Effects of satiation on performance as a function of stimulant and depressant drugs¹

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An experiment was done to test the effects of repetition as a function of drug treatment (dexedrine and seconal) on a variety of performance measures. Three criterion measures were employed (semantic differential scales, paired-associate learning and an arithmetic task). Support for the hypothesis that under stimulant drug conditions satiation effects would be more pronounced as compared with sedative drug conditions received partial support on the paired-associate task only. Satiation effects were found on the arithmetic task but these were unrelated to the drug administered. The semantic differential scales did not yield consistent results for either repetition or drug.

Pyke (1964) found that for Ss tested under dexedrine, repetition led to a reduction in meaning while seconal drug conditions produced an increment in meaning after continuous repetition. In the study by Pyke (1964) as well as experiments by other researchers (Floyd, 1962; Jakobovits, 1962; Jakobovits & Lambert, 1961; Lambert & Jakobovits, 1960) the semantic differential has been employed as the criterion variable. More recent research has indicated that the use of the semantic differential to measure meaning changes following repetition may be undesirable due to the possible confounding effects of regression (Schulz, Weaver, & Radke, 1965; Yelen & Schulz, 1963). This problem is circumvented in the present study through the use of performance measures not subject to regression effects. Paired-associate learning and an arithmetic task, as well as the semantic differential form the criterion variables for this study. These tasks were selected because they have been found to be sensitive to satiation effects (Jakobovits & Lambert, 1962; Kanungo, 1962).

The purpose of this study was to test the generality of the results obtained by Pyke (1964) using performance measures as the criterion indices. It was predicted that following repetition the performance of Ss tested under a stimulant drug condition would deteriorate, while Ss tested under a depressant drug condition would improve or show no change after repetition.

Method

The sample was composed of 32 university students. Two lists of paired-associates (PA), each consisting of 10 pairs, were prepared. Following the procedure of Kanungo, Lambert, & Mauer (1962), nonsense syllables and words served as stimulus and response members respectively. The sample was divided into two matched groups on the basis of performance on PA List 1, with the procedure for presentation modelled after

that of Kanungo et al (1962). Approximately one week later, Ss were tested under the drug condition using a double-blind procedure. One group received 15 mg of dexedrine and the other 125 mg of sodium seconal. Approximately 75 min. after drug administration, all response members of PA List 11 were rated on three semantic differential scales (Kanungo et al, 1962). Immediately following the initial ratings, five of the response items were subjected to the repetition treatment. Ss were required to repeat each word for three 15 sec. intervals. After repetition, all Ss rerated the original 10 response members of PA List 11. Immediately following final ratings, PA List 11 was presented for learning.

The second task was modelled after that of Jakobovits & Lambert (1962) except that the computation involved is a multiplication rather than addition problem. Twenty-four problems were used, 12 constituting the experimental series (the digit repeated was involved in the problem) and the remainder the control series (the digit repeated was not involved in the problem). The problems themselves and their order or presentation was identical to that of Jakobovits & Lambert (1962).

Results

Winer's (1962, p. 324) model for a three-way analysis of variance with repeated measures was employed to analyze the semantic differential data which was scored using the Lambert & Jakobovits (1960) procedure. The predicted effect is a Drug by Rating by Repetition interaction. That is, words subjected to the repetition should show reductions in meaning on final ratings as compared with initial ratings for dexedrine Ss. The same words should show increments for seconal Ss. The only significant effect obtained with this analysis was for Repetition. Repeated words were rated more extremely than unrepeated words on both initial and final testing. Thus, no evidence was found for a satiation effect for either drug group on semantic differential scales.

On PA List 11, the trials to criterion and the error scores were calculated separately for the repeated and nonrepeated response members. Two-way analyses of variance were carried out on these data following Winer's (1962) model where one variable is correlated. The F-ratio for repetition was the only significant effect found ($F=9.18$; $df=1/30$; $p<.01$ for trials and $F=4.73$; $df=1/30$; $p<.05$ for errors). Contrary to previous findings by Kanungo et al (1962), fewer errors were made with repeated concepts and these concepts required fewer trials to learn. There was some suggestion that intralist competition was greater for nonrepeated concepts but this could not be tested directly. For the multi-

Fig. 1. Mean latencies of drug groups on the arithmetic task.

plication task latencies were summed separately for the first and last six problems of both the experimental and control series. A three-way analysis of variance was performed on these data (Winer, 1962). A significant Repetition ($F=12.00$; $df=1/29$; $p<.001$) effect was found. These results are presented in Fig. 1. Both drug groups showed facilitation on the experimental series for the first six problems and increased latencies for the experimental series on the last six problems as compared with the control series.

Discussion

In general, this experiment adds support to the rapidly accumulating evidence that semantic scales are inappropriate as criterion measures of the effects of repetition. However, with reference to the effects of repetition on performance measures the picture is somewhat more encouraging. There is clear support for the deleterious effect of large amounts of repetition on response latencies to perform a problem involving a concept previously subjected to repetition treatment. Similarly, there is some suggestion that had the PA items been matched for

intralist competition, repetition might have led to poorer performance, at least for the dexedrine drug group.

The specific prediction under test in this experiment that repetition would have differential effects as a function of drug treatment received little direct support. Results on the PA learning task do lend some support to the prediction but the differences are not significant. It is possible that drug effects were wearing off by the time the arithmetic task was presented or that these groups differed in their motor speed skills.

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Note

1. This research was supported by grant No. APA-148 from the National Research Council of Canada. An extended report of this study may be obtained without charge from Neil McK. Agnew, Psychological Research Center, 1214 College Drive, Saskatoon, Saskatchewan.