Multiple regression was used to examine the relationship between the serial position and the rated importance of a proposition in a text and the probability of its appearance in free recall protocols. Eight passages were used in the study—four from a standard social studies textbook and four written for the study. Each passage was divided into propositions, where a proposition was a clause or phrase expressing an idea for the first time in the text. A group of 110 sixth grade students read the passages and rated each proposition for its importance to the passage. Another group of approximately 60 sixth grade students then read and recalled the passages by stating their main ideas. Results showed that both rated importance and position predicted recall. In addition, the quadratic of serial position was a significant predictor indicating a recency effect. Neither the interaction term nor the quadratic of importance was significant, nor was there a significant correlation between importance and the linear or quadratic of position. (FL)
Technical Report No. 219

SERIAL POSITION AND RATED IMPORTANCE IN THE RECALL OF TEXT

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September 1981

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The research reported herein was supported in part by the National Institute of Education under Contract No. HEW-NIE-C-400-76-0116.
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Abstract

Multiple regression was used to examine the relationship between the serial position and the rated importance of a proposition and the probability of its appearance in free recall protocols. A total of eight passages were each read and recalled by about 60 sixth-grade students. It was found that both rated importance and position predict recall. In addition, the quadratic of serial position is a significant predictor, indicating a recency effect. Neither the interaction term nor the quadratic of importance were significant, nor was there a significant correlation between importance and the linear or quadratic of position. Texts showing strong effects are discussed in some detail.
A consistent finding in studies of list memory has been the greater recallability of words appearing early and late in the lists (e.g., Glanzer & Cunitz, 1966). The study of serial position effects in the recall of coherent text has not yielded such consistent results. Some researchers (e.g., Deese & Kaufman, 1957; Rubin, 1978) have found clear primacy and recency effects in prose retention measures. Others (e.g., Frase, 1969; Meyer & McConkie, 1973; Rubin, 1977) have presented evidence for a primacy effect, but not for the enhanced recallability of late-appearing propositions, while some studies (e.g., Richardson & Voss, 1960) have found no relation between serial position and recall of text.

Why have these discrepant results been found? Meyer and McConkie (1973) argued that the height of a proposition in the logical or ideational structure of a passage critically affects the probability of a proposition's appearance in a recall protocol. Authors tend to put higher-order information, it is argued, at the beginnings and ends of passages as introductions and conclusions—hence, the advantage of early- and late-appearing propositions. In this account, primacy and recency might be thought of as somewhat misleading terms in that they suggest that the temporal
arrangement of the proposition is of itself not responsible for the effect. There is some research supporting this account. Cirilo and Foss (1980) have found that subjects spend more time reading early-appearing propositions in general, but that highly important propositions which appear late in a passage also tended to be associated with a disproportionately large amount of reading time. It may be that readers expect and need more higher-order information early in a text, but late in a text, having developed notions of what is and is not important in the particular discourse, modify their allocation of time and effort accordingly.

It has been consistently demonstrated in prose research that there is a positive relation between the importance of an element in the text and the probability of that element's being recalled (Gomulicki, 1956; Johnson, 1970). Elements in text can derive importance from a number of sources. A reader's background knowledge and perspective while reading serve to highlight particular elements and increase their memorability (Pichert & Anderson, 1977; Steffensen, Jogdeo, & Anderson, 1978). An element occupies a particular position in the logical hierarchy of ideas in a text. Elements high in the hierarchy are perceived as important and are more likely to be recalled (Meyer & McConkie, 1973; Meyer, 1975). Authors can signal important elements with underlinings, headings, etc., resulting again in increased probability of recall (Rothkopf & Bisbicos, 1967). There is also a category of elements that might be
called "generically important." These would include elements relating to death, danger, romance, power, and information personally related to the reader (Schenk, Note 1).

