Effect of chunking material as an aid to ESL students' reading comprehension

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Effect of chunking material as an aid to ESL students' reading comprehension

by

Meichin Yeh Tzeng

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INTRODUCTION

Many English-as-a-Second-Language (ESL) teachers report that despite the fact that their students may be fluent readers in their native languages, they often are not able to transfer these skills to reading in English. What prevents them from success in their second language?

Research in reading shows that foreign students rate vocabulary as their greatest difficulty (Yorio, 1971; Hatch, 1973). It may be that because foreign students are not reading in their own languages, they tend to focus on the words, relying on their dictionaries and translation to understand word meanings (Yorio, 1971; Kalnitz and Judd, 1981). In any case, they frequently end up spending more time discovering the meanings of the words than comprehending the overall message of the passage.

However, knowing the dictionary meanings of the words in a passage is not enough, because "syntax determines how the semantic associations are to be interpreted" (Dechant and Smith, 1977, p. 13). Thus, if a reader focuses on individual word-units, s/he is likely to miss the larger meaning-bearing patterns of English. Another related problem lies in the inability to group words as the writer intended. Such grouping errors cause failures in reading comprehension because "meaning can not be reached except
through the structures that carry meaning" (Lefevre, 1964, p. 23).

The question raised for ESL teachers by such observations is whether students can be taught to read by phrases rather than by single words. As a first step toward an answer, this study investigates the question of whether pre-organizing the input of reading material by chunking the words into meaningful linguistic units helps ESL students comprehend overall meaning.

"Chunking is the process of organizing or clustering information into ... compact thought units, such as phrases or clauses" (Valentine and Franks, 1979, p. 48). In speaking, phrasing is usually provided by the interlocutors through suprasegmental cues -- stress, intonation, and pauses; however, reading a paragraph silently requires readers themselves to phrase words mentally, that is, to put words into meaningful linguistic units (Graf and Torry, 1966; Stevens, 1983).

Though punctuation sometimes shows how the information should be chunked in written passages, many sentences in a written passage contain few punctuation clues. Consider this sentence: "I remember creeping up downwind of a male that must have weighed more than 5,000 pounds to take a series of photographs showing the square lips that are so well adapted to plucking a few blades of grass at a time (in
fact, grass is the chief food of these enormous beasts)" (Martin, 1984, p. 408).

To comprehend the meaning of this passage, readers likely construct phrases mentally in more or less the following manner: "I remember / creeping up downwind / of a male / that must have weighed / more than 5,000 pounds / to take a series / of photographs / showing the square lips / that are so well adapted / to plucking / a few blades / of grass / at a time / (in fact, / grass is / the chief food / of these enormous beasts)." The question raised in this study is whether such phrasing imposed on the reader from without facilitates comprehension.
LITERATURE REVIEW

There have been several studies of first language readers which show differences in the way good and poor readers chunk material. There is also a body of research indicating the effectiveness of chunking reading materials for first language readers. Finally there have been studies of second language learners which provide some evidence that chunking words into meaningful phrases may increase reading comprehension. A review of these studies follows.

Chunking by Good and Poor First Language Readers

By the analysis of three linguistic variables—juncture or pause, pitch, and stress—in oral reading in children, Clay and Imlach (1971) found that the best readers seemed to read on the average 7 words between pauses, complete a sentence with a fall in pitch, and read 4.7 words per stress, whereas poor readers were more likely to read 1.3 words between pauses, use a rising or sustained pitch implying uncertainty in reading a sentence, and read 1.1 words per stress. These behavioral differences suggest that the best readers are processing the message in syntactic chunks, while poor readers are more controlled by word and
partial word cues.

Studies of eye-voice span (EVS), the number of words that the eye is ahead of the voice in reading aloud, (as determined in experiments in which the text is made unavailable by turning the light off, but the reader continues to "read" as many words as possible) give further indication that skilled readers process more words at a time than unskilled readers. Schlesinger (1968) carried out several studies to determine whether the EVS extended to phrase boundaries. He found that his subjects, proficient adult readers of Hebrew, tended to end their EVSs at the end of units or phrases which are semantic and syntactic wholes. In light of these findings, Schlesinger further suggested that "the reading process may, conceivably, be facilitated by arranging the printed words in groups corresponding to the units of decoding" (p. 43). Schlesinger's findings have been confirmed by others (Levin and Kaplan, 1968; Rode, 1974-1975). Levin and Addis (1979) found evidence in their EVS studies suggesting that "skilled readers processed the text in systematic or meaning units" (p. 38).
Effectiveness of Chunking for First Language Readers

In the 1960s, Amble and his colleagues successfully developed and used phrase reading training programs experimentally with children in the fifth and sixth grades and with remedial readers (Amble, 1966; Amble and Muehl, 1966a; Amble and Muehl, 1966b). They developed a series of picture films to provide tachistoscopic-type presentation with a 16-millimeter projector; two sets of phrase-reading films were designed to provide systematic exposure of many phrases (Amble and Muehl, 1966a). The practice phrases were flashed on the screen for 1/8 of a second, enough time for the pupil to make a single reading fixation. At the beginning the phrases were two, three and four words in length; they were gradually increased during the training sequence on each film. The purpose was to provide practice in rapid reading of meaningful phrases and to increase reading rate and comprehension.

The findings of the phrase reading training studies reveal that students in the training programs at all levels of reading made greater progress than did control subjects in perceptual span, reading rate and reading comprehension. The experiments also show that phrase reading can be improved with training, that it is independent of reading
vocabulary, and that improvement in phrase reading is durable (Amble, 1967). Amble concluded that the phrase reading studies "evidenced a need for further consideration of the phenomena of reading by phrases" (Amble 1967, p. 122).

Another study done with fourth grade students by Amble and Kelly (1970) revealed that children who had problems in learning to read at the expected rate and who lived in a community of limited social-cultural opportunity also appeared to benefit substantially from the phrase reading programs. Thus, the work of Amble and his colleagues suggests that dividing text into meaningful phrases may facilitate reading comprehension.

