mean rates of punctuation miscues, per 100 words, are shown in Table 10 as a function of word recognition level and text version. This type of miscue occurred with about equal frequency for the low and high word recognition groups. If anything, there was tendency for the subjects who were high in word recognition to make more punctuation miscues, but none of the differences between word recognition levels were statistically significant.

Table 9
Mean Proportions of Graphically Similar Miscues in Significant Interactions of Text Version and Word Recognition Level

Story	Reading	Word Recognition	Text Version	
			Original	Rewritten
RT	1	Low	.78	.79
		High	.34	.75**
RT	2	Low	.56	.74
		High	.69	.53*
LO	1	Low	.61	.61
		High	.78	.36**
BW	1	Low	.60	.74
		High	.62	.46*

*$p<.05$. **$p<.01$.

In contrast to these negative results for the main effects of word recognition level, punctuation miscues were found to occur at consistently higher rates for the original versions than for the rewritten versions, and statistically significant differences of this sort were found in all stories except RT. Moreover, while none of the interactions between text version and word recognition level were statistically significant, examination of the means for these interactions (not shown here) revealed that, in all eight readings, the *highest* rate of punctuation errors was produced by the high recognition subjects who read the original versions (compared to the high recognition subjects who read the rewritten versions, or the low recognition subjects who read either of the versions). On the other hand, in four of the eight readings, the lowest rate of punctuation errors was produced by the high recognition subjects who read the rewritten versions. In other words, punctuation miscues were most likely to occur when the original versions were being read by subjects of the sort who generally seemed more inclined toward top-down processes in their reading (i.e., subjects with higher word recognition scores), and they were least likely to occur when subjects of the same sort were reading the rewritten versions. This finding suggests that their topdown processing involved expectations that were confirmed more often by the rewritten than by the original versions. It also explains why there were no main effects of word recognition level favoring those who were high in word recognition.

Table 10
Main Effects of Word Recognition Level and Text Version on Mean Rate of Punctuation Miscues per 100 Words

	Word Recognition			Text Version	
Story	Reading	Low	High	Original	Rewritten
RT	1	1.3	1.4	1.7	1.0
	2	1.1	1.4	1.4	1.1
LM	1	1.2	1.4	1.7	0.8**
	2	1.3	1.2	1.5	0.9
LO	1	1.5	2.2	2.5	1.1***
	2	1.4	1.9	2.4	0.9***
BW	1	2.6	2.6	3.7	1.5***
	2	2.1	2.4	3.4	1.1***

***p<.01.* ****p<.001.*

Comprehension Questions

Mean comprehension scores for each story are displayed in Table 11 by word recognition level and by text version. Performance on the comprehension questions was generally quite high, with a majority of the subjects answering at least 60% of all questions correctly, regardless of word recognition level or text version. Differences between word recognition levels were neither consistent in direction nor statistically significant. In contrast, differences between text versions all favored the rewritten version, and were statistically significant for two of the four stories. There were no significant interactions of text version by word recognition level.

A supplementary analysis of the individual comprehension questions revealed that a majority of the questions about each story were answered correctly more often by subjects who read the rewritten versions than by those who read the original versions. Overall, 32 of the 44 questions favored the rewritten version. A series of exact probability tests showed that seven questions produced significant differences favoring the rewritten versions, while there were no significant differences favoring the original versions. The number and size of the differences favoring the rewritten versions may have been limited somewhat by a ceiling effect on several of the questions.

Of the seven questions on which the rewritten version led to significantly more correct responses, there were four cases in which a correct answer required information that was stated explicitly in the rewritten version, but was carried only by pictures in the original version, or was simply implicit in the text. For example, in the original version of LM, Mouse says:

Table 11
Main Effects of Word Recognition Level and Text Version on Mean Proportion of Comprehension Questions Correct

	Word Recognition		Text Version	
Story	Low	High	Original	Rewritten
RT	.82	.78	.78	.83
LM	.66	.69	.61	.73*
LO	.77	.81	.75	.82*
BW	.66	.72	.66	.71

**p<.05.*

> "Look here, Lion.
> See what I can do."

An illustration shows Mouse nibbling a hole in the net in which Lion is caught. The rewritten version reads as follows:

> "Look here, Lion," said Mouse.
> "Look what I can do."
> Mouse nibbled a hole in the net
> and Lion got out.

When asked "What did Mouse do to help Lion?" most students who read the rewritten version used the word "nibbled" in their answers (75%), while those who read the original version did not, even if they answered correctly (5%). Thus it appears that students reading the rewritten version obtained the necessary information from the text and not from the pictures, even though the same pictures accompanied both versions.

Two other questions required information that was implicit in both the original and rewritten versions. The fact that more responses were correct with the rewritten version suggests that the language of that version made it easier for readers to coordinate information that was given in the text to make the inferences needed for a correct response. Finally, there was one question ("What were the three wishes the man made?") which required information that was explicit in both versions. Once again, however, the reader had to coordinate different parts of the text in order to answer correctly, and the rewritten version apparently made that task easier.

DISCUSSION

Because the effects of text version were of primary interest, and because those effects were assessed in terms of several dependent measures, we have summarized the principal differences between versions in Table 12. Compared to the original versions of the texts, the rewritten versions appear to have had virtually no effect on reading rate. On the other hand, the rewritten version did produce some significant increases in the overall rate of word miscues, but these effects were found in more than one story only for children with lower word recognition scores, as they had more of a tendency to stumble over words that were new to the rewritten texts. More important, however, was the finding that the word miscues made on the rewritten versions were more likely to fit the syntactic context, or to preserve meaning, and that they were also less likely to reflect graphic similarity with the printed word, at least for children with higher word recognition scores. In addition, the rewritten versions consistently resulted in fewer punctuation miscues.

