Punishment intensity and self-punitive behavior[1]

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Resistance to extinction of avoidance running was enhanced by punishment. More self-punitive running was observed when the punishment voltage was the same as the training voltage. Running speed was correlated with punishment intensity.

Punishment has been shown to both decrease and increase resistance to extinction of avoidance-trained running in rats (e.g., Campbell, Smith, & Misanin, 1966; Beecroft, 1967). The paradoxical effects of punishment on avoidance behavior may be related to punishment intensity. This paper reports two experiments which related punishment intensity to self-punitive behavior.

Method

The apparatus has been described in detail (Brown, Martin, & Morrow, 1964). Its salient features are a duplex start box, a 6-ft alley, and a large black goal box. The rat is placed in the top half of the start box and dropped to the grid through a false floor. The Ss, female hooded rats, were handled for two days and both trained and tested on the third day. Training was carried out until the first avoidance response was made in the avoidance interval, which lasted 3 sec between the drop and shock onset. There was no warning signal. The rat was allowed to remain in the goal box 30 sec following a run; the intertrial interval was roughly 1 min. Extinction testing began on the trial after the S made an avoidance response and continued until S failed to enter the goal box within 60 sec or completed 40 trials, whichever occurred sooner. A speed score of 0.1 ft/sec was assigned for the trial on which the extinction criterion was met and the remaining scheduled trials. In Experiment 1, the Ss were 80-95 days old. They were trained with a 55-V ac shock (through 10 K resistance) and tested with 0, 40, 55, or 70 V shock present in the last 1 ft of the alley outside the goal box. In Experiment 2, the Ss were 90-95 days old. They were trained with 70 V and punished with either 55 or 70 V. There were 12 Ss in each of the six groups. A total of nine Ss were eliminated. Of these, four failed to reach the goal box on the first training trial, three extinguished on the first extinction trial before punishment was given, one was injured, and one was shocked outside the intended punishment zone by error.

Results

The mean number of extinction trials completed in Experiment 1 is shown in Fig. 1. The mean is a conservative estimate of resistance to extinction for punished groups, since 18 of the 36 punished Ss completed all 40 extinction trials, whereas none of the 12 nonpunished Ss reached this ceiling. Thus, the population means for punished groups are underestimated. Despite this, the difference between the punished Ss combined and the nonpunished control group is significant at the .01 level ($F = 20.9$, $df = 1/44$), as is the variation among the means of the punished groups ($F = 9.6$, $df = 2/44$). There was less resistance to extinction on either side of 55 V, the voltage used in training the avoidance response. Individual comparisons between the 55-V group and the other punished groups proved to be significant at the .05 level. Figure 2 shows another way of looking at the data. These are upside-down ogives which display the number of Ss who were still running at various stages of testing. No nonpunished S completed as many as 30 trials. Nine of the 12 55-V Ss completed 40 trials, and a tenth rat in this group extinguished on Trial 40. Four 40-V and five 70-V Ss ran the limit.

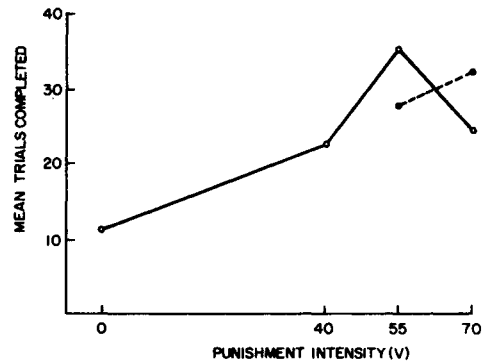

Fig. 1. Mean extinction trials completed as a function of punishment intensity. Solid line is for Ss trained at 55 V (Experiment 1) and dashed line is for Ss trained at 70 V (Experiment 2).

Speed data for the avoidance criterion trial and

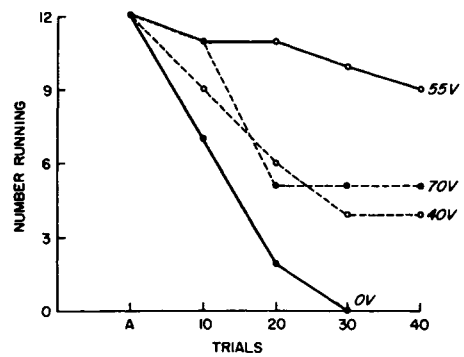

Fig. 2. Number of Ss still running after 10-trial blocks in extinction.

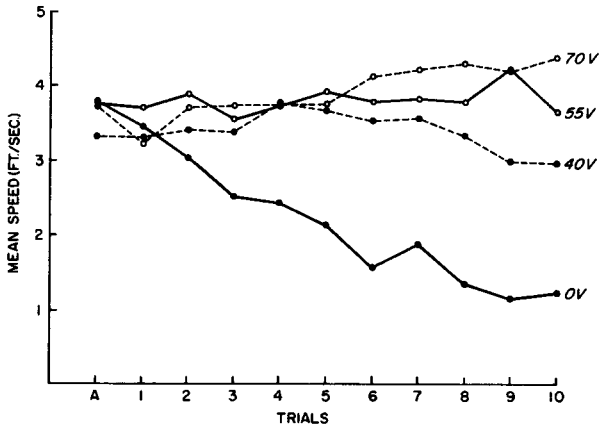

Fig. 3. Mean running speed in shock-free portion of the alley during the first 10 extinction trials.

the first 10 extinction trials are shown in Fig. 3. The measure is the speed over the first 4 ft of the runway, a shock-free measure on all trials. The first punishment was given on Trial 1, so punishment effects cannot appear until Trial 2. The figure shows that speed is generally maintained or increased by punishment, but falls off rapidly without punishment. Speed appears to be related to punishment intensity.

Experiment 2 was conducted to determine if the decrement in resistance to extinction at 70 V would be observed if this were also the training voltage. Two groups were trained at 70 V and tested at either 55 or 70 V. The dashed curve in Fig. 1 shows the results. The 70-V Ss were more resistant to extinction than the 55-V Ss, although the difference was not statistically significant ($F < 1$). Ten of the 70-V Ss completed 30 trials as compared to six of the 55-V Ss. Seven of the 70-V and six of the 55-V Ss ran the limit of 40 trials. Although the results of training at the two intensities are not symmetrical, they do indicate that training-to-punishment intensity shifts decrease self-punitive behavior.

Discussion

The results bear on three points. First, they sustain the conclusion of Beecroft (1967) that near-goal punishment *can* produce self-punitive behavior following avoidance training. There was almost no overlap in the 0- and 55-V extinction distributions, as there had been almost none in the previous study. Second, the data support the discrimination hypothesis insofar as shifts in shock intensity from training to punishment result in less resistance to extinction. Such changes do not cancel the self-punitive behavior; rather, they decrease the number of Ss displaying it. Third, the fact that speed of running is correlated with punishment intensity is in agreement with other studies, notably an escape experiment by Seward, King, Chow, & Shiflett (1965). However, in the Seward et al study punished Ss showed less resistance to extinction than nonpunished controls. Replotting the Seward data in ogival form along with our own, it appears that their punished Ss exhibited roughly the same frequency of self-punitive running at comparable stages of extinction as did our Ss. However, their nonpunished controls showed an even higher level of perseveration, quite unlike any control data we have obtained. This points up the need for a better understanding of simple extinction following various forms of emotional conditioning.

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Note

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