Successive recall as a warm-up task for paired adjectives¹

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An increase in correct responses to the stimulus member of adjective pairs was found on successive recall trials, without further training. By the tenth trial there was no apparent retention loss over 24 hr. when compared to immediate recall. Recall may serve a warm-up function for further recall.

Traditionally, interference has been considered the main source of retention loss and, when prior experience is controlled, the loss over 24 hr. may only be about 25% (Underwood, 1957). However, even 25% may be too much to attribute to interference. Loss of set and the need to warm-up may be equally important (Adams, 1961). Experiments on warm-up have led to conflicting results and some of these inconsistencies may be due to the ineffectiveness of the warm-up task used. The warm-up task, for example, may have interfering effects on subsequent recall, or it may not be similar enough to the act of recalling to facilitate it. The present experiment was based on the hypothesis that retention is not adequately tested in one recall trial and that the act of recalling warms the S up for further recall. Thus successive recall trials would facilitate recall, resulting in a growth of correct recall without further reinforcement. This hypothesis is not suggested by traditional interference theories which imply that without further reinforcement preexisting associations become relatively stronger and interfere with recall of the learned items.

Experiments relevant to other problems in rote learning and retention empirically support the expectation that correct recall increases with trials of unreinforced recall (Peak & Deese, 1937; Richardson, 1958; Goss, Morgan, & Golin, 1959; Richardson, 1960; Schulz & Runquist, 1960; Goss, Nodine, Gregory, Taub, & Kennedy, 1962; Wollen, 1962; Richardson & Gropper, 1964; Butler, 1965; Goss, 1965). In fact, Richardson (1958) in an experiment on intralist transfer used five successive recall trials after a 48-hr. retention interval and found that recall increased from Trial 1 of recall to Trial 5 of recall. He suggested that, "This procedure seems similar to warm-up before recall found by Irion (1949) except that it is practice on the same task rather than on some other task. On the other hand it cannot be considered learning in the usual sense because there was no information given as to the correctness of the response."

The present experiment may be considered, therefore, a direct extension of warm-up studies, partial reinforcement studies, and extinction studies. However, the processes hypothesized in warm-up oppose the

processes presumed to operate in extinction in the present experimental procedure.

Method

Subjects. Ss were 48 experimentally naive undergraduate volunteers from general psychology classes. They were randomly assigned to conditions except for the restriction that there be 12 in each of the four conditions. The criterion material was 15 pairs of adjectives (Irion, 1949) arranged in three different orders to minimize serial learning and presented at a 2 sec. rate with an 8 sec. intertrial interval.

Procedure. There were 10 trials of OL, using an alternative training-and-test procedure. Following Trial 10, Groups I (24, S-R) and II (24, S) were tested after a 24-hr. retention interval; for Groups III (0, S-R) and IV (0, S) the interval was the standard 8 sec. intertrial interval. After the first recall trial Groups I and III continued on the alternate training and test procedure until 10 recall trials were completed. Groups II and IV received 10 successive recall trials without presentation of the response members. These two groups had no knowledge of results during recall trials. Thus, all groups had a total of 20 test trials, 10 during OL and 10 subsequently.

Results

Mean correct responses on Trials 11 through 20, expressed as a percentage of mean correct responses on Trial 10, are presented graphically in Fig. 1.

The number of correct responses on Trials 11 and 20 were each expressed as difference scores by subtracting correct responses on the last trial of OL. These difference scores were subjected to an analysis of variance in a 2 by 2 by 2 factorial design. The main effects were retention interval (0 vs. 24 hr.), presentation method

Fig. 1. Mean correct responses as a percentage of Trial 10.

Table 1. Mean Correct Responses on Trials 10, 11, and 20

Groups	I. 24, S-R			II. 24, S			III. 0, S-R			IV. 0, S		
Trials	10	11	20	10	11	20	10	11	20	10	11	20
Mean	11.67	9.17	14.50	9.42	6.67	9.00	11.00	10.83	13.17	10.75	9.83	10.75
SEm	.99	.89	.34	.78	.89	.82	1.10	1.16	.68	1.16	1.11	1.23

Note. $N = 12$ for all groups.

(entire pair vs. stimulus member only during recall), and Trials (11 vs. 20). The main effect of retention interval was not significant, but there was a significant interaction between retention interval and trials ($F=11.81$, $p<.01$, $df=1/44$), indicating significantly greater rate of gain from Trial 11 to Trial 20 for the 24-hr. groups. The main effects of presentation method and trials were both highly significant, ($F=8.69$, $p<.01$, and $F=12.10$, $p<.001$), as was the interaction between presentation method and trials ($F=11.81$, $p<.001$). All of these effects were in the expected directions, i.e., there was significant improvement in performance from Trial 11 to 20, but more improvement for the groups that had both the stimulus and response member presented than for the groups that had the stimulus member only. The interaction between retention interval and presentation method was not significant, nor was the second order interaction.

Comparisons among individual means (Table 1) were more pertinent to the main experimental hypothesis. The mean difference between 0 and 24-hr. retention intervals on Trial 11 was 2.1 correct responses, ($t=3.83$, $p<.001$, $df=44$), showing significant decrement over 24 hr. In particular, Group II (24 hr., stimulus only) showed a mean decrement of 2.75 correct responses between Trials 10 and 11. However, by Trial 20, this group had recovered almost fully, showing a mean gain of 2.33 correct responses which was significant at the .001 level ($t=5.11$, $df=44$). The remaining mean decrement on Trial 20 did not differ significantly from zero ($t<1$), and amounted to only 4.5% of the mean correct responses given on Trial 10. Performance on Trial 20 for Group IV (immediate recall, stimulus only) was identical to its performance on Trial 10.

These results are consistent with those found in previously cited experiments where the response member was deleted after training. The unique contribution of the present study is to demonstrate that, using materials, list lengths, and procedures typical of most work in warm-up and retention 24-hr. forgetting is almost entirely eliminated provided the effort to achieve total recall is sufficiently extended.

Discussion

Presumably interference theory should predict that correct recall would not increase under conditions of nonreinforcement, especially after 24 hr. when, theoretically, preexisting associations recover in

strength and other sources of interference come into play reducing the recall score. Furthermore, there should be a significant difference in recall between the 0 and the 24-hr. retention interval groups. Thus, the results suggest inadequacies in current interference theory to explain retention loss, or the lack of it. These results also suggest that much of retention loss may be an artifact of the method of testing. One way in which interference theory may explain the results could be that each correct emission of a response reestablishes the stimulus conditions existing at OL, thus facilitating further recall. An alternative explanation is that a single recall trial is not sufficient to tap all the recall possible and that recall itself may be serving a warm-up function for further recall.

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Notes

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