Essentially, this study addresses three questions: (a) Are there reliable serial position effects over many recall protocols based on a large number of wide variety of texts? (b) Are both primacy and recency effects evident? (c) Are these effects "washed out" by consideration of the importance of the propositions in the text?

The data to be reported here arises from a compilation of findings from three experiments reported separately elsewhere (Freebody & Anderson, 1981, and in press). Materials and scoring procedures are described more fully in these reports.

Method

Subjects

In total, 228 sixth-grade students from a small city in central Illinois participated in the study. As assessed by nationally normed achievement tests, these students were, on the average, one-half of one standard deviation above the mean achievement level.

Materials

Eight passages of about 250-300 words each were used in this study. Four were adapted from the Scott Foresman Social Studies program for Grade 6. Four were written for the study in a similar vein and of the same length as the social studies passages. Students read
either three \( n = 146 \) or two \( n = 82 \) of these passages, such that on the average each passage was read by about 62 students. These passages appeared with varying degrees of vocabulary difficulty. Any given passage appeared either with mostly high-frequency words (according to Carroll, Davies, & Richman, 1971) or alternately with 1 in 4 substance words replaced by low-frequency synonyms. These vocabulary manipulations were the focus of our earlier reported studies, and serve to enhance the generality of any effects in evidence in this analysis.

**Importance Ratings**

In all, 110 sixth-grade students of comparable ability to the main sample each read two of the passages and rated each proposition for its importance in the passage. Between 19 and 22 students rated propositions in each passage. A three-point rating scale was used. The students read each passage in normal text format, then read the propositions typed on separate lines. Next to the propositions were three boxes: a large, a medium-sized, and a small box, indicating high, moderate, and low importance. Students were instructed to read the story carefully, then turn the page over and judge whether each separate idea from the story was very important, "sort of" important, or not at all important. These data were scored by awarding to each proposition a score of 3 for a judgment of high importance, 2 for moderate importance, and 1 for low importance.
These were summed across all subjects, and the propositions were assigned a mean importance rating. It should be emphasized that the subjects who rated the propositions were not later involved in reading and recalling the passages.

Procedure

After reading each passage, subjects were asked to complete a number of tasks. Immediately after reading, they were presented with a multiple-choice vocabulary item not related to the passages. This acted simply as an interval filler to minimize rote recall of words appearing late in the passage. Subjects were then asked to freely recall the passage. The instructions indicated that they should use the exact words that were in the passage, or if they could not remember these, to use their own words to express as many of the ideas they could remember. These instructions were typed at the head of a blank page. Having completed their recalls, the subjects were asked to write on the following page a 2-3 sentence summary of the main ideas in the passage. Following this, a 13-item sentence verification test was completed by each student. Neither the summarization or verification data are discussed in this paper.

This entire procedure was repeated after each passage. It was emphasized that the students could read the passage more than once, but having turned to the filler item, they could not look back at the passage.
The students were tested in their intact classroom groups during their reading periods. The purposes of the study were explained to them at the outset of the sessions. The students worked at their own rates, and consequently, there was some variation in completion times.

The passages were divided into propositions, where a proposition was a clause or phrase expressing a separable idea for the first time in the text. For the free recall measure, students were awarded a score when the gist of a proposition was recalled. As reported in Freebody and Anderson (1981) inter-judge reliability on a sample of 94 protocols was .96. Since the passages range from 32 to 45 propositions in length (mean = 41.1), serial position was equated across passages by use of percentile position scores.

Results and Discussion

Data for all passages were combined in a regression analysis with proportion recalled as the criterion variable. The quadratic forms of serial position and importance rating were also entered as predictors to check on curvilinearity. Correlations among these variables indicated that both serial position and its quadratic were orthogonal to importance rating (r pos/import = .006, z = .13; r pos squared/import = .013, z = .26). Linear main effects were entered into the equation first, then their interaction, then the quadratic terms.
The results of the analysis are summarized in Table 1. It can be seen that importance, position, and the quadratic of position predict significant portions of the variance. Simple correlations indicate that importance is positively related to probability of recall ($r = .191$), while position is negatively related ($r = -.214$). It is of note that these contribute independently to the prediction.

