Recovery from punishment as a function of number of pre-punishment reinforcements¹

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Abstract

Ss were given from 200 to 3000 reinforcements in a Skinner box, then shocked for every response until they met a criterion of suppression. The following day, latency of the first response was recorded. Amount of suppression (latency on post-shock day) decreased with number of pre-punishment reinforcements up to 1000, but for greater numbers of reinforcements suppression increased.

Problem

While the evidence is not unanimous, there is an increasing amount of data showing that resistance to extinction (e. g., Birch, 1961; North & Stimmel, 1960), difficulty of discrimination reversal (e. g., Birch et al., 1960), and degree of retroactive inhibition (Postman & Riley, 1959) are not always monotonic functions of number of previous reinforcements. Some preliminary observations in our laboratory suggested that a similar nonmonotonic function might be found for recovery from punishment, and that is what the present study investigated.

Method

Ss were 30 male hooded rats, 110–140 days old, maintained at 80% of normal weight. Three other Ss were discarded (and replaced) due to procedural errors. The apparatus was a commercially-produced (Grason-Stadler Co.) one-lever Skinner box with the appropriate programming, reinforcing, and shocking equipment.

Ss were first given four days of magazine training at 80 reinforcements per day. Reinforcements were 97 milligram P. J. Noyes pellets. These magazine training reinforcements are not counted in the numbers of reinforcements discussed in this paper since they were not response contingent. On the next day, Ss were shaped manually and run on CRF until a total of 100 reinforcements had been received. This total included the shaping reinforcements (which never exceeded 25). On the next day another CRF session of 100 reinforcements was given. Ss were assigned to groups to be shocked after 200, 500, 1000, 2000, or 3000 reinforcements. Ss in the 200 group, thus, were shocked after two days of CRF.

On a punishment day, training conditions prevailed except reinforcement was discontinued and every lever press produced a 1-second., 1.3 ma shock. Ss remained in the chamber until they had failed to press the lever for 1/2 hour. Twenty-four hours (± 1 hour) later, S was returned to the chamber and the latency of the first response was recorded. Specifically, latency was measured from the onset of the S^D for responding (a moderate white noise and illumination of the houselight). Previously,

the S^D was present only while the VI schedule was in effect; i. e., during the time between the start of the session and the receipt of the last allotted reinforcement in that session. For most Ss the post-punishment session was identical to the training sessions, although some Ss later in the study were given an extinction session. Neither procedure, of course, could influence latency to the first response.

Ss continuing on beyond 200 reinforcements before punishment were shifted on their third day to a VI one schedule of reinforcement for the remainder of their sessions. Eighty reinforcements per day were given (except for a final session of 60 for Ss shocked after 500 reinforcements) until 1000 reinforcements had been reached. After 1000 reinforcements were passed, 60% of the Ss had completed the experiment and so it was possible to increase the daily reinforcements to 100 which was kept in effect until the 3000 reinforcement animals had finished.

The experiment was run in four replications, with at least one and no more than three Ss in each reinforcement condition per replication.

Results and Discussion

All Ss took between two and six shocks and this number was, fortunately, not correlated with number of prior reinforcements, so it was not a source of confounding.

Fig. 1. Average transformed latencies of first response on post-punishment session as a function of number of pre-punishment reinforcements. $N = 6$ for each point.

The transformed latency data are shown in Fig. 1. A non-parametric test of ordered alternatives (Jonckheere, 1954) rejects the hypothesis of monotonicity at the .05 level. Specifically, $1000 < 2000 < 3000 < 500 < 200$. In other words, increasing numbers of reinforcements do not continuously or asymptotically increase resistance to the suppressing effects of punishment.

Other measures of post-punishment performance showed no systematic effect. One confounding variable was whether the first response was reinforced or not; a reinforcement was always programmed, but the feeder in this apparatus was not completely reliable (the first pellet did not always drop all the way into the trough).

With respect to first-response latency, however, these results are consistent with the aforementioned growing body of data which indicate that response strength (measured by resistance to various kinds of interfering events) is not always monotonically related to frequency of reinforcement.

Abstract

KERPELMAN, L. C. (Institute for Juvenile Research, Chicago). Pre-exposure to visually presented forms and nondifferential reinforcement in perceptual learning. *J. exp. Psychol.*, in press.—An experimental clarification of previous pre-exposure experiments which seemed to support the differentiation viewpoint of perceptual learning was undertaken. 79 albino rats were reared from birth in a visually sparse environment. Circles and triangles hung in the cages of the experimental Ss. Nondifferential food reinforcement of these

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Note

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cage stimuli was varied, and the resultant effect on subsequently learning to discriminate between them was examined. Discrimination performance of the main experimental groups confirmed the hypothesis that nondifferential reinforcement played a role in previous pre-exposure studies of perceptual learning, thus supporting the enrichment approach. Results for supplementary groups necessitated expansion of that approach to include possible reinforcing effects of novelty. (Pre-publication copies available from author.)