AN INVESTIGATION OF THE PSYCHOANALYTIC "MECHANISM" OF REPRESSION: THE RETENTION OF VERBAL MATERIAL ASSOCIATED WITH NOXIOUS STIMULATION

RICHARD G. CANNICOTT, Central State Hospital and The University of Oklahoma, Norman, and JOHN P. UMBERGER, Cherokee State Hospital, Cherokee, Iowa

There have been numerous clinical and experimental studies on repression.[1] In most cases the major concern has been with the relationship between affective influences and the memory process.[2] The stress on affective influences is, of course, the heart of the repression theory. In general, it states that that which is unpleasant to the individual, or is associated with unpleasantness, is more likely to be pushed into the unconscious, or forgotten. Unfortunately, Freud was not explicit in his use of the term unpleasant, and considerable variation in interpretation has resulted.

STATEMENT OF PROBLEM. The present experiment was designed to subject the principal findings of Diven's study to a further test, using a larger number of subjects under each condition, providing for more adequate control of extraneous variables, and applying adequate statistical tests to the data obtained. Where Diven's study primarily concerned itself with what might be called the influence of a general anxiety factor upon recall, the present experiment was concerned with the affect upon recall of anxiety related to specific words, and with the phenomena of primary and secondary displacement rather than with a general anxiety factor. Such an emphasis was achieved by both experimental and control groups experiencing electric shock preliminary to the experiment, and by both groups being forewarned that they might be shocked at any time. Thus, an attempt was made to equate the strength of generalised anxiety for both experimental and control groups, and at the same time to introduce differential specific anxiety reactions by administering shock to the experimental group in association with particular stimulus words.

THE DIVEN EXPERIMENT. The experiment reported by Diven[1] was concerned with memory for words presented in a laboratory situation involving the actual experience or the anticipation of electric shock. Diven related his findings to the repression process. His subjects were wired into an electrical circuit in an obvious manner in order to raise their level of anxiety. He then orally presented a series of 40 words to each of which the subject as-

[1]Diven, K., "Certain determinants in the conditioning of anxiety reactions," *Jour. Psychol.*, 1937, 3, 291-308.

[2]Rapaport, D., *Emotions and Memory*, New York: Williams & Wilkins, 1942.

sociated out loud for a period of 12 seconds. The word list was built around the "critical" word BARN which was always preceded by the "precritical" word RED. BARN was presented six times while all other words (except RED) were presented once. The word BARN was always followed by an electric shock to the foot of those subjects in the experimental groups, but the control subjects received no shock. After this association period the subjects rested, and then were asked to recall the stimulus words. This was followed by a second association to the same list of words, this time none of the subjects received shock. They rested a second time and were once more asked to recall the stimulus words.

Diven found that the average number of words recalled after "deconditioning" (second association period, no shock given) was significantly larger than in the recall before "deconditioning." The same difference was not significant in his control group. From this he concluded that he was witnessing a "demonstration of dynamic repression," with its subsequent release after "desensitization." This type of conclusion is not warranted. It is entirely possible that the increase in mean recall for the shock group was not significantly greater than the increase in mean recall for his control group.

Diven also investigated whether shock, delay in recall, and "deconditioning" affected the kind of words recalled. The words with a rural meaning plus those which appeared immediately prior or subsequent to the word BARN were called traumatic words, while all other words were called neutral. He found that the proportion of traumatic words recalled was greater in the recall immediately after conditioning, but where this recall was delayed for 24 to 48 hours, the proportion of neutral words was greater. It was suggested that this reflected the subject's conscious concern with traumatic words immediately after the shock experience, and a repression of these same words when a delay period preceded recall. In addition, he found that the delay group's recall after "deconditioning" showed a reversal from a neutral to a traumatic majority, "which may be tentatively cited as demonstrating what is known to the clinician as 'reactivation of a repressed complex.' " The fact that words immediately before and after BARN in the list, and words not temporally continguous with BARN but meaningfully related to it (rural words) also appeared to undergo a repression and release similar to BARN itself, was called primary and secondary displacement respectively. There was no report of tests of significance having been applied to the proportion figures, and there were no control groups used for the 24 and 48 hour delay conditions. The shortcomings of Diven's design and statistical analysis are many. On the other hand, it would be of considerable importance for the theory of repression and psychopathology in general if his findings were found to be reliable.

