Unlearning as a function of the activity between AB and AC acquisition[1]

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AB acquisition was followed by either card sorting or another list (CC'r) prior to AC acquisition. Retention loss under both these conditions was equivalent to a group that had contiguous presentation of AB and AC and was significantly greater than a control group that had no unlearning.

Postman's (1965) elicitation hypothesis and Delprato & Garskof's (1969) inhibition hypothesis, although differing on the particular mechanisms involved, agree in identifying the critical parameter of unlearning as AB presence during AC acquisition. Therefore, both theories would have to predict that any situation that reduced the tendency of AB to be elicited, either overtly or covertly (Keppel & Rauch, 1966) during AC acquisition would lead to a decrease in unlearning.

In this experiment, the attempt to reduce the presence of AB during AC acquisition was manipulated in two ways. In one condition, Ss engaged in an irrelevant activity between AB and AC acquisition, thus allowing AB to fall prey to "ordinary forgetting" (Underwood, 1948). In another condition, Ss engaged in in learning a list (CC'r) related to the AC list after AB acquisition. It was thought that by learning a related list prior to AC acquisition there would be a greater tendency for AC acquisition to evoke this second list rather than the first list. This latter condition can be predicted to result in even less unlearning than the former condition since two factors (the time interval plus the CC'r list) contribute to prevent AB elicitation during AC acquisition.

The present experiment attempts to test those theories that argue that the critical variable producing the unlearning effect occurs at the time of AC learning. Other theories imply that a critical variable could occur at the time of recall. For example, Postman, Stark, & Fraser (1968) hypothesize that the unlearning effect is due to response-set interference. This seems to imply that the critical variable occurs at the time of recall. AB recall in the AB, AC paradigm is reduced because of a loss of "set" to emit first-list responses due to the induction of a set to emit second-list responses. Their hypothesis should predict that the introduction of a third list would result in additional loss of recall of first-list responses because the third task should further disrupt the set to emit first-list responses. An additional implication of their theory is that the closer an activity disruptive of first-list set is to the time of recall, the greater the impediment to first-list recall; the most recent set should be most dominant and therefore recovery of first-list set less possible.

Thus the response set interference hypothesis predicts the reverse order of recall from the inhibition and elicitation hypotheses. The conditions that reduce the "set" to give first-list responses are precisely those conditions that reduce the likelihood of first-list responses being elicited during second-list acquisition. A group that learns AC immediately after AB learning would be predicted to have the most unlearning by the inhibition and elicitation hypotheses and the least unlearning by the response-set interference hypothesis.

DESIGN

Four randomized groups were used in this experiment. Group 1 had a time interval between AB and AC acquisition that was spent in an unrelated filler activity of card sorting. Group 2 was a control group. It had no interval between AB and AC acquisition. However, to keep total time between AB acquisition and AB recall constant, they engaged in the irrelevant filler activity after AC acquisition. Group 3 learned a list between AB and AC acquisition that was similar in some ways to the AC list. Group 4 was a control group for retroactive interference in Group 3. It had the same interpolated list after AB acquisition as Group 3 but was followed by a DC list rather than an AC list. The purpose of this group was to determine the effect of two subsequent lists on AB recall in the absence of an unlearning condition. This experiment was designed so that the total time between AB acquisition and AB recall was constant for all groups.

MATERIALS

Four lists of 10 paired associates were constructed. The AB list was constructed using high-frequency (A, AA) words from the Thorndike-Lorge (1944) word count. They were randomly paired with the restrictions that (1) there be no obvious associations between members of a pair and (2) no members of a pair have the same initial letter. The same restrictions were observed in the construction of the remaining lists.

The AC list was composed of the same stimulus items as the AB list. The response members were either the first or second associate to 10 of the Cohen, Bousfield, & Whitmarsh (1957) category names. The DC list was composed of stimulus members selected from the Thorndike-Lorge word count (A, AA) and the response items were the same as those appearing in the AC list. In the CC'r list the stimulus members were the response members of the AC and DC lists. The remaining 10 items of the first two associates to the Cohen et al (1957) category names were selected for the C'r pool. The C and C'r items were related words mispaired. Thus, if doctor and lawyer are an example of C and C'r items, doctor would be the stimulus item for one pair and lawyer would be the response item for another pair. The CC'r list was designed to interfere with the elicitation of AB.

PROCEDURE

A training-test method was used. Three orders of training and three orders of testing were used to minimize serial learning. Material was presented on a Lafayette memory drum set at a 2-sec rate. A 4-sec interval separated training and testing lists. Six training and testing trials were given for each list. Each list was immediately preceded by the relevant instructions for that list.

After AB acquisition, Group 1 received 4 min of filler activity and then the AC list. The filler activity consisted of sorting two decks of playing cards into suites and arranging them in sequence within suite, naming each card as it was sorted. Group 2 received 4 min of the filler activity after AC acquisition and prior to recall. The filler activity kept the total interval between learning the first list and recall approximately constant for all groups. Group 3 learned AB, CC'r, and AC, and Group 4 learned AB, CC'r, and DC.

