

Successive recall as a measure for the unlearning effect

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The hypothesis that successive recall (SRC) facilitates recall was tested in an A-B, A-C paradigm using 10 trials of paced MMFR after two retention intervals (0 and 24 h). SRC MMFR groups were compared to conventional unpaced MMFR groups and single list controls. Recall tended to increase over SRC trials but terminal performance did not differ from unpaced MMFR.

Reduction of A-B recall in the A-B, A-C paradigm has been attributed to the unlearning of A-B during A-C acquisition. The exact mechanism of the unlearning process is in dispute (e.g., Keppel, 1968; Koppenal, 1963). Two alternative hypotheses are: (1) unlearning inhibits response emission and (2) unlearning permanently weakens the association. A more sensitive recall test than the usual MFR or MMFR might help distinguish between these two alternatives. A number of experiments have indicated that successive recall trials facilitate recall. In a single list condition Lazar & van Laer (1966) have shown that an apparent retention loss over 24 h is eliminated by repeated recall tests. If unlearning inhibits response emission, repeated recall after A-B, A-C learning should show the usual initial retention loss which should be eliminated after repeated recall. Alternately, if the association is permanently weakened there should be no recovery after repeated recall.

METHOD

Design. Two experimental groups were trained on A-B, A-C lists and were tested for retention by 10 successive paced MMFR trials, 0 (SRC 0) and 24 (SRC 24) h after acquisition. If performance improved over the 10 trials this could be attributed to the effect of longer time intervals for response or the set inducing effect of the successive recall. To differentiate these two possibilities two A-B, A-C controls, using the conventional unpaced MMFR (UPRC), were run for two retention intervals (UPRC 0, UPRC 24). In addition two single list controls were used (Con 0 and Con 24) to compare the effects of SRC in a single list condition with the effects of SRC in the unlearning conditions.

Subjects. A total of 96 experimentally naive undergraduates were randomly assigned to one of six groups in order of appearance in the laboratory with the restriction that there be 16 Ss in each group.

Materials. Two lists of 12 nonsense syllable-word pairs were constructed. The stimuli were 0-7% Glaze association value nonsense syllables, the responses were words from the Thorndike-Lorge AA classification. The stimuli were the same in both lists, the responses different. Thus the two lists bore an A-B, A-C relation to each other. The lists were counterbalanced in each condition and each list was presented in three different orders to minimize serial learning. An alternating training-test method was employed and the rate of presentation in training was at a 2 sec rate. Four sec elapsed between each training and test sequence and another 4 sec between the end of a test and the beginning of the next training sequence. The SRC and UPRC groups received six acquisition trials on List 1 followed by six acquisition trials on List 2; the single list controls received six acquisition trials on one list.

Recall Procedure. After acquisition the single list control (Con 0, Con 24) engaged in a filler task of number sorting for a time equivalent to learning a second list. The Con 0 was then given 10 successive recall trials with a no correction procedure. Each time through the list the stimulus item was presented for 2 sec and immediately repeated again for another 2 sec. Three different serial orders of the stimulus lists were used in successive recall. The Con 24 was given anti-rehearsal instructions and dismissed after the filler task. They were then given the SRC task 24 h later.

The SRC groups (SRC 0, SRC 24) were given 10 trials of MMFR. Each stimulus item was presented twice successively for 2 sec each and Ss were instructed to give both responses in any order that they came to mind. These test lists appeared in three different orders and were presented for 10 recall trials with no correction offered. The SRC 0 was given anti-rehearsal following List 2 acquisition, the SRC 24 was given anti-rehearsal instructions after List 2 acquisition and tested for recall 24 h later.

The unpaced recall groups (UPRC 0, UPRC 24) were given one MMFR test. Each stimulus was exposed and they were told to take as much time as they needed to give the responses from both lists in any order that came to mind. The UPRC 0 was tested immediately after List 2 acquisition and the UPRC 24 was tested 24 h after List 2 acquisition.

RESULTS

Since this experiment involves two experimental and four control groups and four dependent variables (recall responses in the first and last recall test in SRC for List 1 and List 2), the results are analyzed separately for each research question. This involves using some of the same comparisons in several analyses, resulting in inflated P values. Therefore, no results are considered to be significant unless the .01 level of confidence is reached.

The per cent retained as a function of recall on the last trial of OL is plotted in Fig. 1. All analyses were done on this data. The per cent retained was calculated by dividing the number of correct responses in the last acquisition trial (of List 1 or List 2 where applicable) into the number correct in the recall test.