During the same period, Graf and Torry (1966) were investigating the hypothesis that grouping words or phrases is necessary for the understanding of reading passages. Using undergraduate college student volunteers, they tried to find out whether subjects would comprehend better if reading passages were broken at syntactic phrase boundaries or in the middle of such phrases. They found that comprehension scores for reading passages which were broken at syntactic phrase boundaries were higher than those for passages broken in the middle of such groups. The results showed that, just as acoustic pauses help to bring about structural organization in speech perception, division of
written text into natural linguistic units enables the reader to see the grammatical organization of a passage.

Wiener and Cromer (1967) suggest four different "assumptions" or explanations which account for reading difficulty: defect, deficiency, disruption, and difference. The assumption of defect is that reading difficulty is attributable to some nonfunction such as sensory impairment; an individual cannot learn to read unless the defect is corrected. The assumption of deficiency is that reading difficulty is ascribable to an absence of some factors such as phonetic skills or vocabulary knowledge which must be strengthened before adequate reading can occur. The assumption of disruption regards the difficulty as the result of some interference, such as anxiety, which must be overcome before one can learn adequately. Finally, the assumption of difference assumes that reading difficulty occurs where there is a difference or mismatch between the reader's typical patterns of structural organization and the syntactic patterns required for the comprehension of the written material.

Using these four models, Cromer (1970) described two types of poor readers: one assumed to fit the model of the difference group -- readers who have adequate intelligence, language skills, vocabulary skills, etc., but who organize reading input in a word-by-word fashion rather than in
meaningful units (phrases), and the other assumed to fit the model of the deficit group — readers who have adequate intelligence and language skills but who are relatively deficient in vocabulary as shown on a standardized reading test. He compared reading comprehension of the two groups of poor readers and then compared the comprehension of good readers with that of each group of poor readers.

Materials chosen to test reading comprehension of these four groups were presented in four different modes: sentences typed in regular prose form, single words typed on separate lines on a roll of paper, phrases (words in groups determined by the criterion of meaningfulness), and fragmented word groups (words in groups that were not meaningful).

Cromer predicted that the difference group of poor readers would perform more like good readers in the phrase mode, and that the good readers under the single word mode would perform more like poor readers. His prediction held. The difference group answered significantly more questions in the phrase-grouping condition than in the other three conditions, actually performing as well as good readers. However, no such effect was found with the deficit group of poor readers, probably because of their inadequate vocabulary. Thus, these findings show that one source of comprehension difficulties is due to the way some poor
readers organize their reading input. If the reading passages were chunked or presented in phrases, better comprehension might result.

It is of course possible that reading comprehension difficulty at all levels might result from lack of vocabulary or word-identification skill. To investigate the relative importance of vocabulary and structural organization for reading comprehension, Oakan, Wiener, and Cromer (1971) compared the comprehension of good and poor readers in the fifth grade.

Poor readers were trained to recognize vocabulary which occurs in stories before actually reading the stories. The results showed that such training did not bring about a distinctive increase in comprehension for poor readers. These findings suggest that lack of comprehension has another source; perhaps poor readers do not organize their input into certain effective syntactic patterns, even though they know every word of a passage. When Oakan et al. asked good readers to read the typed transcripts of tapes which recorded several poor fifth grade readers reading four passages aloud (the transcripts contained all the poor readers' pauses, false starts, errors, mispronunciations, omissions, etc.), the good readers' comprehension dropped off significantly. However, with transcripts of tapes which recorded several good readers in the fifth grade reading
four passages with pauses at appropriate places, both good
and poor readers performed equally well. These findings
indicate that structural organization skills are important
for reading comprehension and that readers who are skilled
in word identification or who have adequate vocabulary
skills may still exhibit difficulties in comprehension if
they do not impose order on the reading input or organize
their reading input into certain meaningful patterns or
units.

Weaver (1979-80) tested the possibility of improving
reading comprehension of third graders by training the
children to point out how the words of a sentence are
related and then to encode information in meaningful chunks
larger than the single word. Sixteen subjects individually
received training in a sentence construction task and in
word grouping for ten to fifteen minutes three times a week.
The sentence construction task involved arranging a set of
words into phrases and then arranging the phrases into
sentences by using a word-grouping strategy. In this
project, "students were taught to form word groups by first
identifying the 'action word,' or verb, and then asking a
series of questions to group the remaining words and to
determine how the word groups are related to the verb"
(pp. 135-136). At the beginning of the training, five-word
sentences were formed; the length was gradually increased to
Weaver compared fifteen control subjects who received no training with these sixteen experimental subjects. Reading comprehension was measured by scores on four types of tests: 1) timed sentence recognition which tested "speed, knowledge and use of syntax, recognition of the difference between meaningful and nonsense or false sentences, and comprehension of single sentences (as opposed to connected discourse)"; 2) cloze comprehension which tested "sentence construction (completion in the case of the cloze), knowledge and use of syntax, comprehension of single sentences, and knowledge of the distinction between meaningful and nonsense sentences or false sentences"; 3) prompted sentence recall which tested "efficiency and organization in short-term memory, and comprehension of single sentences"; and 4) comprehension questions over passages which tested "comprehension of some single sentences, and a presupposed knowledge of syntax" (pp. 131-132).

Results of Weaver's study showed that the experimental subjects were significantly more accurate and faster on the sentence construction test than the control group and, moreover, that training improved sentence construction performance, transferring most to the prompted sentence recall and cloze test, less to the timed sentence
recognition test, and least to the passage-question test. Thus, these results are consistent with the contention that syntactic skills are important in reading comprehension.

Another significant study was done by Stevens (1983). Using high school sophomore boys as subjects, she sought to discover if chunking or organizing reading material into phrase units for students might help them comprehend the material. Two comparable forms of the Gates-MacGinitie Reading Tests, Level F (1978) were used. The readings for the comprehension subtest of Form 1 were presented in their published form whereas those of Form 2 of the same test were chunked by drawing slash lines between meaningful phrase units based on the punctuation, structure, and meaning of the written material.

