Effect of maintenance schedule on the relationship between alley speeds and preexperimental deprivation periods*

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Eight Ss, matched on three critical variables, were employed in an analysis of the relationship between deprivation schedules and length of preexperimental deprivation period on subsequent performance in the alley. With a 23-h deprivation interval, a 2-week preexperimental group was superior to a 2-day group: a finding similar to that of Capaldi & Robinson (1960). When maintained in constant-weight cages (90% BW), no significant differences obtained between the 2-week and 2-day groups.

A number of studies have previously shown that, as the number of days on a deprivation cycle is increased, there is a subsequent increase in activity as measured by an activity wheel (Reid & Finger, 1955, 1957; Finger, Reid, & Weasner, 1957). This increased activity with prolonged deprivation tends to suggest that performance in learning situations that are related to activity (e.g., running) may be determined by the length of time on the deprivation schedule.

Capaldi & Robinson (1960) clearly indicated that length of time on a deprivation cycle does influence performance in the runway (Experiment I). Ss were given runway training after either 1 or 10 days on a 23½-h deprivation cycle. Fifteen massed trials were given to all Ss. The group run after a 10-day exposure to the deprivation cycle ran significantly faster than the Ss given only 1 day. Furthermore, only the 10-day deprivation cycle group showed any indication of a performance change over the 15 massed trials. Thus, these studies indicate that activity and performance both may depend upon length of time on a deprivation schedule.

In the present study, this relationship was examined for two types of maintenance schedules. The Capaldi and Robinson design (23-h deprivation) was repeated but with spaced rather than massed trials. The second maintenance schedule employed weight-control cages, in which Ss are continuously and automatically kept at 90% of initial ad lib weight. Such a schedule differs in important ways from the hours of deprivation schedule (Ehrenfreund, 1960).

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METHOD

Subjects

From a large population of rats, eight experimentally naive male albino rats, approximately 120 days of age at the beginning of the experiment, were selected as described below.

Procedure

Table 1 summarizes the sequence of events. Initial running speeds for the first run of each exploration day (Days 3 and 4) were recorded. At the end of Day 4, all Ss were matched on the basis of their ad lib weights, average amount of food consumed daily, and initial running speeds during the alley exploration pretraining phase of the experiment. Four pairs of Ss, each pair with the same scores on these measures, were selected. One member of each pair was assigned to a 2-day group and the other to a 2-week group. *Deprivation:* Group 2-day/23-h was placed on a 23-h deprivation cycle for 2 days prior to training in the alley. Group 2-week/23-h was placed on the 23-h deprivation cycle for 2 weeks prior to initiation of alley training. Group 2-day/90% BW was placed in weight-control devices and maintained at 90% ad lib weight for 2 days prior to alley training. Group 2-week/90% BW was placed in the weight-control devices for 2 weeks prior to alley training. Thus, within each of the two maintenance schedules there were two Ss maintained for 2 days matched with two Ss maintained for 2 weeks prior to the first experimental trial. The weight-control devices used in this study have been previously described in detail (Ehrenfreund, 1966). Training was initiated on Day 20 for all Ss. All were given one trial per day for 24 days in a 4-ft alley, with a 190-mg pellet as the reinforcer on each trial. Measures of run (middle 2 ft) and total speeds were calculated for each S daily. Ss were maintained on their respective schedules throughout the study.

RESULTS

Mean running speeds in the middle 2-ft section of the alley for the two 90% groups and the two 23-h groups are depicted in Fig. 1. Since our primary concern was whether the 2-day and 2-week Ss within each of the 90% and 23-h groups differed, separate analyses of these

Table 1
Procedure for 2-Day vs 2-Week Groups for Both Maintenance Schedules

Day	2-Day Groups
1-2	Ad lib: Handling (15 min)
3-4	Ad lib: Alley exploration (10 min)
5-16	Ad lib
17	Initiate deprivation (23 h or 90%)
18-19	Deprivation
20	Initiate alley training
Day	**2-Week Groups**
1-2	Ad lib: Handling (15 min)
3-4	Ad lib: Alley exploration (10 min)
5	Initiate deprivation (23 h or 90%)
6-19	Deprivation
20	Initiate alley training

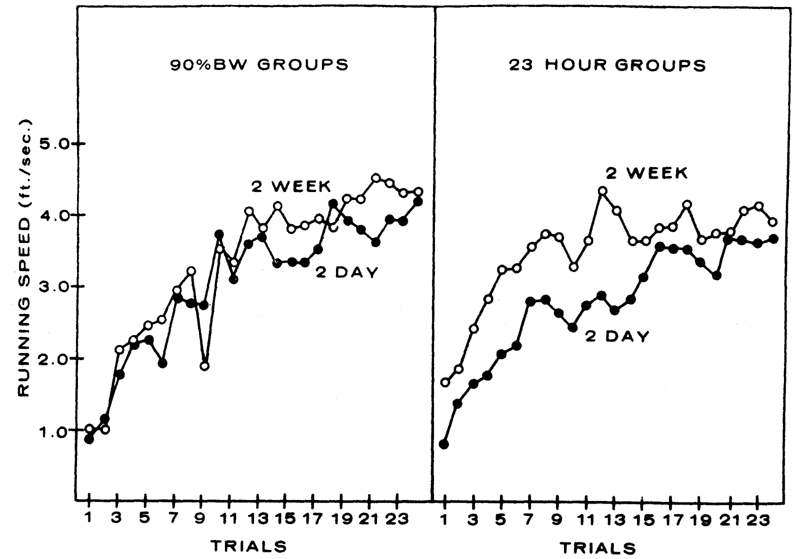

Fig. 1. Running speed (feet/second) in middle 2 ft of alley for each trial for each group.

groups were conducted. A mixed (one between, one within) analysis of variance design was employed to test these effects. The between variable was groups (2-day vs 2-week) and the within variable was trials (24).

The analysis of variance for the 23-h deprivation Ss produced a significant Trials by Groups interaction ($F = 11.49$, $df = 23/46$, $p < .001$). As can be seen in Fig. 1, the 2-week Ss ran faster than the 2-day Ss, although it appears that the superiority of the former diminishes over trials. A similar analysis was conducted for the 90% BW Ss and produced a nonsignificant Trials by Groups interaction ($F = 0.78$, $df = 23/46$). To further substantiate that the 2-week Ss ran *faster* than the 2-day Ss only on the 23-h deprivation schedule, matched pairs analyses (one-tailed) were conducted for Trials 4-14. The comparison of the 2-week and 2-day matched pairs on the 23-h deprivation schedule was significant ($t = 8.53$, $df = 1$, $p < .05$), while the same comparison for the 90% BW Ss failed to indicate a superiority for the 2-week Ss ($t = 0.95$, $df = 1$). Similar analyses for total speeds led to the same conclusions.

DISCUSSION

These results support Capaldi and Robinson. The longer the preexperimental 23-h deprivation cycle, the faster the speed of the Ss. However, the same conclusion concerning preexperimental length of time in weight-control devices is not merited. Ss' performance in the alleyway did not differ as a function of length of preexperimental time on the deprivation schedule as defined by constant-weight cages. One practical application is that, in studies requiring varying preexperimental deprivation periods, the weight-control device would have obvious advantages. On the theoretical level, these data indicate that, as preexperimental deprivation time increases, drive increases if the maintenance schedule is defined in hours but not if the schedule is defined in terms of constantly maintained percentage body weight.

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