Punishment continuity and self-punitive behavior¹

ROBERT S. BEECROFT, BONNIE G. FISHER AND SALLY A. BOUSKA
UNIVERSITY OF IOWA

Partial punishment schedules (20% or 50% trials punished) are as effective as 100% punishment in generating and maintaining self-punitive behavior following avoidance training. If punishment is not continued, running extinguishes fairly quickly.

After a rat learns an avoidance running response, punishment given in the last section of the alley before the goal box is similar in some respects to the avoidance training shock. Given a few avoidance training trials, the animal is usually well on the way to the goal when shock onset occurs and the shock continues during the balance of the run. In the punishment case we have studied, the animal encounters shock 1 ft from the goal box and runs through the punishment zone to complete the trial. We have made use of the presumed similarity of avoidance training and punishment during extinction in predicting that self-punitive running will persist longer following avoidance training than following escape training (Beecroft & Brown, 1967). The first experiment reported in this paper was concerned with a related issue, the resistance to ordinary extinction without punishment which is produced by punishment training as compared to avoidance training. Insofar as punishment training is similar to avoidance training, comparable amounts of such training should produce equal resistance to extinction.

EXPERIMENT 1

Method

The runway and the avoidance training procedures have been described previously (Beecroft, Bouska, & Fisher, 1967). All Ss, female hooded rats 84-94 days old, were trained to one avoidance with a 3 sec avoidance interval. One group of 20 Ss was given 10 more avoidance training trials. The number of additional shocks received by the avoidance Ss ranged from 0 to 7 with a mean of 3.4. The other group of 20 Ss was given punishment training for 10 trials. The punishment was a 55 V shock applied in the last 1 ft of the alley. After receiving either avoidance or punishment training for 10 trials, shock was discontinued for all Ss. The extinction criterion was 60 sec without entering the goal box. A maximum of 100 extinction trials was permitted, although no S approached this limit in Experiment 1. Four Ss were discarded. One did not reach the goal on the first avoidance training trial, one was lost because of an equipment breakdown, and two Ss extinguished during punishment training.

Results

The Ss given extended avoidance training showed slightly more resistance to extinction than the punishment-trained Ss. The respective means were 23.5 and 17.5 trials completed; medians were 20 and 12.5. The difference between the means was not statistically significant. The resistance to extinction displayed by these groups is somewhat greater than that of Ss who are ex-

tinguished directly after meeting the criterion of one avoidance. Thus, the additional avoidance or punishment training produces a small increment in resistance to extinction, but not the persistent running seen in Ss who are punished on every extinction trial as long as they continue to run. Of most importance is the fact that when punishment was removed, running extinguished within a comparatively few trials. This suggests that self-punitive behavior depends on the continuity of punishment rather than some buildup in extinction reserve. In the next two experiments, we investigated partial punishment schedules. Such schedules maintain punishment continuity although they vary punishment frequency.

EXPERIMENT 2

Method

The Ss were female hooded rats 83-98 days old when trained. There were 20 Ss per group. After being trained to one avoidance, they were given either 100% or 50% punishment during extinction. The 50% punishment group was punished on every other trial beginning with the first trial after the first avoidance. Three Ss were discarded for failing to meet the avoidance criterion within 30 trials, one escaped from the apparatus, one was injured, one failed to complete the first trial, one was shocked through error, and one was terminated because E had to go to class.

Results

Mean extinction trials completed for the 100% group was 42.1 compared to 41.0 for the Ss punished on 50% of the trials. Thus, the 50% punishment schedule was as effective as 100% punishment in maintaining running. Since nonpunished controls show much less resistance to extinction, this implies that somewhere along the punishment percentage dimension there is a sharp breakdown. If punishment is sufficiently infrequent, running will extinguish between scheduled punishments. Since control Ss extinguish on the average in 10-15 trials, a schedule in which punishment is given every fifth trial would place only two or three shocks in the presumptively important sequence of trials at the beginning of extinction. Experiment 3 was undertaken to see if resistance to extinction would be down at 20% punishment relative to the higher punishment percentages.

EXPERIMENT 3

Method

The Ss were female hooded rats 84-100 days old. There were 20 Ss per group. All Ss were trained to one avoidance, then punished on 0, 20, 50, or 100% of the extinction trials. Punishment began on the trial following the first avoidance. For the 50% group it was given on alternate trials and for the 20% group on every fifth trial. Eighteen Ss were discarded. Two Ss were injured, three were lost because of E error, two did not complete the

first training trial, two did not learn the avoidance response within 30 trials, there were two equipment failures, and E had to terminate running one S to go to class. Six Ss who extinguished on either the first or second extinction trial were discarded. Completion of one trial is necessary to be sure that S has been exposed to punishment or its absence; completion of two trials is necessary to insure that exposure to partial punishment has taken place.

Results

Figure 1 shows that the functions relating punishment percentage to resistance to extinction do not fall down at 20% punishment. The three punishment percentages were equally effective so far as self-punitive running was concerned. This is also shown in Fig. 2 which exhibits the number of Ss running after varying blocks of extinction trials. There was a tendency for more of the 100% punishment Ss to complete the first block of trials (also observed in Experiment 2), which is to be expected since this condition provides maximal exposure to punishment during the early extinction trials.

DISCUSSION

These experiments indicate that self-punitive running depends on punishment continuity. Once punishment is removed extinction occurs in short order. However, a

Fig. 1. Mean and median extinction trials completed as a function of punishment percentage.

Fig. 2. Number of Ss still running after 10-trial blocks in extinction.

20% partial punishment schedule is as effective in promoting durable self-punitive behavior as 100% punishment, although a few more partial Ss may extinguish within the first 10 extinction trials.

Two theoretical lines may be taken with respect to these facts. One would assert that periodic punishment is necessary to maintain conditioned fear. According to this view, if punishment is omitted for many trials, conditioned fear will extinguish and the animal will cease running. The other line, not necessarily contradictory, emphasizes the fact that by running fast S minimizes punishment duration and this reduction of punishment reinforces fast running which in some way prevents extinction. It is going to be difficult to experimentally separate these interpretations since both notions normally predict fast running.

References

- BEECROFT, R. S., BOUSKA, SALLY A., & FISHER, BONNIE G. Punishment intensity and self-punitive behavior. *Psychon. Sci.*, 1967, 8, 351-352.
- BEECROFT, R. S., & BROWN, J. S. Punishment following escape and avoidance training. *Psychon. Sci.*, 1967, 8, 349-350.

Note

1. This research was supported by Grant MH 11734-02 from the National Institutes of Health to Judson S. Brown.