What is one-trial learning?

LEONARD BROSGOLE, ANGELO F. CONTINO, and
KAREN H. HANSEN, St. John's University, Jamaica, N.Y.
11432

This study was directed at assessing whether repetition produces partial learning. Accordingly, a group of Ss learned a list of paired associates in which all incorrectly anticipated responses were removed and replaced by new ones. The same stimuli were retained, however. It was reasoned that on the basis of partial learning, the old deleted responses should proactively interfere with the recall of the newly inserted ones, thereby retarding the learning process. This group was shown to be significantly inferior to one which learned a list repetitiously. Therefore, the noncontinuity position was rejected.

Through the use of a rather unique procedure, Rock (1957) revived the old continuity-noncontinuity controversy. In his study, one group learned a list of paired associates in the traditional manner of seeing the same pairs over and over again from one trial to the next. A second group was not given the advantage of having the unlearned material repeated, as all incorrect pairs were dropped from the list and replaced with new ones on the following trial. Since the two groups did not differ significantly in terms of trials to criterion and errors, Rock concluded that associative bonds were not formed incrementally.

It may be argued that there is a great deal of interference generated by presenting a list over and over again. That is to say, an incorrect response (either implicit or explicit) to a particular stimulus may actively compete with the subsequent learning of the correct response. The incremental strengthening of the correct connection may temporarily be offset by these intrusions and, therefore, not be evidenced immediately in performance. The time required to overcome this type of inhibition may conceal the beneficial effects of repetition. This is especially the case when the learning of a list presented repeatedly is compared to a substitution list which is completely devoid of the intrusion errors just described.¹ Hence, a failure to demonstrate the facilitative effects of repetition on performance cannot be used as the basis for denying the existence of subthreshold connections or partial learning.

The present study was substantively a replication of Rock's experiment, but with several procedural modifications and the inclusion of an additional treatment. This third group of Ss learned a list in which only the incorrect response items were removed and new ones coupled with the same old stimuli. The logic of this condition demanded that the deleted material should proactively interfere with the recall of the newly inserted response items, on the basis of partial learning. Of course, a failure to retard the learning process would argue strongly in favor of the noncontinuity position.

Thus, the following experiment was directed at assessing the role of frequency in the formation of associative bonds by inquiring as to the presence or absence of partial learning.

SUBJECTS

Twenty-one males and 12 females participated in this study. Ranging in age from 18-28, their mean age was 20.6 years. They were all students who were naive as to the purpose of this experiment.

PROCEDURE

The S was required to learn a list of eight pairs of nonsense syllables by the method of anticipation. The syllables were of 40-60% association value, as taken from the Glaze Table. All

material appeared in bold type on 3 x 5 index cards.

The stimulus member of the pair was exposed for 2 sec with S required to anticipate the correct response. This was immediately followed by a 2-sec presentation of the entire pair. The next stimulus item then appeared with no delay. There was a 6-sec intertrial interval. The same-paired associates were presented over and over again, in a different order on each trial, until S met the criterion of one perfect recitation.

Subjects were then broken down into three equally sized groups which were matched in terms of the number of trials to criterion on the above specified repetition list. The first group then learned another repetition list in the same fashion. Thus, the amount of savings from one list to the next was ascertained.²

Group 2 learned a list of eight pairs which were randomly selected from a pool of 125. Whenever a response was incorrectly anticipated, the entire pair was deleted from the list and replaced by a new one. The remaining 117 paired associates were used for purposes of substitution. S was advised of this procedure in advance so as to avoid undue confusion. For all intents and purposes, repetition was eliminated through the use of this substitution paradigm.

For the third group, an incorrect anticipation led to the replacement of only the response member of the pair. The list was constructed so as to allow for the substitution of 25 responses for each of the eight stimulus items. This replacement procedure permitted partial learning to reveal itself through proactive interference.

The time intervals used in the learning of this initial matching list were employed throughout the experiment. Also, it must be noted that S read the material aloud upon presentation in order to minimize the factor of selective attention.

RESULTS AND DISCUSSION

Groups 1-3 learned the matching list in an average of 14.5, 13.4, and 14.6 trials, respectively. These differences were not significant according to the Kruskal-Wallis one-way analysis of variance ($H = .453$, $df = 2$), indicating that the groups were equated successfully in terms of learning facility.

While it took 10.5 trials for Group 1 to learn the second repetition list, Group 2 required 14.6 under the substitution procedure. However, Group 3 needed 25.2 trials to master their task with the replacement of only the response items. These differences were significant according to the Kruskal-Wallis one-way analysis of variance ($H = 14.7$, $p < .01$, $df = 2$). The Mann-Whitney U test indicated that response substitution significantly impaired the learning process when compared to the replacement of the entire pair ($U = 21$, $p < .02$), as well as repetition ($U = 4.5$, $p < .01$). No reliable difference was found, though, between Groups 1 and 2 ($U = 41.5$).