Table 12
Significant Effects of Text Version (Original vs. Rewritten)
Found in Two or More Stories

Dependent Measure	Main Effect of Text Version	Interaction with Word Recognition
Reading Rate	— —	— —
Word Miscue Rate	— —	Lo WR: R>O
		Hi WR: O>R
Proportion of Word Miscues that:		
Fit Syntax	R>O	— —
Preserved Meaning	R>O	— —
Matched Graphic Cues	— —	Lo WR: R>O
		Hi WR: O>R
Punctuation Miscue Rate	O>R	— —
Comprehyension Correct	R>O	— —

Taken together, these findings suggest that the rewritten versions allowed greater use of top-down processing, especially on the part of children who were already capable of recognizing a relatively large number of words from the texts when they were presented in isolation. The tendency for children to engage m top-down processing based on their linguistic and world knowledge seems very strong. Its strength is evidenced in the present study by the fact that a majority of all miscues fit the syntactic context. It is also apparent in the qualitative miscue analyses we have reported elsewhere (Simons & Ammon, 1988; 1989), in that many of the miscues children made on the original versions had the effect of editing the text to make it conform more closely to natural language. But if the language of a given text interferes with the reader's tendency to create and use knowledge-based anticipations in top-down processing, due to its unnaturalness, then the result seems to be a more text-bound, bottom-up approach to reading. The present data indicate that children reading the original versions were more likely to take such a bottom-up approach, in that their miscues were generally less sensitive to syntactic context and meaning, and were sometimes more sensitive to graphic cues in the printed words.

If the unnatural language of the original versions resulted in greater reliance on bottom-up processing, then one might also expect negative effects on comprehension, and in fact there was evidence of a general tendency toward poorer comprehension with the original versions. However, it is not clear how these two effects of text version were related to each other. Did children comprehend the original versions less well because they were engaged in more bottom-up reading, or did they engage in more bottom-up reading because of difficulties they were experiencing with comprehension? Quite possibly it was both. It is also possible that the differences between versions in oral reading and in comprehension were somewhat independent of one

another and resulted from different features of the texts. Our qualitative analysis of the comprehension items that discriminated significantly between text versions appears to shed little light on this issue, as the comprehension errors in question could represent either causes or effects of the apparent tendency toward more bottom-up reading with the original versions. However, the absence of significant differences in comprehension between high and low word recognition levels suggests that more bottom-up processing per se would not suffice to produce comprehension errors of the sort that occurred more frequently with the original versions, since the subjects with low word recognition scores generally seemed inclined to engage in more bottom-up processing, but did not make significantly more errors in comprehension.

On the other hand, the present study may well have underestimated the extent to which comprehension is sensitive to differences between word recognition levels, or between text versions, because the subjects were already quite familiar with the stories by the time their comprehension was tested. That is, they had read through each story twice, and-in some cases may even have heard one or more of the three fables prior to the experiment. In a similar vein, the differential effects of text version and word recognition level on the extent of top-down versus bottom-up processing may have been weakened in this study by the conditions under which the reading process was investigated. Reading aloud to an adult seems likely, by its very nature, to induce a bias toward bottom-up processing, even with more natural texts. Under other task conditions, the children in the present study might have taken greater advantage of the features that distinguished the rewritten texts from the originals, by drawing more freely upon their linguistic knowledge in a top-down approach to reading. Moreover, their ability to do so may have been enhanced if their language arts programs had done more to make them familiar with natural "storybook" language. Finally, it should be noted that the original and rewritten texts used in the present study probably did not differ as markedly from one another as typical primerese selections do from real children's literature, since the more natural texts, in this case, were created by making some rather modest changes in existing primerese stories that were already relatively well-formed to begin with.

Despite these mitigating circumstances, the present data nonetheless indicate, on the whole, that the children read the rewritten texts in a more fluent fashion than the controlled originals. However, we must be cautious in applying that interpretation to children with lower word recognition scores, as significant interactions were found between text version and word recognition level with respect to both the overall rate of word miscues and the proportion of miscues that matched graphic cues in the text. In those cases, it appeared that the low word recognition group did not gain the same kind of advantage from the rewritten version as the high word recognition group, and that they may even have found the rewritten version somewhat more difficult at least on the first readings, where five of the six significant interactions occurred.

It might be argued from these interaction effects that text controls of the sort employed in the original versions are still desirable in the earliest phases of reading instruction, to help children establish some minimum level of word recognition skill. But before the interactions can be interpreted in that way, a better understanding is needed as to exactly why they occurred. The high and low word recognition groups probably differed not only in word recognition skill but in other ways as well. For one thing, children with low word recognition scores may also have been less familiar with natural storybook language, in which case the implication might be to give them more prereading experience with children's literature, rather than highly controlled beginning reading texts that might actually retard their developing familiarity with, and ability to process more natural written language.

The fact remains that children at *both* word recognition levels appeared to read the rewritten versions in a more meaning-driven, top-down fashion than the original, controlled versions, as evidenced by the presence of significant main effects of text version (and by the absence of significant interactions with word recognition level) on miscues that were syntactically appropriate, on miscues that preserved meaning, on punctuation

miscues, and on comprehension. At the very least, then, it seems reasonable to conclude that any conceivable advantage to be gained from conventional text controls is quickly lost as children start to become readers, and that the existence of such an advantage-even in the earliest phases of reading instruction-is very much in doubt. Thus the results of this study add substantially to the mounting body of evidence that conventional controls need not, and probably should not, be imposed on beginning reading texts.

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