Each subject was given both forms of the Gates-MacGinitie Reading Tests Level F. The order of presentation was randomly assigned. Before each test, the teacher presented a short lesson of about ten to fifteen minutes on the importance of reading in phrases, using wrongly phrased examples to show the importance of proper phrasing. Students were shown the function of the slash lines in these examples and told that if they were able to read along by using the lines to organize their thoughts, their understanding would improve.

The results indicated that chunking the material into
meaningful linguistic units improved the subjects' reading comprehension. Dividing subjects into ability groups by their scores on the vocabulary subtest on the Gates-MacGinitie Reading Test, Level F, Stevens found that chunking aided low, middle, and high ability readers equally.

However, two studies, one by Radebaugh (1983) and one by Carver (1970), did not find chunking to be so effective. Radebaugh, working with fourth- and fifth-grade children, tried to determine if differences in reading were related to grapho-syntactic organization. Three cloze tests were constructed by deleting every fifth word from three 330- to 350-word narrative passages. "Each cloze test conformed to one of the following grapho-syntactic organizations; (a) regular paragraph format, with the passage typed as it would normally appear in print; (b) meaningful units format, with sentences pre-organized into units which corresponded to the sense boundaries identified by a group of good comprehenders; (c) sentence fragments format, with sentence pre-organized into units which did not correspond to the sense boundaries identified by good comprehenders" (p. 22).

Radebaugh found that students comprehended better on both the meaningful units format and the sentence fragments format than on the regular paragraph format. Thus, she concluded that while some form of preorganization may be
beneficial, the basis on which the preorganization is done is not important.

Carver (1970), in a study of college students, used the chunking device of placing each chunk in a passage on a separate line. He found that the technique did not improve the reading efficiency of mature readers when they were reading at their normal rate. In reviewing this research, Stevens (1983) commented that Carver's subjects may have been too mature to benefit from any device as an aid to improve their reading ability.

The body of research reported in this section provides evidence that chunking is an aid to immature readers or readers who are deficient in structural organization. The obvious question in our field is whether chunking can also help ESL readers who are not mature readers in English (though they might be in their first languages).

Chunking and ESL Reading Problems

Hatch, Polin and Part (1974) asked foreign students and Anglo college students to mark out letters such as a's or o's in a text as they read it for comprehension. They found that Anglos marked out letters only in content words (e.g., nouns, verbs, adjectives) but not in function words (e.g., articles, conjunctions, prepositions) whereas foreign
students marked them everywhere. The findings suggest, at least indirectly, that foreign students are processing one word at a time and that their eyes do not take in chunks or focus on the meaning-bearing words as Anglo college students' do.

In order to obtain more information, Hatch et al. did another experiment in which native and non-native subjects were told to mark out letters in stressed syllables. They found that Anglos tended to cross out only letters appearing in syllables which would be strongly stressed in speech, but that foreign students showed no patterns with respect to stressed or unstressed syllables. Here, the difference in performance between foreign students and Anglos may indicate that Anglos read silently with the phrasing they would use in speaking, while foreign students tend to ignore phrasing in silent reading because it is not provided by suprasegmental cues -- intonation, stress, and pauses -- as it is in speaking, but must be provided by the readers themselves.

Looking at scores on comprehension tests following each of the crossing-out studies, Hatch et al. found that foreign students comprehended significantly less than Anglos did. While one cannot be sure that this lower comprehension of foreign students resulted from patterns of phrasing discussed above, it is at least possible that this was the case, and that some form of training in chunking might help
these students improve their reading comprehension.

In another study of ESL students, Plaister (1968) experimented with practice in phrasal reading. He rewrote passages with two columns on a page, each column being one phrase wide. The purpose was to show students what words should be grouped together as meaningful units and to train them to process text in chunks rather than one word at a time. Though he did not carry out any research to test reading comprehension after phrasal reading, Plaister informally found that it was common to get 125-word-per-minute readers up to 400 words per minute in one semester on simple material. One would at least hope that, in addition to moving faster through passages, Plaister's students were also learning to process more accurately and efficiently.

The research cited in this section suggests that there is a relationship between phrase grouping and comprehension in ESL reading; however, I know of no researchers in second language reading who have tested the effect of chunking as an aid to comprehension in the way that Stevens and others have done in first language reading. Therefore, in this study, I have attempted to find out whether pre-organizing reading material into syntactic chunks facilitates ESL students' reading comprehension. My hypothesis was that passages which are chunked would be better comprehended by ESL readers than passages which are unchunked. The basis
for my study was Stevens' research with English speaking high school students; materials and presentation were modified somewhat in adapting the method to an ESL audience.
METHOD

Subjects

Forty male and ten female foreign students in reading classes in the Intensive English and Orientation Program (IEOP) from levels 3 to 6 at Iowa State University served as subjects in this study. They were from different countries with various cultural and educational backgrounds. Most of them were preparing to study at a university, but their English proficiency was not yet at an acceptable level, that is, their TOEFL (Test of English as a Foreign Language) scores were below 500.

Materials

Six reading passages were used in this study. They were adopted from three reading inventories which contain parallel passages for use as pre-tests or post-tests for American elementary and high school students: the Classroom Reading Inventory (Silvaroli, 1982), the Analytical Reading Inventory (Woods and Moe, 1981), and the Inventory of Essential Skills (Brigance, 1981). The six passages were chosen from a larger number of possible selections on the basis of several pilot studies with students in the same
In the first pilot study with 15 students, sixteen passages, along with short, open-ended comprehension questions, were used in order to discover which ones were most appropriate for these students. After the pilot study, passages which even the high-level students could not understand well were thrown out. Eight passages out of the sixteen were kept and paired — two easy pairs, one intermediate and one difficult — according to how well students had done on them. In order to provide a check on whether members of a pair were at the same level of difficulty, they were judged and modified by three experienced ESL teachers. Four multiple-choice questions for each passage were then constructed from the answers obtained to the open-ended questions. This second set of passages and questions was pilot tested with 11 students enrolled in IEOP reading classes, and an item analysis was run on the data collected. Items which proved to be non-functional on the basis of the response frequency distribution were discarded or rewritten. A third pilot study was then run with 12 students to discover the average time needed to read a passage and answer four multiple-choice questions about it.

