Encoding variability in mediated transfer *

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The encoding variability (EV) of the B terms (mediators) was varied in an attempt to contrast the mechanisms of unlearning and mediation in the three-stage chaining paradigm, i.e., A-B, B-C, A-C, and the corresponding pseudomediation groups. It was thought that the pseudomediation hypothesis might apply only for low-EV B terms, where unlearning might be more likely. Test-list performance indicated mediated facilitation, and there was a difference of comparable magnitude for the pseudomediation groups, but neither was influenced by the EV of the mediating terms.

Mediated facilitation is presumed to have been shown when performance on List 3 of an A-B, B-C, A-C sequence of paired-associate lists is better than the performance on the same A-C list after the control sequence A-D, B-C, A-C (cf. Kjeldergaard, 1968). However, the third-stage difference has been challenged as an artifact due to differential reduction of interference (Mandler & Earhard, 1964). If the experimental group encounters interference from the List 1 backward associations during the acquisition of List 2, these associations must be extinguished in order to learn List 2; presumably, the forward associations are simultaneously unlearned. Since Lists 1 and 3 require the acquisition of different responses to the same stimulus, the List 1 associations may interfere with the acquisition of the third list, but this interference would be markedly reduced in the experimental group due to the bidirectional unlearning during List 2. This pseudomediation hypothesis does not require the utilization of the C terms in Lists 2 and 3, and a test might involve new response terms in either stage, i.e., A-B, B-E, A-C vs A-D, B-E, A-C, or repaired A and C terms in List 3.

While the phenomenon of pseudomediation has been demonstrated in such ways several times (e.g., Earhard & Earhard, 1967), there have been failures to find pseudomediation (e.g., Goulet & Postman, 1966), and the presumed unlearning has not always been found (Peterson & Koltnow, 1968; Schulz, Liston, & Weaver, 1968). While one explanation for the discrepancies may be the assumption that unlearning occurs simultaneously in both directions (e.g., Petrich, 1971), the present research concerned another possible confounding.

Mediated transfer is known to increase with the meaningfulness (m) of the mediator (B term), and failures to find mediation have usually involved low m materials (Kjeldergaard, 1968, p. 89). While this is consistent with an interpretation in terms of mediator availability, it is also what would be expected if encoding variability (EV) determines the extent of unlearning in such cases. When S encounters interference in List 2, he might select a new functional stimulus to avoid interference from List 1 backward associations (cf. Bryk & Kausler, 1966; Martin, 1968), provided the B terms are sufficiently high in EV. The result would be little unlearning of the List 1 associations, so interference from List 1 associations would be present in List 3 for both the experimental and control groups. Thus, the List 3 difference between the experimental and control groups would be smallest when EV was highest, i.e., with low-m B terms.

If unlearning is involved at all, the issues of bidirectional unlearning and recoding must be considered; the present experiment explored the latter problem.

METHOD

Subjects and Design

Fifty students from introductory psychology courses served in partial fulfillment of course requirements. The basic design was a 5 (groups) by 2 (EV) mixed factorial, with EV manipulated within Ss.

Procedure

Each S learned two eight-pair paired-associate lists to a criterion of one errorless trial, followed by six trials on the third list. One familiarization trial was always given. The anticipation method was used throughout, with a 4:4-sec rate of presentation and an 8-sec intertrial interval. The Ss were required to spell their responses.

The third list was the same for all groups, with paradigmatic variation accomplished by differences in List 1 and/or 2. The mediation experimental (ME) group learned a sequence of lists conforming to the chaining paradigm, A-B, B-C, A-C. The mediation control (MC) group learned a sequence which differed only in the use of different responses in the first stage, A-D, B-C, A-C. The pseudomediation experimental (PE) group learned the sequence A-B, B-E, A-C, and the pseudomediation control (PC) group involved the A-D, B-E, A-C sequence. The warm-up (WU) control group learned three unrelated lists, E-D, B-F, A-C. Half of the B and D terms in each list were high EV and half were low EV.

Materials

The items were chosen from the Butler & Merikle (1970) norms. Each of 100 trigrams had been scaled by asking 100 Ss to give their first associate to each, and the number of different associations was taken as the index of EV. The number of different associations in the items used varied from 16 to 51, with an m range of 15%-85% in increments of 10%. Within each m level, the item with the fewest different associations was designated a B (or D) term and the item with the most different associations a D (or B) term. By alternating B and D as high or low over the various levels of m, it was possible to equate the high- and low-EV subsets on m (50% average) for both B and D terms. The A, C, E, and F terms were then chosen from the

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Table 1
Average Total Errors on All Three Lists by Encoding Variability Level for Each Group, with Standard Deviations in Parentheses