These findings show that the single presentation of a paired associate is sufficient to generate some associative strength, as evidenced in the performance of the third group. Furthermore, the Rock type of procedure is not sensitive enough to reveal the incremental effects of repetition, for the reasons previously cited.

There is yet another way to interpret the data, which is perhaps even more meaningful. That is to use S as his own control by viewing each group independently. In comparing Ss' performance on the matching list with that on the one which followed, Group 1 showed a consistent practice effect. The second repetition list was learned significantly faster according to the Wilcoxon test ($T = 0$, $N = 11$, $p < .01$). The second group found the two lists comparably difficult, as the transfer effect dissipated ($T = 25$, $N = 10$, $p > .05$). Learning

through repetition proved to be easier than response substitution for Group 3 ($T = 0$, $N = 10$, $p < .01$).

It seems clear that if learning through substitution is equivalent to learning repetitiously, then the second group should have shown the same amount of positive transfer as the first. Since they did not, it may be concluded that the marginal advantage provided by frequency was cancelled out by the presence of practice in the learning of the replacement list. Furthermore, when the interference of partially learned responses is added to the absence of repetition, performance significantly deteriorates. Accordingly, the noncontinuity standpoint must be categorically rejected.

ADDENDUM

There have been many studies on one-trial learning carried forth in our laboratory. It seemed most profitable to abstract the findings as one separate appendage to the main body of this article, as opposed to submitting a host of lengthy papers to a group of weary editors.

First, we inquired as to whether it was possible to use Rock's substitution procedure in such a way as to permit the intrusion of old, partially learned responses. It was reasoned that if the order of a list of paired associates is held constant, then the response item of a deleted pair should subsequently be elicited by the position which it had previously occupied in the list. This would allow it to compete with the recall of a newly formed connection. Accordingly, an experiment was conducted in which the learning of a repetition list was compared to that of a replacement list, keeping a fixed order

of presentation. As a result, learning through repetition was significantly easier.

Secondly, it was difficult to support the continuity position when using the replacement paradigm with a group of rapid learners. However, it was found that frequency provided a decided advantage for these very same Ss when the task was made harder by merely increasing the length of the list.

Finally, the prompting method has been found to be sensitive to small differences between repetition and substitution which cannot be detected using the method of aided recall.

In conclusion, noncontinuity results seem to be based upon a peculiar combination of events, namely, subjecting rapid learners to a menial task, varying the order of pairs from trial to trial, and using the method of aided recall. When these conditions are not met, the facilitative effects of frequency emerge.

REFERENCE

ROCK, I. The role of repetition in associative learning. *American Journal of Psychology*, 1957, 70, 186-193.

NOTES

1. The interference of prior learning was not possible in the Rock substitution procedure. This is partially because the stimuli required to elicit the partially learned responses were no longer present. In addition, the responses could not be selected out on the basis of their previous position within the list, because the order of the pairs was varied from trial to trial.

2. In order to overcome the possible criticism that the second repetition list may have been easier than the first, it was randomly chosen from a pool of three different lists.

An attempt to relate test anxiety and Palmar Sweat Index

STEVEN B. SCOTT and MARC KESSLER, *University of Nebraska, Lincoln, Nebr. 68508*

Forty-seven female Ss completed the Mandler-Sarason Test Anxiety Scale (MSTAS), a rating of apprehension in an experimental situation, and were administered the Palmar Sweat Index (PSI), in the experimental situation. Self-ratings of apprehension and MSTAS were significantly correlated, but neither of these were found to correlate with PSI. Items from MSTAS asking about sweating also were not correlated with PSI. Results were discussed in terms of the criticisms of previous attempts at relating verbal and nonverbal indices of anxiety.

Much interest has been evident recently in the relationship between self-report indices of anxiety and measures of physiological emotionality or arousal. With the exception of a

study by Haywood & Spielberger (1966) most of this work has failed to demonstrate any relationship between the two variables (Katkin, 1965; McGuigan, Calvin, & Richardson, 1957; Winter, Ferreira, & Ransom, 1965). In discussing factors which may contribute to the difficulty in obtaining such a relationship Katkin suggests that "In order to elicit differential physiological responses from subjects who are presumed to differ in 'reactive anxiety' as measured by the Manifest Anxiety Scale it would appear necessary to elicit differential levels of apprehension from high anxiety and low anxiety subjects [p. 332]." Such differences in apprehension level would therefore seem to be a prerequisite to evaluating the possible relationship between the two measures.

Further, McGuigan et al suggest that the lack of correlation between the verbal and physiological indices may arise because of the different aspects of anxiety tapped by each. They point out that the physiological measures frequently employed, such