On the basis of these times and of an item analysis of answers provided in this pilot, a single pair of easy
passages was formed and questions for all passages were modified. The resulting test thus included: 1) two relatively easy passages (1A and 1B), 2) two intermediate passages (2A and 2B), 3) two difficult passages (3A and 3B).

Out of each pair, one passage was chunked and one was left unchunked. (The choice of which member was chunked is discussed in the next section.) Chunking was shown by means of three blank spaces rather than slash marks, as in Stevens' study, because discussion with several adult native speakers indicated that slashes tended to distract rather than help. The pairs of passages were presented in ascending order of difficulty. A sample test is shown in Appendix A.

**Design**

If I could have been certain that the two passages at each level were exactly equivalent, I could have presented all the A passages in chunked form and all the B passages in unchunked form. However, I knew of no way to ascertain the equivalence of the passages (and their accompanying comprehension questions) for students from a variety of cultural and language learning backgrounds who participated in this study. Therefore, I decided to control for this variable in the statistical model. I presented each passage in both
chunked and unchunked form, using a completely randomized blocked model. With two forms of each passage and three pairs of passages, there were eight different combinations of chunked and unchunked passages being presented. These were numbered 1-8 as shown in Appendix B. In order to randomly assign the tests to subjects, subjects' names in each level were alphabetized and then numbered -- one to eleven in level 3-4, one to fourteen in level 4A-5A, one to ten in level 4B-5B, and one to seventeen in level 5-6.

Using a table of random numbers from *Statistical Methods for the Social Sciences* (Agresti and Agresti, 1979), I rearranged and renumbered the subjects in each level for actual assignment. Subjects 1-8 (and subjects 9-16 in level 5-6) received tests 1-8, respectively. The entire group of "leftover" students was then assigned tests sequentially, beginning at the lowest level.

Two scores were obtained for each subject -- one for the number of correct answers on the chunked passages and one for the number of correct answers on unchunked passages. A perfect score was 12 for each set.

**Procedure**

Each subject was given a test during his/her regular reading class period. One student in level 4B-5B and one in
5-6 did not show up on the day of testing. Therefore, the subjects with numbers after the students who were absent were moved one test combination number forward. Before working on the test, students were asked to fill out an information sheet noting their first language, age, sex, and country of origin. Then, a short set of directions on the first page was read together with them. Its purpose was to indicate that three passages out of the six were presented in regular form, while the others were in phrase form with extra spaces to show phrase boundaries. Every effort was made to ensure that subjects understood the procedure before doing the test.

A digital watch was used to tell students when to begin and when to stop. Students were told to read each passage as quickly as they could and then choose the best answer to each of its questions. They were permitted to work on that passage until they were told to stop. If they finished before the specified time, they were asked to sit quietly and not to work on other passages.

After the test I interviewed 27 students in level 3-4 and 5-6 in order to get feedback on the test.
RESULTS

Comprehension performance on the "chunked" mode of presentation was compared with that on the regular or "unchunked" mode of presentation, using a paired $t$-test. Results are shown in Table 1.

Table 1. Comparison of mean scores for the chunked and unchunked passages

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean Scores</th>
<th>Standard Deviation</th>
<th>Mean Diff</th>
<th>T Value</th>
<th>Prob&gt;T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chunked</td>
<td>49</td>
<td>5.92</td>
<td>2.39</td>
<td>-.43</td>
<td>-1.34</td>
<td>.19</td>
</tr>
<tr>
<td>Unchunked</td>
<td>49</td>
<td>6.35</td>
<td>2.62</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Although there were fifty subjects in this study, one of the male students did not answer any of the questions in passages two or three. Therefore, he was omitted in the analysis. The results of this comparison indicate that, overall, chunking did not help these ESL students to comprehend better.

The statistical techniques of analysis of variance and regression were employed to find out whether chunking produced differences in comprehension when subjects are compared with respect to sex, region of origin, first
language, level of instruction, age, and ESL reading proficiency as determined by the Michigan English Placement Test (MEPT). The results are summarized in Tables 2 to 11.

Tables 2 and 3 show a comparison of the differences in performance on the two types of presentation by sex. The

### Table 2. Comparison of difference by sex

<table>
<thead>
<tr>
<th>Sex</th>
<th>N</th>
<th>Mean Scores</th>
<th>Mean Diff</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Chunked</td>
<td>Unchunked</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>39</td>
<td>5.79</td>
<td>6.38</td>
<td>-0.59</td>
</tr>
<tr>
<td>F</td>
<td>10</td>
<td>6.40</td>
<td>6.20</td>
<td>0.20</td>
</tr>
</tbody>
</table>

### Table 3. ANOVA Source table for sex

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Prob&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>1</td>
<td>4.96</td>
<td>4.96</td>
<td>.98</td>
<td>.33</td>
</tr>
<tr>
<td>Within</td>
<td>47</td>
<td>237.04</td>
<td>5.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>242.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

female subjects performed slightly better on the chunked passages while the males performed slightly better on the unchunked passages. However, the difference in difference scores for men and women is not statistically significant.
In order to find out whether chunking preferentially helped students from certain regions of the world, students were classified by country of origin and then grouped as follows: 1) students from southeast and east-central Asia (Indonesia, Japan, Korea, Malaysia, and Thailand); 2) students from South America (Argentina, Colombia, Ecuador, Honduras, Mexico, Panama, Peru, Puerto Rico, and Brazil); 3) students from the Middle East and northeastern Africa (Egypt, Jordan, Kuwait, Saudi Arabia, Sudan, and Syria); and 4) Students from southern and southwestern Asia (India, Pakistan, and Iran). The results of this comparison are shown in Tables 4 and 5.

