Word arousal and verbal mediation¹

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Four high and four low arousal words served as the common (B) elements in a chaining mediation paradigm (A-B, B-C, A-C or A-Cr). The A and C items were two-digit numbers. Lists were aurally presented using the recall procedure. High arousal words significantly facilitated learning during the first two stages. The Mediation group differed only slightly from the Nonmediation group on Stage 3. Effects of the arousal condition were not found to be significant in this last stage.

It seems clear that emotional characteristics of verbal material affect learning. Theorists acknowledge that retention is greater when learning occurs under heightened but not extreme degrees of arousal. Walker (1958) has proposed a general theory of learning which correlates perseverative consolidation of neural traces and arousal. He suggests that high arousal during the associative process results in poor immediate recall because of active and competing consolidating processes. Over a longer period of time, however, the better consolidation results in better retention. Several studies, employing single-repetition, short-term memory procedures, support this theory (Kleinsmith & Kaplan, 1963, 1964; Walker & Tarte, 1963). Walker's theory must be tested in other than the short-term memory paradigm.

The purpose of the present study was to examine (a) the effects of emotive tone of words on learning, and (b) the effects of differential arousal value of the common elements on mediate association.

Method

Fifty-six Introductory Psychology students served as subjects (Ss). Half were randomly assigned to the Mediation group and the rest to the Nonmediation. There was an equal number of males and females in each group. The mediation paradigm consisted of three stages, A-B, B-C, test A-C, where B consisted of four high arousal and four low arousal words, and A and C were two-digit numbers. The sequence of lists for the Nonmediation group was A-B, B-C, test A-Cr (repaired). Stage 3 involved pairing stimulus items A at random with response items C such that no A-Cr pair had a common B-association. Each stage involved eight paired-associates (PA). The high arousal words (rape, vomit, slut and kiss) and low arousal words (carrot, berry, pencil and walk) were selected from Walker & Tarte (1963) who determined degree of arousal by a galvanic skin response measure. The Thorndike-Lorge (1944) word count indicates, with the exception of the word "rape," that low arousal words exceed high arousal words in frequency of occurrence. The association values of the numbers, chosen from Battig & Spera

(1962), ranged from 0.79 to 1.69. The two-digit numbers were selected following the instructions of Yarney (1966).

Ss were run in two separate groups. The lists were presented aurally by a tape recorder following the recall method. In each stage there were six study trials (both the stimulus and response members of the PA presented) alternating with six recall trials (stimulus items presented alone). Six randomizations of the position of items on both study and recall trials were made to prevent serial learning. The PA were read in a monotone approximately 2 sec. apart during the study periods while the stimulus words were spoken at 5 sec. intervals during recall trials. A 10-sec. intertrial interval and a 2-min. interval between stages was employed.

To insure correct recognition of stimulus words, the items were printed in capital letters on 5 x 7 cards and shown simultaneously with their aural presentation during trial one, stage 1. Ss recorded their responses on an 18-page booklet, each page representing one trial. The letters, A-H, appeared in a column along the edge of each page showing where responses were to be written. To aid the recording of responses, the guide letter was read aloud immediately before the presentation of each stimulus during recall.

Results

Since the Mediated and Nonmediated groups received identical treatments on stages 1 (A-B) and 2 (B-C) and did not differ in performance (stage 1, $F=0.18$, $df=1/54$; stage 2, $F=0.37$, $df=1/54$), these scores were combined on the first two stages for comparison purposes of arousal recall scores. In all three stages, the same analysis, a 2 by 2 by 6 analysis of variance for repeated measures, was used. The treatment, Mediation-Nonmediation, was a between-Ss variable while treatments, Arousal conditions and Trials, were within-Ss variables.

Stage 1 (A-B). High arousal pairs were better recalled on all six trials ($F=14.07$, $df=1/54$, $p<.01$). The only other significant main effect was Trials, $F=98.24$, $df=5/270$, $p<.01$, indicating an increase in learning with practice. None of the interactions was significant.

Stage 2 (B-C). The response numbers evoked by high arousal stimulus words were better recalled on all trials but the last. Analysis of variance indicated that Arousal conditions and Trials again yielded significant effects ($F=13.03$, $df=1/54$, $p<.01$ for the former; $F=96.40$, $df=5/270$, $p<.01$ for the latter). The only significant interaction was between Trials and Arousal conditions, $F=2.84$, $df=5/270$, $p<.05$, indicating that high and low arousal items were not recalled equally well over trials. A t-test for correlated samples performed between correct recalls for high and low arousal items on trial

six indicated that the reversal was a function of chance ($t=1.39$, $df=55$).

Stage 3 (A-C and A-Cr). In both the Mediation and Nonmediation groups, high arousal associated pairs were recalled less well than low arousal associated pairs. This difference, although fairly consistent over trials, was not significant, $F=2.76$, $df=1/54$. The analysis of variance showed a significant main effect for Trials, $F=50.43$, $df=5/270$, $p<.01$. The expected difference between Mediation and Nonmediation groups just approached the generally accepted statistical level of significance $F=3.95$, $df=1/54$, $p<.10$, indicating that the treatment conditions may have differed. All of the interactions were non-significant including the one of most interest in this study, Arousal conditions by Mediation conditions.

Discussion

In ordinary usage, the high arousal words employed in this study would be called emotionally toned words. Assuming that the high arousal words in the present investigation operated in a similar manner to the procedures of Walker and Tarte (1963) to produce differentially higher emotional states, the results tend to cast doubt on a portion of Walker's (1958) theory. Contrary to Walker's hypothesis, high arousal facilitated recall during the early stages of learning. In both Stage 1 (A-B) and Stage 2 (B-C) high arousal words improved performance. This study did not provide data relevant to Walker's hypothesis concerning permanent memory.

Since the emotional characteristics or some related factor (e.g., some associative factor that is correlated with GSR magnitude cf., Berlyne, Borsa, Craw, Gelman, & Mandell, 1965) did function in a differential manner, one would expect the higher arousal to also create a differentially active mediational effect. This expectation was not confirmed. First, the results for Stage 3 showed that the main effect, Mediation-Nonmediation, only approached the accepted statistical level of significance. More important for purposes of this study was the nonsignificant effects of Arousal conditions and the interaction Mediation by Arousal conditions. It is possible that word arousal is not conducive to higher order conditioning such as is the case for mediated learning. It is also possible that the variable, arousal, may have been responsible for stimulating irrelevant learning that interfered with mediated learning. The data indicate that high arousal words facilitated learning on Stages 1 and 2. This suggests that high

arousal words were more available as mediators for Stage 3 learning. The increased availability, however, may have been responsible for the nonsignificant findings. Ss may have learned to pay selective attention to pairs with emotional words as common mediators without concomitant facilitation resulting in the learning of response numbers. For example, Ss may have paid attention to the mediating word "rape" which stimulated implicit responding toward itself rather than fostering associations between the stimulus and response (A-C) numbers. It is possible that even stronger interference effects would be found if extremely high arousal words e.g., taboo words, were used as the common elements.

Another interpretation of these results might be that "unlearning" of the incorrect backward B-A associations during Stage 2 (B-C) (as hypothesized by Earhard & Mandler, 1965, to be a critical factor involved in this paradigm) proceeds faster for low arousal than high arousal words. This would result in less interference on Stage 3 for low arousal A-C pairs than high pairs and reduce any advantage that the latter conditions may show in mediated learning.

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Note

1. A version of this paper was presented to the Canadian Psychological Association, Annual Convention, Montreal, Quebec, June, 1966.