# EFFECTS OF CHUNKED TEXT-MATERIAL ON READING COMPREHENSION OF HIGH AND LOW ABILITY READERS

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Recent research results have indicated that "chunked" reading material or separation of sentences into meaningful related phrases will improve reading comprehension of some readers. The purpose of this study was to examine whether text-material presented in "chunks" or phrases would significantly improve the reading comprehension of 50 eighth-grade students composed of two reading-ability groups. The performance of each group, one high- and low-ability, was compared to determine if they differ in ability to comprehend text-material presented in "chunked" style. As hypothesized, test results revealed that low-ability readers' scores were significantly affected by "chunked" style material. On the other hand, high-ability readers showed marginal or no gain on test scores. These results indicate "chunking" sentences into meaningful units of thought aids low-ability readers more than high-ability readers.

Research has shown that good readers seem to differ from poor readers in their understanding of what is read on the printed page. For example, observation by Taylor, Wade and Yekovich (1985) revealed that during oral reading poor readers, unlike good readers, read in a piecemeal, word-by-word manner and are unable to read at an adequate rate, comprehend idea units, or use inference. Cromer (1970) hypothesized that poor readers, although having adequate intelligence, language skills, and vocabulary do not seem to organize their reading input in a meaningful way. Educators have searched for ways to improve reading comprehension of slow readers as well as those with little or no reading difficulties. One such method to assist readers has been the procedure referred to as "chunked" or phrase reading.

In 1978, Smith referred to "chunking" as the process of storing the largest meaningful unit of information in short term memory (p. 49). Gillet and Temple (1982) summarize the importance of chunking in the following way: "chunking allows more information to be perceived and processed and allows perception and recall of idea units rather than letters or single words" (p. 13). This mental process of chunking words into phrases is necessary since the mind cannot hold in short-term memory more than approximately four to seven separate items/words (Miller, 1956). Simply stated, "chunking" is the grouping of words in a sentence into short meaningful phrases.

Thus, to fully understand a printed text, a reader must employ "chunking." A basic "chunked" sentence might be constructed like the following:

Helen Keller was struck with a serious illness at nineteen months old which left her deaf and blind. Her isolation was bro-

ken by Ann Sullivan who taught her sign language Braille and then later to speak. ('The Teacher', *Crystal Stair,* McGraw-Hill, 1989).

Investigations (Amble and Butler, 1967; Amble and Kelly, 1970; Casteel, 1988-89; Cromer 1970; Mason and Kendall, 1979) revealed that relatively low-ability and remedial-level readers at elementary, intermediate, junior high, and college levels improved significantly in comprehension and reading rate when using phrased or "chunked" reading material. Similarly, researchers (Cromer, 1970 and O'Shea and Sindelar, 1983) have noted that when sentences were organized or "chunked" into meaningful phrases, less-able or poor readers' comprehension performance proved comparable to that of good and high-ability performers. Mason and Kendall (1979) found that low-ability fourth-grade readers achieved higher comprehension scores on a "chunked" reading presentation than did high-ability readers using the same text. Stevens (1981) investigated the effect of "chunking" upon poor, average and good-ability readers, and concluded that while all subjects read significantly better in a "chunked" mode, those subjects in the low and middle percentile group had even larger gains. In a study using poor and good readers, Radebaugh (1983) found that these fourth and fifth graders profit from pre-organized reading material, and the syntactic nature used to separate sentences into small units is of less importance.

In summary, while various studies support the hypothesis that "chunking" or phrasing material into meaningful though units appears to improve students' comprehension performance on test materials, this positive effect seems to be more noticeable in low-ability readers.

The purpose of this study was to investigate if text-material presented in "chunked" mode units would improve reading comprehension performance among two groups (high- and low-ability) of readers.

## Method

*Subjects*

Fifty 8th grader students (32 females and 18 males) from a public middle school within Jefferson Parish, Louisiana, participated in the study. Of the 50 students, 46 were white and 4 black. Subjects were identified and placed in two groups on the basis of stanine scores obtained on a reading subtest of the California Achievement Test (CAT), (test Revised, 1983, by McGraw-Hill). The test was administered in the spring of the previous school year. Students were defined as being below-average in reading achievement if their stanine scores on either or both of the vocabulary and comprehension reading subtests of the CTBS and CAT were 4 or below ($n$ = 26). Students with stanine scores above 4 were identified as high-ability readers ($n$ = 24). There was no significant differences in age among the two ability groups. It was concluded that all subjects were well qualified for this study.

*Materials*

In order to examine the literal comprehension of high- and low-ability readers, passages consisted of two "chunked" and two traditional types. All four passages were taken from *Crystal Stair,* a new standard eighth grade reader from McGraw-Hill (1989). This reading series was used in a pilot program.