The first analysis compared the per cent of List 1 retention for the three methods (SRC, UPRC, Control) over the two time intervals (0 vs 24 h). Only method is significant $F(1, 42) = 8.05, p < .01$. Significantly more items are retained by the control groups than the SRC and the UPRC groups, which do not differ from each other. Thus this experiment suggests (1) the presence of unlearning and (2) the efficacy of SRC in this design is due to longer response time permitted by repeated recall, by Trial 10 of

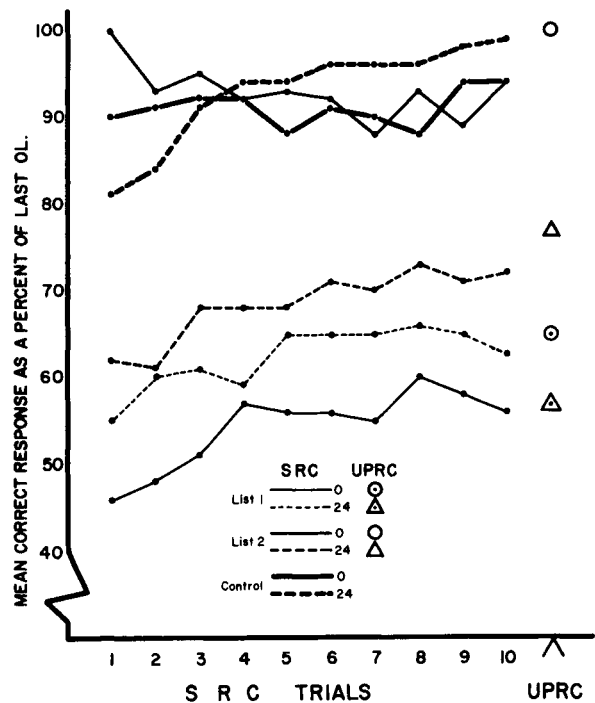


Fig. 1 Mean correct responses in recall expressed as a percentage of mean correct responses given on the last trial of original learning.

SRC, performance doesn't differ from the UPRC groups which had only one recall opportunity with extended recall time.

In a second analysis a comparison of recall Trial 1 and recall Trial 10 for groups SRC 0, SRC 24, Con 0 and Con 24 over the two retention intervals for List 1 recall yields a significant effect for trials $F(1, 60) = 29.61, p < .01$ and the interaction of method (SRC, Con), time (0, 24 h) and trials (1, 10) is also significant $F(1, 60) = 12.38, p < .01$. The increase in per cent retained in Con 24 between the first and last recall trial is about twice as much as the increase for the other conditions. Comparing the first two analyses, the results can be interpreted as suggesting that SRC is operating in the same direction regardless of whether it is counteracting ordinary forgetting or unlearning.

This interpretation is further supported by the comparison of Trial 1 and Trial 10 recall for List 1 (unlearning condition) and List 2 in 0 and 24 h SRC conditions. Significant effects were found for retention interval $F(1, 30) = 8.15, p < .01$ the per cent retained is higher for the 0 h than for 24 and for lists $F(1, 30) = 39.75, p < .01$, List 2 recall is significantly better than List 1 recall. The triple interaction of time, (0, 24), Lists (1, 2) and Trials (1, 10) is significant. This appears due to List 2 results at the 0 interval where there is no retention loss on the first trial of recall but some loss by Trial 10. All other conditions have some initial loss but recovery by Trial 10. Thus List 1 loss due to unlearning shows some recovery with increased response time and List 2 loss (which is present only in the 24 h condition) shows similar recovery by Trial 10.

In a final analysis of UPRC performance and SRC performance on Trial 10 of List 2, for both retention intervals, an $F(1, 60) = 2.20$ for method (SRC, UPRC) is obtained but is not significant and for retention interval the $F(1, 60) = 9.40, p < .01$. Recall is better at the 0 retention interval than at 24 h suggesting the SRC method did not facilitate recall any more effectively than unpaced recall.

DISCUSSION

Since SRC and UPRC yielded equivalent results on List 1 and List 2 recall it appears that the effect of SRC is due simply to the longer response time allowed. The effect of response time is similar in unlearning and non-unlearning situations suggesting that forgetting due to unlearning is as stable as other sources of forgetting which is consistent with the hypothesis that unlearning permanently weakens the associations in the A-B, A-C paradigm. One difficulty in accepting this hypothesis from the present experiment is that the particular form of SRC used with MMFR may not be functionally analogous to the SRC used in the control condition. Lazar & van Laer (1966) hypothesized that SRC might be effective in facilitating recall because recall was serving as a warm-up task, or was reinstating the stimulus conditions existing at the time of original learning. While SRC may have been doing this in the control conditions it may not have been doing this effectively in the experimental conditions. In the control conditions Ss learned and recalled single responses associated with each stimulus item, while in the experimental conditions Ss learned one response at a time but had to recall two responses during SRC. If the set inducing effects of SRC are dependent on greater similarity between original learning and recall, than a better test of the inhibition hypothesis might be provided by using SRC of List 1 or List 2 in separate groups.

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