In order to clarify the relationship between serial position and recall, the best-fitting equation was found for probability of recall regressed on position and then position-squared. The equation was then solved for 10-point intervals of the percentile position scale. The resulting relationship is presented in Figure 1. It can be seen that there is a strong predicted primacy effect and a moderate but significant recency effect. While the amount of variance accounted for is not great, the effect may be thought to be stable and generalizable due to the large number of subjects, propositions, passages, and experimental conditions in which they appeared.

It was decided to examine the pattern for each passage and to analyze informally any interesting correspondences. Only two of the analyses of individual passages showed significant effects for the quadratic component. Trends toward significance appeared in two other passages. The linear component was significant for five of the passages, with a trend in one other. Since each $F$ value was based on one degree of freedom in the numerator, an effect-size
Position, Importance, and Text Recall

Table 1
Partitioning of Variance and Significance Tests for Predictors of a Proposition's Appearance in Recall Protocols

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Percentage of Variance</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position</td>
<td>1</td>
<td>4.57</td>
<td>20.66**</td>
</tr>
<tr>
<td>Importance</td>
<td>1</td>
<td>3.70</td>
<td>16.73**</td>
</tr>
<tr>
<td>Position x Importance</td>
<td>1</td>
<td>.25</td>
<td>1.13</td>
</tr>
<tr>
<td>(Position)^2</td>
<td>1</td>
<td>1.74</td>
<td>7.87**</td>
</tr>
<tr>
<td>(Importance)^2</td>
<td>1</td>
<td>.16</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Error</td>
<td>405</td>
<td>89.58</td>
<td></td>
</tr>
</tbody>
</table>

**p < .01
Figure 1. Predicted recall of propositions related to percentile serial position.
analysis was carried out, whereby the effect size for each passage for both position and its quadratic was taken as the square root of F. These were then averaged over the passages, and a mean effect size was obtained (after Glass, 1978). This can be interpreted as the size, in standard deviation units, due to the effect. For position, the mean effect size was 1.86 (SD = 1.49), and for the quadratic of position, the mean effect size was 1.22 (SD = 1.05).

Those passages showing a strong quadratic effect were examined. The predicted relationships for these two passages are shown in Figures 2 and 3, respectively. For both passages, the overall variance accounted for by the linear and quadratic terms was significant ("Trade Laws," $R^2 = .226, p < .02$; "Huta," $R^2 = .396, p < .01$).

Thus, a strong recency and primacy effect operated for both of these passages. Also, the upward curve comes late in both cases. The next-to-last paragraph in "Trade Laws" is a continuing description of the reasons for tariffs. The last paragraph is a one-sentence conclusion in figurative language. Thus, it might have mnemonic value due to its structural significance as a conclusion or encapsulation and to its possible imagery value, as well as its position. Inspection of the data indicates that the proposition—"a tariff is like a fence between countries"—was recalled by an atypically large proportion of the students (.236). For "The Huta Game," interpretations of the pattern are not so evident. The concluding section mentions the fact that there were large contests and that
Figure 2. Predicted recall of propositions in "Trade Laws" related to serial position.
Figure 3. Predicted recall of propositions in "Huta" related to serial position.
the Indians would often play "dressed only in chaps and shirts," since the sun and the game kept them warm. The fact that there were contests was well recalled, but the detail concerning attire was recalled by a far greater proportion (.295). This information seems insignificant in the ideational structure of the passage.

Various factors may be operating in the advantage of early and late appearing propositions in the overall analysis. It has been the function of this study to demonstrate, over a very large number of propositions, appearing in a variety of passages and textual conditions, that early and, to a lesser but significant extent, later propositions are better recalled. It has also been shown that the rated importance of a proposition predicts probability of recall independently of its serial position.
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