Table 4. Comparison of difference by region of origin

<table>
<thead>
<tr>
<th>Region</th>
<th>N</th>
<th>Mean Chunked</th>
<th>Mean Unchunked</th>
<th>Mean Diff</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18</td>
<td>6.05</td>
<td>5.83</td>
<td>0.22</td>
<td>2.04</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>6.67</td>
<td>7.00</td>
<td>-0.33</td>
<td>2.50</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>4.00</td>
<td>5.20</td>
<td>-1.20</td>
<td>2.57</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>6.83</td>
<td>8.16</td>
<td>-1.33</td>
<td>1.03</td>
</tr>
</tbody>
</table>

*1: students from southeast and east-central Asia; 2: students from South America; 3: students from the Middle East and northeastern Africa; 4: students from southern and southwestern Asia.
Table 5. ANOVA source table for region of origin

<table>
<thead>
<tr>
<th>Source</th>
<th>DP</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Prob&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>3</td>
<td>18.62</td>
<td>6.21</td>
<td>1.25</td>
<td>.30</td>
</tr>
<tr>
<td>Within</td>
<td>45</td>
<td>223.38</td>
<td>4.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>242.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

While data in Table 4 show that Asian students scored better on the chunked passages, the differences among these four groups with respect to difference scores are not significant.

To find out whether chunking preferentially helps certain language groups, subjects were reclassified into seven first-language groups: 1) Sino-Tibetan (Chinese and Thai); 2) Romance (Spanish and Portuguese); 3) Semitic (Arabic); 4) Indo-Iranian (Urdu, Persian, and Assamese); 5) Malayo-Polynesian (Indonesian); 6) Korean; and 7) Japanese. (Classification follows that shown in Voegelin and Voegelin, 1977.) The results of this comparison are shown in Tables 6 and 7.
Table 6. Comparison of difference by language group

<table>
<thead>
<tr>
<th>Languages</th>
<th>N</th>
<th>Mean chunked</th>
<th>Scores Unchunked</th>
<th>Mean Diff</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>6.33</td>
<td>5.33</td>
<td>1.00</td>
<td>3.46</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>6.67</td>
<td>7.00</td>
<td>-0.33</td>
<td>2.50</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>4.00</td>
<td>5.20</td>
<td>-1.20</td>
<td>2.57</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>6.83</td>
<td>8.16</td>
<td>-1.33</td>
<td>1.03</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>6.50</td>
<td>5.16</td>
<td>1.33</td>
<td>1.75</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>5.75</td>
<td>6.75</td>
<td>-1.00</td>
<td>1.15</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>5.60</td>
<td>6.20</td>
<td>-0.60</td>
<td>1.52</td>
</tr>
</tbody>
</table>


Table 7. ANOVA source table for language group

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Prob&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>6</td>
<td>37.20</td>
<td>6.20</td>
<td>1.27</td>
<td>.29</td>
</tr>
<tr>
<td>Within</td>
<td>42</td>
<td>204.80</td>
<td>4.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>242.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Although group 1 speakers (Chinese and Thai) and group 5 (Indonesian) speakers show higher scores in the chunked
mode, the differences among language groups with respect to difference scores are not significant.

To discover whether chunking preferentially helps students of different English proficiency, analysis of variance was employed once again with students grouped by level in IEOP. The results are shown in Tables 8 and 9.

Table 8. Comparison of difference scores by level

<table>
<thead>
<tr>
<th>Levels</th>
<th>N</th>
<th>Mean Scores</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Chunked</td>
<td>Unchunked</td>
<td>Diff</td>
</tr>
<tr>
<td>1</td>
<td>11</td>
<td>5.09</td>
<td>4.54</td>
<td>0.55</td>
</tr>
<tr>
<td>2</td>
<td>13</td>
<td>5.23</td>
<td>5.77</td>
<td>-0.54</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>6.00</td>
<td>7.11</td>
<td>-1.11</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>7.00</td>
<td>7.62</td>
<td>-0.62</td>
</tr>
</tbody>
</table>

Table 9. ANOVA source table for level

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Prob&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>3</td>
<td>15.40</td>
<td>5.13</td>
<td>1.02</td>
<td>.39</td>
</tr>
<tr>
<td>Within</td>
<td>45</td>
<td>226.60</td>
<td>5.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>242.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results indicate that students in the lowest level performed slightly better with chunking. However, once again the differences among groups with respect to difference scores are not significant.

In order to determine whether there was a relationship between age and the effects of chunking (as measured by difference scores), a regression analysis was carried out. (Since age is a continuous variable, regression is a more appropriate technique than analysis of variance, which would require subjects to be divided into age groups.) The results are shown in Table 10.

Table 10. Regression of difference scores on age

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Prob&gt;F</th>
<th>R^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1</td>
<td>27.62</td>
<td>27.62</td>
<td>6.06</td>
<td>0.0176</td>
<td>0.11</td>
</tr>
<tr>
<td>Error</td>
<td>47</td>
<td>214.38</td>
<td>4.56</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>242.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Parameter Estimate
Intercept  2.9435
Age        -0.1352
The data in Table 10 show a significant (p<.05) relationship between difference scores and age. The R-square value for this regression is 0.11, indicating that 11% of the variance in the difference scores is explained by the variable of age. In Figure 1, the difference scores are plotted as a function of age. The regression line shows that younger students seemed to be helped more by chunking than older students.

Difference = Chunked - Unchunked Scores

Figure 1. Regression of Difference Scores on Age
To determine whether the effects of chunking were related to proficiency in ESL reading, a second regression was carried out. Here, the independent variable was subjects' reading scores on the MEPT, taken a week after this study. The results are shown in Table 11.

Table 11. Regression of difference scores on MEPT Reading Scores

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Prob&gt;F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading Scores</td>
<td>1</td>
<td>14.47</td>
<td>14.47</td>
<td>2.99</td>
<td>0.0904</td>
<td>0.06</td>
</tr>
<tr>
<td>Error</td>
<td>47</td>
<td>227.53</td>
<td>4.84</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>242.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Parameter Estimate
- Intercept: 2.9779
- Reading Scores: -0.0454

The relationship here is not strong (p<.1); however, there is a trend, shown graphically in Figure 2, suggesting that poor ESL readers benefit more from chunking than good readers.
Difference = Chunked-Unchunked Scores

Figure 2. Regression of Difference on MEPT Reading Scores
Generally, this study provides little evidence that preorganizing reading material into meaningful chunks improves the reading comprehension of ESL readers. These results are apparently in conflict with those of Stevens (1983), who found chunked reading materials helpful for high school readers. One possible explanation for this lies in the type of directions given to students before the test.