The four passages, labeled A,B,C,D, were typed directly from the text using a word processor. Passages A and C were presented traditionally while passages B and D were presented in the "chunked" mode. The length of each passage was about 1700 words. To assess comprehension, each passage contained 10 multiple-

choice questions and each question contained 4 possible answers taken directly from the basal reader series. The possible score for each passage was 100.

There are no firm rules for chunking reading material, and the rules used seem to vary with each report. However, as noted by Murdock (1968), the number of bits per chunk is certainly of importance. In designing passages for this study the guidelines of Klare et al., (1957) were used. Such rules included the following:

1. Subject and predicate of simple sentences were separated and the object was separated from the predicate.
2. Noun modifiers, if short, were linked with the noun, and verb modifiers with the verb; however, single subjects were isolated.
3. Contractions containing subject and verb were not separated. (p. 461)

In this study, as in a previous study by Casteel (1988-89), spaces were used as separating devices. "Chunks" or phrases were separated/spaced into lengths of two to six words and typed in a single space with no divided words between sentences. The passages were typed so that spacings between chunks/phrases always consisted of four spaces, which would represent meaningful units of thought for this study. It should be noted that such interpretations are determined by the individual reader's interactions with the text. (Example of a "chunked" sentence is presented above). Two reading specialists from a local university (Tulane University) helped design the material.

*Design and Procedure*

This study was designed to assess the effects of text-material (passages) "chunked" into phrase units on the reading comprehension of two groups (high- and low-ability) of readers.

Each subject read 4 text passages ("chunked" and traditional). The 4 passages (A,B,C,D) to be read were randomly assigned to the subjects. The first subject to be tested read passage A (traditional) and then answered the questions. Next, the subject read passage B (chunked), followed by passage C (traditional) and passage D (chunked). The second subject first read passage B, then passage A, passage D, and passage C. Such distribution of passages was similar to the technique used in a study by Gerrell and Mason (1983). This procedure was continued throughout the testing of subjects. All passages were at the same reading difficulty level as determined by two local university professors.

After reading each passage, students were asked to answer all questions in written form. Data was collected and analyzed in terms of number of correct questions scored on test passages. This study began in November, 1989 and concluded two months later.

The two independent variables investigated in this study were ability level and passage type. The ability level variable had two levels: high and low. The passage type consisted of two levels: traditional and "chunked" (two passages each). The number of correct answers on the four passages (2 chunked, 2 traditional) provided the instrument for the dependent variables. The total weight of each passage was 100.

The test statistic used in this study is a test of significance for matched pairs. Such a test is useful when attempting to control as many variable as possible (with the exception of the experimental variable). It can be used when matching two individuals on some characteristic or as in this case, using the same individual twice. Since the two samples are not independent (they are the same sample), it is preferable to a difference of means tests (Blalock, 1979).

## Results and Discussion

Table 1
Means and standard deviations by ability level, and passage type (Traditional and Chunked).

| Ability level | N | Traditional | | Chunked | |
|---|---|---|---|---|---|
| | | M | SD | M | SD |
| High | 24 | 72.81 | 15.16 | 77.19 | 14.94 |
| Low | 26 | 58.57 | 10.50 | 68.31 | 11.39 |
| Total | 50 | 65.69 | 12.83 | 72.75 | 13.16 |

Possible score 100

In this study, the major concern was the effect of text manipulation (traditional and chunked) on the number of test questions scored correctly on each of the four passages. The means and standard deviations of performance level (high- and low-ability readers) and passage type (2 traditional and 2 chunked) are presented in Table 1. Performance on passages presented in "chunked" form was compared to that of traditional passages. The differences was significant beyond the .05 level using a dependent measure group *t* test. Each separate *t* statistic tests the null hypothesis for each group. An overall comparison of the means and standard deviation for the two modes of presentation were: tradition mode, $M = 65.69$, $SD = 12.83$; "chunked" mode, $M. = 72.75$, $SD = 13.16$. For the combined groups, $N = 50$; the mean score was increased 7 points with the presentation of "chunked" text-material. An analysis revealed this effect to be due to the superiority of a "chunking" procedure which was most pronounced for readers in the low-ability group. This group's mean scores were 58.57 (traditional mode) versus 68.31 (chunked mode). That is, the low-ability group's score using "chunked" material was elevated by nearly 10 points at the $p < .05$ level. This significant gain in comprehension by the low-ability group was expected. However, for the high-ability group, the mean score was 72.81 (traditional passages) versus 77.19 ("chunked" passages). Such result is determined not to be significant at the $p < .005$ level. Although the "chunked" mode of presentation aided the high-ability readers somewhat, the group failed to show a significant gain as a result of "chunked" material used in this study. Consequently, little difference between scores on the traditional and "chunked" modes of presentation was likely to occur for subjects who read with meaningful thoughts and accuracy, such as high-ability readers.

