Generalization of the partial reinforcement effect¹

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In within-subject experiments, partial reinforcement is usually given to one stimulus, 100% reinforcement to the other. Data are presented which suggest that rate of extinction to the two stimuli is not only determined by percentage reinforcement to the partially reinforced stimulus, but also by the overall percentage reinforcement.

Recently, the relation between partial (PRF) and continuous reinforcement (CRF) and resistance to extinction of a locomotor response has been studied within single organisms (within-S). The majority of these within-S experiments have failed to reproduce the between-S partial reinforcement effect (PRE). Instead, resistance to extinction has been as great in the presence of the stimulus signalling CRF as to the PRF stimulus (Amsel, Rashotte, & MacKinnon, 1966; Brown & Logan, 1965; Pavlik, Carlton, & Hughes, 1965; Spear, 1964; Spear & Pavlik, 1966; Spear & Spitzner, 1967).

A characterization of the within-S finding as a generalized PRE (Brown & Logan, 1965) might be taken to suggest that, for a given percentage of reward, resistance to extinction to the within-S CRF stimulus should not only be the same as to the PRF stimulus, but that both should show the same resistance to extinction as a comparable between-S PRF condition. However, experiments comparing extinction performance after within- and between-S training (e.g., Amsel, Rashotte, & MacKinnon, 1966, Exp. 4; Pavlik, Carlton, & Hughes, 1965) suggest that when the same Ss are rewarded on all trials to one stimulus and on 50% of trials to another (75% reward overall) they extinguish more quickly to both stimuli than does a group which receives 50% reward to both stimuli.

We were interested in this experiment to determine whether resistance to extinction shown in both runways by a group rewarded 50% in the PRF runway and 100% in the CRF runway is determined by the percentage of reward to the PRF stimulus or by the overall percentage. For comparison, one group was trained with 50% reward in both runways, and another group was trained with 75% reward in both runways.

Method. The Ss were 21 experimentally naive male albino rats obtained from Woodlyn Farms, Guelph, Ontario. They were approximately 80 days old at the beginning of training.

The apparatus was identical to the 3-ft runways described by Amsel, Rashotte, & MacKinnon (1966) except that, to control for brightness effects the runway stimuli used were of the "split alley" variety (Kolesnik & Amsel, 1966); that is, one runway was black on the left and white on the right (BW), the other was white on the left and black on the right (WB).

The Ss were maintained in individual cages and were placed on a 10g-23h food deprivation schedule for 11 days preceding the beginning of experimental training. On each of these days Ss were handled in the colony room and fed the daily ration in their home cage shortly afterward. Ss were not exposed to the apparatus before training began. Ss were randomly assigned to three groups of seven labelled 50-100, 50-50, and 75-75. The hyphenated numbers indicate for each group the percentage reward given in the BW and WB runways, respectively. Four trials were run on each day, two in the BW and two in the WB alleys. The minimum intertrial interval was 15 min. Ss of the 50-100 group were rewarded on only one of the two BW trials on each day; the 50-50 Ss were rewarded on only one of the BW and one of the WB trials on each day; and the 75-75 Ss were nonrewarded on one BW and one WB trial in successive 2-day blocks (one nonreward every four trials in each runway). On rewarded trials Ss were removed from the runway when they had finished eating; on nonrewarded trials, 20 sec after breaking the last photobeam. Throughout the experiment, reward was one 500-mg Noyes pellet.

Each S ran 120 acquisition trials (60 in each alley) followed by 40 extinction trials. During extinction if S failed to traverse any 1-ft segment in 60 sec it was removed from the apparatus and given a score of 60 sec in all remaining measures.

Fig. 1. Mean total alley speeds on the last acquisition block and each extinction block.

Results and Discussion. Because, in extinction, the three runway measures showed very similar effects, they were combined into total alley speeds in ft per sec (3.0/total time). These speeds are shown for each of the groups in the two runways on the last block of acquisition and each of the extinction blocks in Fig. 1. Analyses of variance performed separately on the data for each group confirmed that there were no significant within-S differences in the two runways for any group, but yielded significant block effects ($p < .01$) indicating that extinction occurred. Between-group comparisons were performed employing Anderson's (1963) transformation to equate terminal acquisition levels among groups, and comparisons were made between groups in terms of performance in the WB runway, which should reflect the generalized PRE for the 50-100 group. Analysis of the Anderson-transformed data for the 50-100 and 50-50 groups yielded a significant difference, $t = 4.25$, $df = 12$, $p < .01$, which reflects slower extinction for the group receiving 50% reward to both stimuli. The same kind of analysis revealed no significant difference ($t < 1$) between the 50-100 and the 75-75 groups, again in terms of performance in the WB runway.

These comparisons indicate that, in the usual within-S PRF experiment, with 50% reward to the PRF stimulus and 100% to the CRF stimulus, rate of extinction to both stimuli is not determined only by the PRF percentage but by the overall percentage reward. This confirms the suggestion made by Pavlik, Carlton, & Hughes (1965). Such a finding suggests that within-S extinction is not simply a matter of generalization of the PRE (Brown & Logan, 1965) but that it may involve generalization from the CRF stimulus also.

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NOTES

1. This research was supported by Research Grants GB-3772 from the National Science Foundation and APB-72 from the National Research Council of Canada.

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