In Stevens' study, the regular classroom teacher gave examples of chunked and nonchunked materials on the board and discussed the importance of reading in phrases; moreover, students read some wrongly phrased examples to show the importance of proper phrasing. Students were told that slash lines in the material they would read divided the material into thought units and that if they could use these to organize their thought, their comprehension would improve. Then a sample paragraph with slash lines was discussed. The whole lesson before doing the real test took ten to fifteen minutes.

In this study, however, subjects were not told the function of extra spaces between phrases and were not encouraged to use them to organize their thoughts in order to enhance comprehension. They were only given a short paragraph with three sentences as an example of the chunked
mode to compare with the regular mode. These differences in presenting directions in the two studies may have been partially responsible for the results. Since subjects in Stevens' study were told that the slashes would enable them to perform better, they may well have tried harder on the slashed passages.

Another possible reason for the failure of chunking to improve comprehension in the present study could be due to too many short phrases in the chunked passages. For example, "City firefighters will be conducting a survey of house numbers in the city next week" (phrasing used in sample test, passage II) could be phrased as "City firefighters will be conducting a survey of house numbers in the city next week." Syntactically, the chunks in the first version are well grouped, but semantically several of them can be read together. Thus, some subjects who were able to read two or three phrases together may have been disturbed by the three extra spaces which had been inserted to show them the phrase boundaries and to tell them where to stop in order to organize their reading in thought units. (This problem was confirmed in interviews with some of the subjects after the test.)

Goodman (1970) provides a theory which may help to explain why the extra spaces apparently decreased some subjects' comprehension. He notes that reading is a
selective process involving partial use of available language cues (graphic, semantic and syntactic) which are selected from perceptual input on the basis of readers' expectations. As readers process the partial information, they hypothesize about what is to follow. These hypotheses are confirmed, rejected or refined as reading progresses. Therefore, efficient reading does not require accurate perception and identification of all elements but requires skill "in selecting the fewest, most productive cues necessary to produce guesses which are right the first time" (p. 108). Therefore, in this study, too many short phrases in chunked passages which can be semantically read together may have hindered efficient ESL readers in making predictions, sampling the material, and confirming their guesses.

Although this study does not show that chunking improves comprehension for ESL readers in general, it does suggest that younger students benefit more from chunking than older students. (In fact, older students, on the average, perform worse with chunking than without.) One reason for this may be that younger students are relatively open-minded in accepting a novel way of presenting passages and less resistant to using chunking as an aid than older subjects, who may be more close-minded and less tolerant of the untraditional. However, it should be remembered that
even though the portion of the variation in the difference scores which is explained by the factor of age is statistically significant, it is relatively small (11%). Obviously, other factors such as students' feelings about the test and motivation in trying the new format are involved.

The evidence in Table 11 suggests that there is a weak relationship between proficiency in ESL reading and the effects of chunking, readers with lower proficiency appearing to benefit from chunking. This finding corroborates work by Carver who showed that preorganizing material into meaningful chunks does not improve the comprehension of mature readers. However, this trend must be interpreted with care because of the nature of the MEPT. This test has three sections, the last of which is reading. The sections are not timed separately; as a result, students who do not complete the test usually leave answers blank (or guess) in the reading section and thus fail to provide an accurate measure of their reading ability. While we can assume that students who got high MEPT reading scores are good readers, we do not know whether students who got lower reading scores are poor readers or good readers who merely ran out of time before finishing that section. Therefore, the relationship suggested here requires further investigation with better methods of testing reading
proficiency before a definitive statement about it can be made.
IMPLICATIONS AND CONCLUSIONS

In summary, this study shows that the effect of chunking on comprehension was limited. Overall, for these subjects, chunking did not increase comprehension. However, when age of subjects was considered, a small but significant effect was noted, that is, young subjects benefited more from chunking than older subjects. A second trend shown here was a relationship between level of reading proficiency and the effect of chunking. However, for reasons noted in the previous section, this trend requires further study.

Despite the fact that few positive results were obtained in this study, there are several interesting questions related to it that merit further attention:

1. The subjects here were not given any practice in how to use chunked passages. Perhaps if they had received more instruction in using phrases to organize their thoughts and more time to try the new method of reading, their comprehension would have improved.

2. This study showed chunking to be more beneficial to the younger subjects tested; however, it only dealt with adults from 17 to 43 years. Further research is needed to discover whether this effect extends to elementary and high school students.

3. In this study, subjects were provided with pre-chunked
material in order to help them divide text into meaningful phrases. Although this technique did not produce marked success, other methods of accomplishing this goal should be investigated.

One place to provide some answers to these questions might be within traditional reading programs in which other reading skills such as developing vocabulary strategies, scanning to locate specific information, and skimming for main idea are being taught. Into such a program, a classroom teacher can introduce activities which are designed to help students to read in larger meaningful units. Given the findings of this study, it seems that this approach would be more helpful for young low level students -- elementary or high school.

Possible activities include the following:

1. For teaching new words, a classroom teacher may present new words, not in isolation, but in phrases or sentences. For example, in teaching beginners or low level students the target word "talk," teachers can use phrases such as "talk business," "talk to me," or "talk sense."

2. Comprehension questions can be used to turn attention to phrases, and oral questions during a group reading lesson can emphasize phrase answers (from Harris and Sipay, 1980). Comprehension questions in written form
can also require answers in meaningful phrase form rather than as single key words.

3. Teachers can read a sentence orally with somewhat exaggerated phrasing and then ask children to imitate their reading of the sentence. Students can read aloud printed material where the phrases have been marked by the teacher by means of vertical lines, underlining, parentheses, blank spaces, or placing one thought unit per line.

4. Teachers can help students transfer their oral language to reading. They may point out that suprasegmental cues provided by the speaker aid the listener, but that readers must phrase for themselves. Recordings of radio or TV newscasts may be played to illustrate pauses between sets of words which provide meaning for the listener. Students can read short passages which are marked for phrase boundaries while listening to a recording of native speakers reading the passages.

