The rat's adjustment to the 23-hour water-deprivation schedule under two conditions of food availability¹

ROBERT H. DUFORT, ANNE J. FUNDERBURK AND HOWARD A. ROLLINS²

WAKE FOREST COLLEGE

Two groups of rats were placed on a 23-hr. water-deprivation schedule. Group F always had food available; Group NF had food available except during the daily 1-hr. water-intake period. Both groups adjusted to the schedule in 3 to 6 days; however, the weight of Group F increased after adjustment while weight of Group NF remained constant. The possibility that the groups differed in motivation level following adjustment was discussed.

Studies have found that the rat adjusts to the 23-hr. food-deprivation schedule in 15 to 20 days and to the 23-hr. water-deprivation schedule in 2 to 5 days (Dufort, 1963, 1964; Dufort & Blick, 1962; Fallon, 1965; Reid & Finger, 1955). Dufort, Rollins, & Funderburk (1965) observed, however, that these findings are limited to schedules in which the non-deprived substance (e.g., water for food-deprived Ss) is available during the daily 1-hr. period when the deprived substance (e.g., food) is available. There is little uniformity among Es who use deprivation schedules to control motivation in animal-learning studies with regard to whether or not they permit Ss to have the non-deprived substance with the deprived substance; indeed, many Es fail to report information on this matter. Since presence or absence of the non-deprived substance might affect adjustment, and since Ss should adjust before being introduced to the learning situation (Reid & Finger, 1955), comparisons of adjustment under the two conditions of availability of the non-deprived substance are needed. Dufort et al. (1965) showed that the 15 to 20 day adjustment period needed for the 23-hr. food-deprivation schedule when water is given with food changes to an estimated 30 to 35 day period when water is not given with food. The experiment reported here is concerned with the effect on adjustment to the 23-hr. water-deprivation schedule of presence or absence of food during the daily 1-hr. drinking period.

Method

The experiment was run in two replications, identical except for number and age of Ss. In the first replication, two matched groups of eight Ss each, 127 days old, were formed on the basis of mean daily body weight during a six-day ad libitum base period; the second replication used two matched groups of five Ss each, 115 days old, formed in the same way. All Ss were male rats of the Holtzman strain, housed in individual living cages. After the base period, both groups in each replication were placed on a 23-hr. water-deprivation schedule for 21 days; water was given only from 2:00 P.M. to 3:00

P.M. daily. For Group F, Purina lab chow pellets were always available; for Group NF, pellets were available at all times except during the 1-hr. drinking period. Measures taken for all Ss were body weight at 2:00 P.M. and water intake during the daily 1-hr. period.

Results

Adjustment trends were similar in both replications; therefore, only data from the first replication will be presented. In Table 1, weight and intake measures for the 21 days of deprivation appear. Day-0 weights were obtained on the day after the base period, just before deprivation started. The difference in Day-0 weights for Groups F and NF was not significant in either replication ($p > .05$).

With regard to adjustment trends, Table 1 shows that Group F lost weight for three days and then gradually gained weight. Group NF also lost weight for 3 days but failed to gain thereafter. The water intake of Group F increased for 5 to 6 days and remained stable thereafter. Similarly, intake of Group NF increased for 6 days before reaching stable values. As would be expected, mean daily water intake of the group with food during the drinking hour (Group F) was significantly greater than the intake of Group NF in both replications ($p < .05$).

Table 1. Mean body weight and water intake for the groups in the first replication (N=8 in each group)

Day	Group F		Group NF	
	Weight (gm)	Intake (ml)	Weight (gm)	Intake (ml)
0	439.0		438.2	
1	411.4	18.6	411.3	15.8
2	405.6	22.0	406.4	17.8
3	405.4	22.9	404.3	19.3
4	406.3	23.9	405.1	19.8
5	407.1	25.9	404.3	20.1
6	407.0	26.1	405.6	22.0
7	407.5	25.8	404.9	21.0
8	409.6	26.3	405.4	20.7
9	409.3	26.4	405.2	21.8
10	410.4	26.0	404.8	20.4
11	410.7	26.7	405.4	21.9
12	411.3	27.3	405.6	22.8
13	413.0	25.7	408.7	22.7
14	412.8	26.1	406.2	22.2
15	413.9	24.8	404.6	23.1
16	414.2	26.3	407.2	22.5
17	415.6	25.9	406.9	22.6
18	416.3	27.0	407.1	22.1
19	416.5	26.4	405.8	21.3
20	418.6	25.7	407.0	22.0
21	419.7	26.5	406.7	20.8

Discussion

The weight and intake trends for Group F show adjustment to the schedule in 3 to 6 days, as expected from previous research. The trends for Group NF also show adjustment in 3 to 6 days. Thus, although removing water during the eating hour virtually doubles the adjustment time for the 23-hr. food-deprivation schedule (Dufort et al, 1965), presence or absence of food during the drinking hour has no effect on the adjustment time for the 23-hr. water-deprivation schedule. The chief effect of the food variable is, rather, on weight trends after adjustment. Group F shows a steady increase in weight after Day 3, a trend seen previously for Ss on this schedule (Dufort, 1963). Group NF shows a surprisingly stable weight level following adjustment. This stability of weight, however, has not been universally found; Kutscher (1964), for example, reports a modest weight gain following adjustment for Ss on a 23.5-hr. schedule that omitted food during the .5-hr. drinking period. This discrepancy between Kutscher's results and the present results could be due to the different temporal features of the two schedules.

More to the point, for the E using water deprivation in studies of learning, is the possible implication for the motivational level of the Ss of the difference in post-adjustment weight trends in Table 1. Using bar pressing as a behavioral index, Davenport & Goulet (1964) report that Ss kept at a constant weight following adjustment to a food-deprivation schedule undergo an increase in motivation as a result of failure to maintain a normal growth rate. Ss on a schedule which permitted

them to gain weight after adjustment, however, showed evidence of remaining at a relatively constant motivational level. The weight trends of Groups F and NF bear an obvious similarity to the weight manipulations used by Davenport & Goulet. Whether their results with food deprivation would be obtained using the water-deprivation schedules of the present study can only be determined empirically.

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Notes

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2. Now at University of California, Los Angeles.