Immediate serial recall of mixed letter strings¹

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This study examined the immediate serial recall of letter strings composed of a mix of high and low frequency consonants, for high and low digram storage Ss. The results clearly showed that high digram storage Ss show superior recall to low digram storage Ss for mixed letter strings and that systematic proactive and retroactive effects on recall performance occur with such mixed letter strings.

In a recent study (Mayzner & Tresselt, 1967) high and low digram storage Ss, as assessed by means of a skeleton-word digram ranking test (Mayzner & Tresselt, 1962; Tresselt & Mayzner, 1966), were presented with letter strings that varied in their single-letter and digram frequencies, with the results showing superior recall for the high digram storage Ss for all types of letter strings examined. In the present study high and low digram storage Ss again are presented with letter strings and asked for their immediate serial recall. However, in contrast with previous studies in which the letter strings were composed entirely of either high frequency or low frequency consonants (Mayzner & Schoenberg, 1964; Mayzner & Tresselt, 1967), the present study employs mixed strings, in which the same letter string contains both high and low frequency consonants. Also, the serial position of these high and low frequency consonants are varied systematically in order to provide a preliminary assessment of proactive and retroactive influences of high and low frequency elements within the same letter strings.

Method

One hundred students in introductory psychology classes at NYU were administered the skeleton-word digram ranking test (Tresselt & Mayzner, 1966) and 50 Ss, a high digram storage group (HS) with scores ranging from 17 to 27 ($N = 25$) and a low digram storage group (LS) with scores ranging from 7 to 17 ($N = 25$), were selected for the presentation of 16 letter strings. These strings were composed of a mixture of high frequency (C, D, F, H, L, N, R, S, and T) and low frequency (B, G, J, K, P, Q, V, X, and Z) consonants, as given in the single-letter frequency counts of Underwood & Schulz (1960). Sixteen strings were selected to yield two examples for eight different types of mixed string variations. Eight strings were composed of a mix of three high frequency letters and six low frequency letters (3H6L) and eight strings were composed of a mix of three low frequency letters and six high frequency letters (3L6H). The three high or low frequency letters always occurred immediately next to one another, but as a group occupied serial positions 1-3, 3-5, 5-7, or 7-9. The

16 letter strings examined were as follows (with the three high or low frequency letters underlined here to show the reader their serial position in the strings): 3H6L—(1) DTFQBZVJX, (2) SRHVXPZQJ, (3) XQLCNPZVK, (4) BZTNRQKQJ, (5) BKGVFDHZQ, (6) GZXQLCSJP, (7) VPJQXZTDF, (8) ZKQBGJHLR; 3L6H—(1) BKGDTFSRH, (2) ZJQLRHDTG, (3) TNPXV-RFDH, (4) DFZJQCSNR, (5) CNFSVBGDH, (6) SDC-NPKXHL, (7) LCFHDTXQB, (8) TFDNRHKZV. Since previous studies (Mayzner & Schoenberg, 1964; Mayzner & Tresselt, 1967) had shown sequential digram frequencies influenced recall performance, the 16 letter strings were ordered so as to yield sequential digram frequency values of zero or very close to zero.

Each of the 16 letter strings, each nine letters in length and each typed on a 3 x 5 in. card in a single horizontal line, were displayed to S for 6 sec. and S was then given 10 sec. to write the letters down. Each S received the 16 strings in a different random order and for each recall, S was given a blank card with nine dashes on it and was told to write down the letters he could recall in their correct position and sequence.

Results and Discussion

Since the 16 letter strings were composed of a mix of high and low frequency consonants (i.e., 3H6L or 3L6H) and the 3H and 3L groupings occupied serial positions 1-3, 3-5, 5-7, and 7-9, percent correct recall was calculated separately for all of these combinations, also taking into account the high and low digram storage conditions (i.e., HS and LS). The results of this analysis are presented in Figs. 1 and 2. Thus, Fig. 1 presents percent correct recall for 3H mixed with 6L and 3L mixed with 6H for the HS and LS groups and for serial positions 1-3, 3-5, 5-7, and 7-9 (i.e., groups HS-3H6L, LS-3H6L, HS-3L6H, and LS-3L6H). Since it was desired also to examine the proactive and retroactive effects involved in the mix of high and low frequency consonants, and since in a previous study (Mayzner & Tresselt, 1967) HS and LS groups had received unmixed strings of nine high frequency or nine low frequency consonants, equivalent percent correct recall scores were calculated treating the 9H string as if it were a 3H6H string and the 9L string as if it were a 3L6L string, taking into account equivalent serial position variations. The results of this analysis are presented also in Fig. 1 (i.e., HS-3H6H, LS-3H6H, HS-3L6L, and LS-3L6L). The results show clearly for all HS-LS comparisons that percent correct recall is greater for the HS groups than for the LS groups for both the mixed and unmixed strings and for all serial position variations, thus supporting our previous find-

ings with the storage variable (Mayzner & Tresselt, 1967). For example, for the 3H conditions HS recall is superior to LS recall for all eight possible comparisons ($p < .004$) as evaluated with the Sign Test) and identical results occur with the 3L conditions. In contrasting 3H mixed with 6H versus 3H mixed with 6L for the HS and LS groups, we find superior recall for the 3H6H combination over the 3H6L combination in seven out of the eight possible comparisons ($p < .035$), while in contrasting 3L mixed with 6L versus 3L mixed with 6H for the HS and LS groups, we find superior recall for the 3L6H combination over the 3L6L combination in seven out of the eight possible comparisons ($p < .035$).

Figure 2 presents similar analyses as Fig. 1, but for percent correct recall for the 6H and 6L components. Again the HS groups show superior recall to the LS groups on all equivalent comparisons and again the mixed strings analysis reveals equivalent trends. Also, both Figs. 1 and 2 clearly show for all conditions that percent correct recall decreases as serial position values move from 1-3 to 3-5 to 5-7 to 7-9. Overall the results suggest that the digram storage variable continues to play as an important a role with mixed

Fig. 1. % correct recall for HS and LS groups for the 3H and 3L strings as a function of serial position.

Fig. 2. % correct recall for the HS and LS groups for 6H and 6L strings as a function of serial position.

strings as it does with unmixed strings and that the percent correct recall of various letter subsets within the total letter string (i.e., 3H, 3L, 6H, and 6L) show differential proactive and retroactive variations, which warrants further systematic study.

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