Self-punitive behavior and periodic punishment¹

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Periodic punishment (33%) was compared with continuous punishment (100%) for producing self-punitive behavior in a straight-runway shock-escape situation. Both punishment schedules resulted in self-punitive or vicious circle behavior. Periodic punishment was as effective as continuous punishment. The differences in performance on punished and nonpunished trials of the periodically punished group emphasized the role of punishment as a source of temporal drive.

The literature on the efficacy of percentage of punishment for production of self-punitive behavior reveals apparent contradictory findings. Melvin (1964) found self-punitive behavior more likely to occur with higher percentages of punishment after 33% or 67% schedules of "partial reinforcement" escape trials during acquisition. Beecroft, Fisher, & Bouska (1967) report self-punitive behavior to be equally probable within 20, 50, and 100% schedules of punishment after avoidance training. Thus, while different training procedures were employed in the two studies (escape vs avoidance), the effects of percentage of punishment have been different. The effects of percentage of punishment after 100% shock-escape training were tested in the present study.

Method

Twenty-four naive male Sprague-Dawley rats from Dublin Laboratories were used as Ss. They weighed approximately 225 g. The Ss were housed in individual cages and maintained on an ad lib food and water diet. Each S was deprived of food for 22 h prior to the experimental session.

The apparatus was a modified Hunter straight runway. The start box (4 x 4-1/2 x 12 in.) and alley (4 x 12 x 32 in.) were painted white with a stainless steel grid-rod floor through which scrambled shock (1.0 mA) of constant current was delivered. The goal box (4 x 12 x 4-1/2 in.) was black with a black wooden floor. Photocells and Klockounters were used to measure start time and alley time to the nearest .01 sec. Guillotine doors separated the sections of the apparatus.

After 16 shock escape trials with an average inter-trial interval of 30 sec, S was randomly designated to receive punishment on either 100%, 33%, or 0% of the next 99 trials. The punishment was shock delivered in the first 18 in. of the alley. Start speed and alley speed were recorded on each trial. During extinction shock was not present in any portion of the apparatus except in the punishment area.

Results

Analysis of variance of alley speeds during acquisition showed no differences between the groups prior to administration of punishment conditions.

Fig. 1. Mean number of responses completed during 99 extinction trials for punished (100% and 33%) and nonpunished (0%) groups.

Figure 1 shows the differences in number of responses completed during the 99 extinction trials for the three groups. The punished groups ran many more trials than the nonpunished group ($F=11.72$, $df=2/21$, $p<.001$), but there was virtually no difference between the 33% and 100% punished groups.

The speed measures during extinction support the number of responses to extinction data and provide a comparison between the performance of the 33% and 100% punished groups across trials. Figure 2 shows that both punished groups showed faster speeds than the nonpunished group ($F=11.35$, $df=2/21$, $p<.001$). The difference between the 100% and the 33% groups was statistically significant until the sixth block of trials ($t=2.74$, $df=14$, $p<.005$).

A comparison of the performance of the 33% group on punished and on nonpunished trials (Fig. 3) showed that performance was lower at every point on the nonpunished trials. This difference was statistically significant ($t=3.63$, $df=14$, $p<.025$). The difference

Fig. 2. Mean alley speeds in feet per sec over blocks of nine trials for punished (100% and 33%) and nonpunished groups during extinction.

Fig. 3. Mean alley speed in feet per sec during extinction for 100% punished group and punished and nonpunished trials of 33% punished group.

between the 33% and 100% groups was no longer statistically significant when performance on punished trials was compared.

Discussion

The results showed 33% punishment to be as effective as 100% punishment for producing self-punitive behavior.

How are differences between these data and those obtained by Melvin explained? Our best guess is that the variable of "percentage of punishment" may well have an effect, but that its effects may be masked by other conditions that are optimal for producing self-punitive behavior. Melvin (1964) used escape training while Beecroft et al (1967) used avoidance training, and it has been shown (Hurwitz, Bolas, & Haritas, 1959; Beecroft & Brown, 1967) that self-punitive behavior is more likely to occur after avoidance training than after escape training. Another reason might be that Melvin used delayed punishment (near the goal box) while immediate punishment (near

the start box) was used in this study. Martin & Melvin (1964) have shown that immediate punishment is much more effective for producing self-punitive behavior.

These data offer little support for the discrimination hypothesis explanation of self-punitive behavior since it would predict stronger self-punitive behavior from the 100% punishment group because extinction-punishment conditions for that group would be most similar to training conditions. To support the Mowrer-Brown (see Brown, Martin, & Morrow, 1964) "conditioned fear" explanation we would have to assume that the percentage of punishment employed was sufficient to maintain the conditioned fear and thus prevent its extinction. The differences in performance on the punished and nonpunished trials of the 33% group show how rapidly performance can drop when the drive due to the shock-punishment is omitted. The temporal aspect of the drive variable may also be important for maintaining self-punitive behavior.

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Note

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