Design of Experiment. Forty students from the State University of Iowa served as subjects for this experiment. They were assigned at random to four groups of ten subjects each, two experimental groups and two control groups. The procedure with all four groups was as follows: association period, rest, recall of stimulus words, second association period, two minute rest, second recall of stimulus words. The conditions for the two experimental (shock) groups were identical with the exception that the one group's first recall of stimulus words occurred two minutes after original exposure to the word list, while the other experimental group experienced its first recall 24 hours after original exposure to the word list. The two control groups served under conditions identical with those of the corresponding experimental groups except that neither control group was given an electric shock during the association to stimulus words.

Each subject was seated in a chair before the apparatus. An electrode was strapped to his wrist, and a series of increasingly stronger shocks was given until the subject reported them to be so uncomfortable that he did not want them increased. The inductorium was fixed at this point. The subject was

instructed to call out words which came to his mind as soon as each new stimulus word appeared in the window of the apparatus. The associations themselves did not play an integral part in the experiment, but served to mask the aim of the study.

A list of 20 stimulus words was affixed to the cylinder of a standard Missouri memory drum which was set to automatically expose a different word every six seconds. The word list used by Diven was modified to a considerable extent for the purposes of this study. The list used in the present experiment contained 20 different words, 10 of which were "neutral," 10 of which were "rural" in meaning. The critical word, BARN, likewise appeared only once in the list and was made to fall in the middle of the list, preceded and followed by a rural word. The remaining 27 words were randomly assigned to other positions in the list. The list was constructed in this manner to allow equal learning opportunity for all words and to provide an equal emphasis on both neutral and rural meanings.

Discussion of Findings. The data obtained was subjected to statistical analysis. This consisted in testing the null hypothesis with respect to the various differences between experimental and control group recalls using the *t* test according to small sample theory. It was found that the application of noxious stimulation during exposure to a series of words does not significantly reduce the number of words subsequently recalled, either immediately or after a 24 hour delay, nor does it significantly affect the particular type of words recalled. A reexposure to the same words in a situation devoid of noxious stimulation does not allow a significant release of previously learned but repressed words. Further, there is no evidence that the traumatic nature of the word directly associated with noxious stimulation is displaced to other words in the list either through temporal contiguity or through meaning.

The differences obtained between this and the Diven experiment might be explained by resorting to the conclusion that Diven's results were but chance results obtained with a small number of subjects, and that there is actually no basis for the forgetting phenomena found by Diven. On the other hand, the disparity in findings might be explained on the basis of one or more of the following factors in the present experiment which tended to mask the operation of the repression and displacement processes: (a) Learning of the stimulus words may have been too great for all subjects, thus leaving little room for inter-group variability; this might be corrected in subsequent studies by presenting more words or fewer trials in order to lengthen the range of recall, (b) The noxious stimulation may have been so weak that it was masked by the general anxiety level experienced by all groups of subjects; this factor could be corrected by eliminating some of the cues eliciting anxiety in relation to the over-all situation, or by giving a more intense shock, shocking for a longer period, or possibly shocking more frequently in relation to the critical words, (c) the rural nature of half the stimulus words may have served as a recall aid by all groups, thus reducing inter-group variability of traumatic word recall; this might be counter-balanced in a subsequent experiment by choosing neutral words which were non-rural in meaning, but which were nevertheless all meaningfully related.

On the basis of the present findings the conclusions of Diven with respect to the specific effect of shock-induced anxiety on recall become open to question.