Recall was tested immediately after AC learning for Groups 1 and 3 and immediately after the filler task for Group 2 and after the DC list for Group 4. A MMFR test was used for recall. Ss were given a sheet of paper on which the A items were printed in a column. To the right of each A item, two blank lines were printed. Ss were instructed to write the words that had been paired with the A items. They were not asked to indicate what lists the items came from. They were allowed to fill in the items in any order and they were given unlimited time for the task.

SUBJECTS

The Ss were 60 experimentally naive undergraduate volunteers from general psychology classes given extra course credit for taking part in the experiment. They were assigned randomly to each of the four treatments in the order that they appeared in the laboratory except for the restriction that there be 15 Ss in each condition.

RESULTS

All analyses were based on the number of correct responses. No significant differences were obtained in original AB acquisition. Groups 1, 2, 3, and 4 made a mean of 37.40, 34.93, 40.93, and 36.60 correct responses in original learning ($F < 1$), respectively.

AC acquisition was poorer for Group 2, which learned AC immediately after AB acquisition, than for Groups 1 and 3, which learned AC after some other activity. The mean number of AC responses for Groups 1, 2, and 3 were 44.13, 32.26, and 40.60, respectively ($F = 5.04$, $df = 2{,}42$, $p < .05$). Group 2 made significantly fewer correct responses than the other two groups, which did not differ from each other, as indicated by the Tukey hsd procedure (Winer, 1962, p. 87). Impeded AC acquisition for Group 2 is consistent with both the elicitation and inhibition hypotheses that would predict greater negative transfer under this condition where response competition is greatest.

Groups 1, 2, 3, and 4 recalled a mean of 4.40, 4.80, 4.60, and 7.13 AB responses in MMFR, respectively. The F for treatments = 3.58, $df = 3{,}56$, $p < .05$. A Tukey test (hsd procedure) indicated that all the treatments differed from Group 4, which had no unlearning and the highest recall. The other groups did not differ significantly from each other. Contrary to the elicitation and inhibition hypotheses, conditions that should reduce the availability of AB during AC acquisition did not lead to less unlearning.

AC recall for Groups 1, 2, and 3, respectively, were 9.60, 8.67, and 9.27. While Group 2, which had less AC learning than the other groups, tended to recall less AC items, these differences were not significant ($F = 1.50$, $df = 2{,}42$, $p > .05$).[2]

DISCUSSION

The data of this experiment are not completely consistent with theories of unlearning that postulate that AB availability or implicit AB responses during AC acquisition lead to unlearning. The predicted rank ordering of the groups involved in the experiment from least unlearning to most unlearning differs for the two classes of theories considered. The theories that view unlearning as due to factors operating at the time of AC acquisition (the elicitation and inhibition theories) would rank order the groups from least unlearning to most as follows ("F" refers to filler activity): Groups 4 (AB,CC'r,DC), 3 (AB,CC'r,AC), 1 (AB,F,AC), 2 (AB,AC,F), e.g., Group 2 would be predicted to have the most unlearning because it would result in the greatest tendency for AB to be elicited during AC acquisition.

The response-set hypothesis would predict the following rank ordering from least unlearning to most: Groups 2 (AB,AC,F), 1 (AB,F,AC), 4 (AB,CC'r,DC), 3 (AB,CC'r,AC). Here Group 2 would be predicted to have the least unlearning due to two factors: Group 2 has only one list to learn after AB acquisition and one list would reduce the set to give List 1 responses less than the two lists given to Groups 3 and 4. In addition, Group 2, as opposed to Group 1, has an interval between AC acquisition and AB recall, giving an opportunity for spontaneous recovery of the first-list set.

The finding that Groups 1, 2, and 3 did not differ from each other and had significantly more unlearning than Group 4 does not clearly refute any of the theories. However, the finding that Group 4 had less unlearning than the other groups is more consistent with the predictions from the inhibition and elicitation theories than from the response-set interference theory.

In the present experiment, when CC'r preceded AC, CC'r did not appear to have any effect on AB or AC recall as compared to a group that had only the AB, AC tasks. This is contrary to earlier findings (Lazar & Weiss, 1969) with the same materials but in a different order. When CC'r followed AB, AC acquisition, it reduced both AB and AC recall. In another experiment with slightly different materials (Weiss and Lazar, 1969), when CC'r again followed AB, AC acquisition, it impeded AC recall but appeared to facilitate AB recall. If the order of learning AC and CC'r is a critical factor in AB recall it would be consistent with the Lazar-Weiss (1969) hypothesis, which views unlearning as AC inhibiting AB at the time of recall. A cross-experimental comparison supports a generalization that AB recall is facilitated when AC is inhibited by a subsequent CC'r task, while if AC is preceded by a CC'r task, AC is not inhibited and AB recall is not facilitated.

This study offers little support for the theories that view unlearning as occurring during AC acquisition. Similarly, the response-set interference theory is not supported. Indirectly, by a cross-experimental comparison, this experiment is consistent with the Lazar-Weiss (1969) inhibition hypothesis, which argues that the critical variable in unlearning operates at the time of recall.

This experiment suggests that the nature and locus of successive tasks have systematic effects on first-list recall. The exact nature of the processes involved remains to be specified.

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NOTES

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2. Intrusion errors were not recorded. However, results reporting a changing covert/overt intrusion error ratio would make such an analysis inconclusive (Keppel & Rauch, 1966).