

# Errors versus correct responses in the serial learning of word lists<sup>1</sup>

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*Using percent error as the dependent variable in serial anticipation learning of 15-word lists, no difference in the serial position curve was found for lists of high or low approximation to sentence word-order. When percent correct responses were examined, high approximation lists produced a flatter curve.*

When plotted in terms of percent of total errors, the shape of the serial position error distribution obtained in serial learning has been shown to be invariant with several manipulations of the learning situation (McCrary & Hunter, 1953). Although the approximation to sentence word-order of a list of words has been shown to be a powerful determinant of task difficulty (e.g., Miller & Selfridge, 1950), the influence of this variable upon the serial position effect has not been fully investigated.

One recent attempt (Simpson, 1965) to examine the distribution of errors in learning serial lists of varying approximation to sentence word-order found no evidence for change in the serial position effect. However, that research suffered from an inadequate number of representatives of high approximation lists thereby rendering the precise shape of the serial position curve for these lists somewhat unclear. The present research was designed to provide a better estimate of these effects.

Jensen (1962) has suggested that, given the situation where experimental treatments produce different proportions of total errors (total errors/total responses), coincidental serial position error curves for two treatments will not be accompanied by coincidental serial position *correct* curves for the same treatments. Therefore the present experiment also examined the possibility that absence of a differential serial position effect with changing sentence approximation (Simpson, 1965) might reflect the particular dependent variable (errors) chosen.

Also of interest was an attempt to replicate the earlier findings that grammatical class of a word influences its difficulty and that these grammatical class differences depend upon the sentence-approximation level of the list within which the words occur, being greater with higher approximation lists.

## Method

Eight 15-word sentences (Condition H) were constructed from previous word lists (Simpson, 1965). The number of grammatical class representatives in each sentence was not equated as in the earlier study.

However, at least one representative of each class (noun, adjective, verb, adverb, function word) did occur in each sentence. Summing over the eight lists, the numbers of representatives of each class used were (in the above order): 25, 27, 20, 22, 26. An attempt was made to balance grammatical class across the 15 serial positions. Low approximation (Condition L) lists were constructed by rearranging the Condition H lists according to two rows of a randomized 15 by 15 Latin square.

The Ss were students in introductory psychology at the University of Wisconsin. Three randomly ordered replications of the experimental design (2 approximation levels by 8 lists) were run, for a total of 48 Ss.

Before learning the word list, S learned a practice list of 2-digit numbers. Stimuli were presented one at a time at a 2-sec. rate by an externally timed Kodak Carousel slide projector. The S was instructed to anticipate as many words correctly as possible, guessing when uncertain. There was a 20-sec. rest interval between trials. A green slide at the end of the rest interval indicated the beginning of the list. When S had correctly anticipated all of the words on one trial, the session was terminated.

## Results and Discussion

The serial position error distribution for each S was transformed to percent (of S's total errors) values and the mean curves for Conditions H and L are shown in Fig. 1a. Both curves have a bowed, skewed shape although the Condition H curve appears somewhat more flat. Analysis of variance failed to differentiate the two curves ( $F < 1$ ,  $df = 14/644$ ). The curves appear consistent in shape with those from the 30-word lists of the earlier study (Simpson, 1965) and support the earlier finding of no influence of approximation level upon the serial position effect.

The proportions of total errors committed were .25 for Condition H and .39 for Condition L. In this situation the Jensen (1962) analysis would predict that, in spite of the lack of difference in the *error* curves, plotting *correct* responses should produce a more bowed curve for Condition L. Percent correct serial position curves are shown in Fig. 1b. Analysis of variance indicated a reliable interaction Serial Position by Approximation Level ( $F = 3.60$ ,  $df = 14/644$ ,  $p < .01$ ). The Condition L curve is more bowed than the Condition H curve. The choice of dependent variable (errors vs. correct responses) is thus indeed a determinant of whether or not serial position distributions

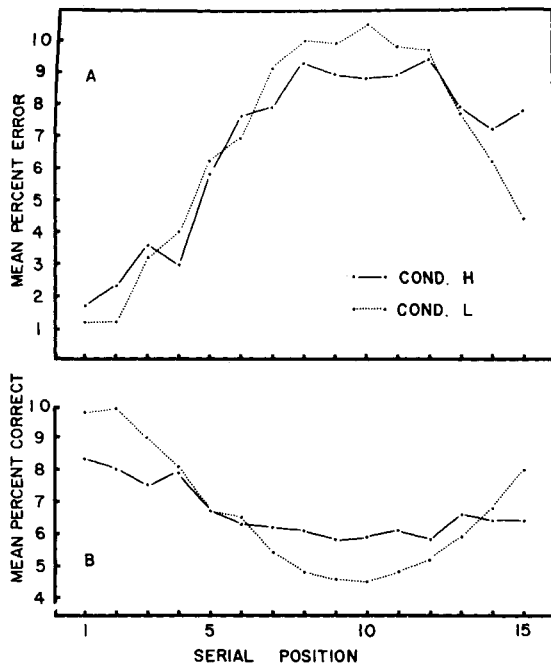


Fig. 1. Mean percent error (a) and correct (b) at each serial position for high (H) and low (L) sentence-word-order approximations.

from these treatments are seen as coincidental or different. When considered in terms of percent correct responses, the difficulty of learning the various serial positions in a list is relatively uniform for lists of high approximation to sentence word-order; for low

approximation lists these various serial positions are highly different in difficulty. Considered in terms of percent error, the serial position distribution is not affected by approximation level.

The mean errors for each grammatical class were also computed. The order of classes and means were; noun (2.4), verb (2.8), function word (3.0), adjective (3.2), adverb (3.4). This difference failed to reach significance at the .01 level ( $F = 2.62$ ,  $df = 4/128$ ) although a Duncan Range Test suggested a reliable difference between nouns and adverbs, consistent with the earlier study (Simpson, 1965). In contrast with the previous findings, there was no change in the relative difficulty of grammatical classes for Condition H and Condition L ( $F < 1$ ,  $df = 4/128$ ). Thus, although it does not approach the potency observed in the learning of longer (30-word) lists, grammatical class remains a minor variable in the serial learning of 15-word lists.

### References

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### Note

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