5. Different methods of chunking a given passage can be presented for class discussion in which students comment on how meaning may be lost or twisted by improper phrasing.

6. The classroom teacher may ask students to mark off their own phrase units in printed material in order to indicate whether they understand how to group words for
themselves in reading. Recorded passages may be played and students asked to mark phrase boundaries on typed transcripts of what they hear. This may also indicate whether students are obtaining the meaning through suprasegmental cues.

The effectiveness of such activities needs to be further evaluated. Although this study has failed to confirm that the simple device of pre-chunked reading material helps ESL students comprehend better, it may be that other methods will prove to be more helpful for students who need to do a majority of their reading in English.
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My special appreciation goes to my parents and my husband for their patience and constant encouragement.
APPENDIX A: SAMPLE TEST
INFORMATION SHEET

Subject

First Language

Country

Age

Sex

Level
Directions

In the following reading practice you will find six passages. Three of them are presented in regular paragraph form. The other three are presented in phrases; that is, one to five words are put together to express a single thought. Extra spaces are put between phrases to show phrase boundaries. For example:

The explosion was horrible that tragic day in Cleveland, Ohio, in 1916. Thirty-two men were trapped in a tunnel 250 feet below Lake Erie. No one could enter the smoked-filled tunnel to rescue survivors.

There are four multiple-choice questions after each passage. You must read each passage and answer its questions in the time allowed. I will tell you how much time you have for each passage before you begin working on it.

When I tell you to begin a passage, read it as quickly as you can and then choose the best answer to each of its question. You may work on that passage until I tell you to stop. If you finish before I say "stop," sit quietly. DO NOT WORK ON OTHER PASSAGES.
"Cool" items have become popular, and the mercury is expected to climb above the 100 degrees' Fahrenheit mark for the seventh straight day. Merchants are reporting a steady rise in the sale of ice, soft drinks, and air conditioners. Ice plant owners who have been in the business for over thirty years say they have never seen anything like it. A major chain store manager said she has customers for all the air conditioners she can manage to acquire. Soft-drink vending machine owners have their employees working overtime.

No relief from the unusually hot weather is forecast before the weekend.
Circle the letter of the best answer to each question. You may look back at the passage if necessary.

1. Soft-drink vending machine employees  
   a. think it is too hot to work.  
   b. are working after the usual hours.  
   c. have been working for over thirty years.  
   d. are reporting a steady rise in sales.

2. When is the hot weather likely to end?  
   a. during the week  
   b. before the weekend  
   c. not before the weekend  
   d. on the seventh day of 100 degree weather

3. The "cool" items in the story do not refer to  
   a. ice  
   b. vending machines  
   c. air conditioners  
   d. Coca cola

4. The main idea of this article is:  
   a. The hot weather will continue for seven days.  
   b. Rain is expected to end the heat.  
   c. "Cool" items are selling well during the hot weather.  
   d. Merchants are suffering from the hot weather.

STOP

Do not work on any other passage of the test.
City firefighters will be conducting a survey of house numbers in the city next week. The placement of house numbers should be uniform to help fire and police personnel locate the correct house quickly when responding to emergency calls. All even numbers should be on the same side of the street, and all odd numbers should be on the opposite side. Making addresses easier to read is part of the city's new crime prevention program.

The city will provide numbers for unmarked houses at the owners' request. If an owner is not able to install the numbers, the firefighters will make the installation.

GO ON TO THE QUESTIONS
Circle the letter of the best answer to each question. You may look back at the passage if necessary.

1. Firefighters will install house numbers
   a. if the house is on the even side of the street.
   b. if there is an emergency call to the house.
   c. if the police request that the house be marked.
   d. if the owners are not able to do it themselves.

2. What will probably happen first, according to this story?
   a. The city will provide numbers for unmarked houses.
   b. Firefighters will install numbers, if needed.
   c. A new fire prevention program will be discussed.
   d. Firefighters will conduct a survey of house numbers.

3. The word uniform in the second sentence means
   a. following a pattern
   b. easy
   c. military clothing
   d. varying in form

4. The main idea of this article is:
   a. Firefighters will install the house numbers.
   b. House numbers in the city will be made uniform.
   c. A crime prevention program will be set up.
   d. Uniform house numbers will prevent mail mix-ups.

STOP
Do not work on any other passage of the test
A beaver's home, called a lodge, always has a flooded lower room. These homes are built in large ponds or streams. Mud and sticks are the main building materials. One room is built above the water level and another room is located under water. The only way a beaver can get into the house is to submerge and enter through an opening in the flooded room. This room serves two purposes: a storage area and a sanctuary from enemies.

Occasionally the lower room becomes dry because the beaver's dam has been destroyed. This energetic animal has to quickly repair the dam or begin building a new home in another place.
Circle the letter of the best answer to each question. You may look back at the passage if necessary.

1. The beaver does not use the flooded room to
   a. hide from attackers.  
   b. fight with enemies.  
   c. store up food.  
   d. go into his lodge.

2. If the dam is broken, the beaver might
   a. move to higher ground.  
   b. get help from other beavers.  
   c. move to the upper room.  
   d. build a new lodge.

3. Which of the following is characteristic of a beaver's home?
   a. A beaver's home contains earth and stones.  
   b. A beaver's upper room is used as a store room.  
   c. A beaver's home has an opening under water.  
   d. A beaver's lower room is always kept dry.

4. The word sanctuary in "a sanctuary from enemies" means
   a. sacred place  
   b. place of safety  
   c. forbidden area  
   d. frontier

STOP

Do not work on any other passage of the test
Many wild creatures that travel with their own kind know by instinct how to protect the group. One of them acts as a sentinel.

Once while I was hiding by the branches of a low-hanging tree, I watched two white-tailed deer feeding in a meadow. At first, my interest was held by their beauty. But soon I noticed something which was quite unusual: they were taking turns at feeding.

One deer was calmly cropping grass, unafraid and at ease. The other, a sentinel, stood guard against enemies. The guard deer watched every movement and used its sensitive nostrils to "feel" the air. Not for a moment, during the half hour I spied upon them, did they stop their teamwork.
Circle the letter of the best answer to each question. You may look back at the passage if necessary.