In the case of high-ability groups, we fail to reject this hypothesis. Interestingly, no statistically significant difference between the scores for the traditional and chunking methods is revealed (See table 2). On the other hand, for the low-ability group with 20 degrees of freedom, a probability below the $p < .005$ level corresponds to a *t* of 4.16. This means that for the low-ability group we have to reject the null hypothesis and conclude that there is a statistically significant difference between the "chunking" and traditional methods.

Table 2
Matched pairs *t* statistics for separate levels of reading ability using Traditional and Chunked Passages.

| Ability level | *t* | N | Degree of Freedom | |
|---|---|---|---|---|
| High | 1.14** | | 24 | 15 |
| Low | 4.16** | | 26 | 20 |
| Total | 2.65* | | 50 | 35 |

*Significant at the .05 level.
**Significant at the .005 level.

Importantly, one will note that for both groups, with 35 degrees of freedom, a probability of $p < .05$ corresponds to a $t$ of 2.65. This means that once again the null hypothesis is rejected and concludes that the test scores for the "chunking" method are significantly higher than those of the traditional method. However, any significant difference in overall test scores is attributable primarily to the low-ability group, the only group to show a significant difference between the traditional and "chunking" methods.

The "chunked" mode of presentation does not appear to be either beneficial or detrimental with high-ability readers. The high-ability group's performance indicates they might already have mastered the conventional ability to "chunk" or organize material into meaningful thought. Good readers or high-ability readers seem to possess the skill that is vital for forming and inferring relationships into meaningful units. However, this study suggests that low-ability readers could have some difficulty in organizing their words into thought patterns.

These findings support those of early studies (Amble and Butler, 1967; Amble and Kelly, 1970; Casteel, 1988-89; Frase and Schwartz, 1979; Mason and Kendall, 1979; North and Jenkins, 1951; O'Shea and Sindelar, 1983; Stevens, 1981) who found that low-ability readers benefit significantly from "chunked" material. Stevens (1981) impartial conflict with this investigation, found that "chunking" not only improved the comprehension of poor readers, but that of readers of all levels. Data gathered in this investigation is also in conflict with investigations (Carver, 1979; Taylor et al., 1985), which concluded that the presentation of "chunked" material did not significantly improve the comprehension level of their readers. Carver tested the comprehension as well as the reading rate of its subjects (college students). Upon analysis, Carver's and Taylor's subjects' may possibly have been too mature for this type of study. Notwithstanding, it is possible that more emphasis was placed on subjects' reading rate rather than comprehension. As with Taylor et al. (1985), the lack of improvement shown with subjects could also be contributed to the design of the "chunked" material used in the study. Specifically, lines were doubled spaced with one phrase or idea unit per line (instead of

using extra spaces or slash marks), which could possibly have confused their subjects.

## Conclusions

The results of this study indicate that the presentation of "chunked" or phrased material separated into meaningful related groups of words might improve the comprehension of some readers, most noticeably those readers who are classified as poor or low-ability readers. Poor/low-ability readers who because of lack of skill development are unable to "chunk" their reading material can be aided in their comprehension when printed material is carefully "chunked" or organized for them. Evidence here seems to indicate that "chunking" improves mainly the comprehension of those students that are below-average readers, however, it does not necessarily imply that other types of readers will not benefit from text-material organized into meaningful units.

While "chunking" seems to be an effective device for improving comprehension of some readers, it may be impractical to expect classroom teachers to organize all reading material. For some educators, the process of organizing reading material may be unfamiliar, and for others too laborious. However, O'Shea and Sindelar (1983) suggest several ways to organize material that don't involve the teacher in the process of retyping or rewriting reading material (which is necessary in "chunking"). For example, verb, noun, and object phrases may be separated by vertical lines or even underlined to highlight their importance in the sentence, which could be accomplished by students prior to reading a story (p. 465). This process would enable students to "chunk" their own reading material.

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## Author Notes

The treatment of participants (humans) was in accordance with the ethical standards of the APA. This hypothesis was assumed, then tested after other similar studies.

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Shirley Boes Neill and George W. Neill (1989). Only the Best. The Cumulative Guide to Highest-Rated Educational Software Preschool-Grade 12. New York: R.R. Bowker.

The book includes 550 of the highest rated computer educational programs for grades preschool through grade 12. The programs were rated by 37 different evaluation services and are described in the book. To be included the program must receive either two grades as "best", or one as "excellent" and three as "good". Many of the evaluations were state evaluation appointed groups.

Zelda R. Maggart and Miles V. Zintz (1989). Corrective Reading. Sixth Edition. Dubuque, Iowa: Wm. C. Brown Publishers.

The book is intended as a base from which a reading teacher can respond to both the cognitive and affective needs of their students. It seeks to help teachers understand how to empower children with the ability to make decisions about their own learning, to become partners in the teaching and learning process, and to participate in the evaluation of learning. Some titles of chapters that suggest the special content are as follows: Standardized tests and records of progress, Additional data needed for further diagnosis, Study strategies and skills, and content fields reading. Attitudes of teachers toward students who fail, and working cooperatively with parents.