	ME	MC	PE	PC	WU
List 1					
Low EV	17.30 (8.18)	30.20 (10.00)	15.90 (7.92)	27.40 (9.12)	17.60 (6.15)
High EV	18.80 (9.00)	20.40 (9.18)	16.30 (7.24)	22.20 (8.48)	19.40 (8.78)
List 2					
Low EV	11.60 (7.53)	13.10 (8.43)	12.40 (5.15)	11.30 (5.50)	7.60 (4.17)
High EV	16.30 (12.46)	18.00 (8.41)	11.70 (5.74)	12.80 (6.56)	13.70 (7.48)
List 3					
Low EV	4.70 (2.95)	10.10 (5.15)	10.00 (4.35)	14.10 (6.97)	8.20 (5.03)
High EV	9.50 (5.68)	13.70 (6.18)	12.00 (6.68)	16.10 (5.20)	12.80 (4.37)

next-lowest EV items at each level of m, again maintaining the same average m.

RESULTS

Table 1 shows the average errors by EV level for each group in each phase of the experiment. A 5 by 2 analysis revealed that low-EV terms were more difficult when in the response function, $F(1,45) = 5.46$, $p < .05$, and there was a groups main effect, $F(4,45) = 2.95$, $p < .05$. The Groups by EV interaction suggested that the EV effect was most apparent in the MC and PC groups (A-D list), $F(4,45) = 5.51$, $p < .01$.

While the group effect in List 1 could be either an ability difference in sampling or a difference in the difficulty of the A-B (experimental) and A-D (control) lists, the latter seems most likely, since there was no such effect on the second task when experimental and control groups learned the same list, $F < 1$. High-EV stimuli were more difficult than low-EV stimuli during List 2, $F(1,45) = 14.34$, $p < .001$, with no Groups by EV interaction, $F(4,45) = 2.08$. To some extent, the EV effect in this stage serves as a manipulation check, confirming that the B terms do differ in EV. (By having 10 Ss separately learn the B-C, B-E sequence, it was found that more transfer occurred for the high-EV items, further confirming the generally expected EV effect.) Individual comparisons (Tukey's HSD) revealed that the ME-MC and PE-PC comparisons were not significant ($p > .05$) in either EV subset, nor were the ME-WU and PE-WU comparisons.

Analysis of the total errors on List 3 revealed a significant group effect, $F(4,45) = 3.88$, $p < .01$, and a significant EV effect, $F(1,45) = 18.90$, $p < .001$, with no interaction, $F < 1$. The comparisons of the ME group with the MC and the PE group with the PC were significant ($p < .05$), as were the comparisons of ME and PE with WU. The pairs that had previously involved high-EV items were harder to learn in the third stage than those that had been associated with the low-EV items. In the case of the ME and PC groups, an EV effect might be attributed to mediator availability and differential unlearning, respectively, but it appears that the pairs in the two EV subsets were simply differentially difficult, obscuring any other effect potentially attributable to EV.

DISCUSSION

The present results indicated a reliable mediation effect from the very first test trial. A pseudomediation effect was also present, but not until after the first test trial. The reduction in interference for PE is consistent with the unlearning argument of Mandler & Earhard (1964), but it does not seem to account for all of the mediation effect. However, neither effect was influenced by the EV of the B terms.

Before concluding that the EV-unlearning relationship does not apply in mediated transfer, however, two alternative interpretations of these results can be considered. First, although the EV of the A terms here was nominally low, that was a relative definition only, and the present materials with an average m of 50% may still have been fairly high in EV. If so, all Ss might promptly recode during List 3 to avoid any interference, but several features of the present data suggest that such an alternative interpretation is too simple. For example, recoding in List 3 would eliminate both mediation and pseudomediation effects, but there were substantial mediation and pseudomediation differences here. Furthermore, if pseudomediation involves unlearning and if List 3 recoding would reduce EV-based unlearning differences, then PE and PC would have been comparable, i.e., not different, at each EV level, rather than comparably different for high and low EV. In addition, recoding during List 3 would still indicate the unlearning-based pseudomediation effect for the higher m (low-EV) A-term pairs. Since there was some m variation within the A terms here, some further information was available, but inspection of the present data in that regard found little support for this possibility.

A second alternative interpretation of these results may also be involved in the bidirectionality issue in the general unlearning literature. Since the B (D) terms serve as responses during the learning of List 1, it is possible to argue that these items become integrated when serving as responses, with the process of response integration thus mitigating EV differences. The extreme form of this argument would suggest that any cue selection during List 2 learning would obviate the need for unlearning. The results in List 3 transfer would again be the simultaneous attenuation of both mediation and pseudomediation effects, at least that portion of the latter due to unlearning, and the absence of any EV effect at all, but these results were not apparent.

It seems possible to reject both List 3 recoding and response-integration reduction of EV differences as alternative explanations for the absence of the hypothesized EV-unlearning effect in mediated transfer. It seems more likely that the EV-unlearning relationship is either not effective here or that the EV differences are of such small magnitude that the three-stage transfer arrangement is largely insensitive due to its complexity.

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