1. The author was surprised by
   a. the beauty of the white-tailed deer.
   b. the calmness of the deer eating the grass.
   c. the organized cooperation of the deer.
   d. the sensibility of the deer to feel the air.

2. One deer was eating at ease and not afraid because
   a. it had a sensitive nose to feel danger.
   b. it had a partner watching for an enemy.
   c. it acted as a sentinel in the meadow.
   d. it hid itself by the branches of a tree.

3. Which of the following is not characteristic of the deer's teamwork?
   a. They are safe from danger every minute.
   b. They protect each other without training.
   c. They take turns "feeling" for danger.
   d. They both eat when everything is quiet.

4. The word spied in the last sentence means
   a. ate
   b. frightened
   c. guarded
   d. watched

STOP

Do not work on any other passage of the test.
As the Michaud family entered the village of Shimshal, the villagers abandoned their work and ran to welcome the travelers. They were the first Europeans the people of Shimshal had seen in twenty-seven years!

Shimshal, situated at an altitude of 10,000 feet, is the most remote village in Hunza. Located near a junction between China, the Soviet Union, Afghanistan, Pakistan and India, Hunza rests among the steep towers and deep gorges of the mountains.

The Michauds' journey took place in the spring of the year, so the danger of avalanches was always present. To reach Shimshal the party picked their way along the mountain ledges with painstaking care. Along the difficult trail lay several obstacles. For example, a suspension bridge consisting of stretched cables for handrails and planks for a footpath provided the only way to cross a dangerous river.

Shimshal has 5,000 to 6,000 inhabitants. Despite the fact that by Western standards these people are quite poor, the Michauds found them to be most generous and hospitable. They are a solid people living a life consisting of vigorous physical exercise, an adequate nutritional diet, and freedom from emotional stress. It is purported that many of them live to be as old as a century or more, thus attracting the attention of the
outside world. Studies have been done to analyze the life-style of the Hunzakuts in an attempt to understand the secrets of longevity.

Their diet, consisting primarily of whole grains and fresh fruits, is of particular interest to the outside world. Because fuel is scarce, the food is minimally cooked and therefore maintains most of its nutritional value. Meat is rarely included in the diet because of limited pasture land. The Hunzakuts' steady nature is often attributed to dietary habits. At the turn of the century, a famous physician of British India wrote: "Their nerves are as solid as cables and sensitive as the strings of a violin."

GO ON TO THE QUESTIONS
Circle the letter of the best answer to each question. You may look back at the passage if necessary.

1. The Michauds probably traveled to Shimshal
   a. to learn about the life-style of the Hunzakuts.
   b. to explore the high mountains of that region.
   c. to build suspension bridges across the rivers.
   d. to establish better relationships among the countries in that region.

2. The Michauds' journey to Shimshal was hard because
   a. the Michaud family did not bring enough food to eat.
   b. the Michaud family encountered a heavy amount of snow.
   c. the village of Shimshal is located at a high altitude.
   d. wild animals attacked the Michaud family several times.

3. Which of the following is not true of the Hunzakut's eating habits?
   a. they eat little meat.
   b. they cook their food a long time.
   c. they eat large amounts of whole grains.
   d. their diet is nutritionally balanced.

4. Which of the following is not true about the Hunzakuts?
   a. They have few luxuries in their homes.
   b. Their life-style includes a lot of physical activity.
   c. They share their food with strangers.
   d. They have a lot of emotional stress.

STOP
Do not work on any other passage of the test
A young Pygmy stood in the parching equatorial African sun. He stood but five feet tall and his stature was bent from hard labor. His skin was golden brown and his hair was short and curled tightly to his head. His feet were bare and his clothes tattered. His eyes had the dull stare of a man once proud and free, but now deprived of the will to maintain his own gentle life-style.

The Pygmies are central Africa's oldest known surviving people and in the 1930s about 35,000 proudly lived in the Itiru Forest of the eastern Congo, now called Zaire. By 1957 their population had fallen to 25,000.

During the 1950s, the Pygmies' ancestral forest was wastefully chopped down by lumber industrialists, robbing them of the vegetation and game they depended upon for survival. Consequently, the people were forced into the blistering sun to which they were unaccustomed. Large plantations closed in on their environment. National parks and game reserves were established, but no land was set aside to aid the Pygmy societies in their struggle for survival. Tourists brought contagious diseases to which the Pygmies had no immunity, and as a result their population continued to decline.
In 1960 the Belgian Congo received political independence, becoming the nation of Zaire. This political change brought civil war for which the nonaggressive Pygmies were the first to suffer and their number rapidly dwindled to 15,000. They became victims of new burdens such as paying income taxes, being drafted into the Zaire army, continuing to lose their cultural identity, and by 1975 having their number shrink to some 3,800.

The Pygmies have a warm and gentle life-style with a dignified moral code which forbids killing, lying, stealing, devil worship, sorcery, disrespect for elders, and blasphemy. They do not engage in cannibalism, mutilation, ritual murder, intertribal war, initiation ordeals, or other cruel customs sometimes associated with equatorial Africa.

GO ON TO THE QUESTIONS
Circle the letter of the best answer to each question. You may look back at the passage if necessary.

1. The main idea of the story is
   a. We should try to save the lives of the Pygmies.
   b. The Pygmy tribe is becoming smaller and smaller.
   c. The Pygmies have a warm and gentle life-style.
   d. The Pygmy tribe is a hard-working group.

2. The young Pygmy described in the first paragraph
   a. had long golden hair.
   b. wore nice clothes.
   c. was able to keep his life-style.
   d. was only five feet tall.

3. Which of the following did not cause the number of the Pygmies to decline?
   a. the lack of land to hunt on.
   b. civil war in the Belgian Congo.
   c. killing of tribe members in ritual murder.
   d. diseases introduced into the Congo.

4. Which of the following was characteristic of the Pygmies?
   a. They stole horses when necessary.
   b. They worshiped evil spirits once in a while.
   c. Their main occupation was farming.
   d. They took care of their old people.

STOP
Do not work on any other passage of the test
APPENDIX B: EIGHT COMBINATIONS
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