Deprivation changes initial affective value of sodium saccharin

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The relationship between degree of water deprivation and affective value of a .2% sodium saccharin solution was determined for 15 female albino rats in a one-bottle test situation. Initially, ad lib animals greatly preferred saccharin, whereas rats deprived for 23½ h decreased their fluid intake and the 47-h deprived showed no initial change. Subsequently, these effects did not appear when a 1% sodium chloride solution was presented to assess effects of stimulus change. Thus, the effect observed with saccharin may not be simply due to novelty of the new solution.

Bauer (1968) showed that female rats under ad lib conditions highly preferred a .2% sodium saccharin solution in a one-bottle situation. In an unpublished study in the present laboratory, this same strength of saccharin produced temporary depression of intake under 23½ h of water deprivation. The present experiment attempts to resolve this discrepancy by manipulating water deprivation and observing changes in affective value.

Fig. 1. Average relative fluid intake (fluid drunk per unit of body weight) under varying degrees of water deprivation for one-bottle presentations of water, .2% sodium saccharin, and 1% sodium chloride solutions.

In an attempt to determine whether or not the observed effect is due to increased sensitivity to stimulus change, a 1% sodium chloride solution was also presented. If deprived animals are more sensitive to stimulus change, then sodium chloride might reasonably be expected to produce the same initial depression of intake among deprived animals as the sodium saccharin, while producing the same initial increase in intake among the nondeprived animals as the sodium saccharin.

METHOD

Fifteen female albino Dublin (DUB/SDD) rats (80 days old) were housed individually under 24 h of light with ad lib Purina Chow. Nine days of ad lib tap water were allowed for adjustment to living conditions. After the ninth day, five of the rats were placed on a 23½-h water-deprivation schedule (½-h daily access to water) and five on a 47-h water-deprivation schedule (1-h access to water every other day); the remaining five were continued on the ad lib schedule (continuous access to water). Nine more days were allowed for adaptation to the new conditions. Following this adaptation period, a .2% soluble sodium saccharin solution was substituted for the water for the next 8 days (Deprivation Days 10 through 17). Following this saccharin-presentation period, a 1% sodium chloride solution was substituted for the saccharin for 3 days (Deprivation Days 18 through 20).

All solutions used were made with fresh tap water and stored at room temperature for at least 24 h prior to presentation. Body weights, as well as fluid intake, were recorded daily. Since the three groups differed in terms of body weight as a consequence of the differing schedules, fluid intake was calculated as intake per unit of body weight (cc/kg).

RESULTS AND DISCUSSION

Fluid intakes by days for the three groups of animals are shown in Fig. 1. If deprivation alters affective value of saccharin, then the deprived animals should show depressed intake on Day 10 (first saccharin day) while the ad lib animals should show an increase. The average water intake for Days 8 and 9 was used as a baseline for water for ad lib and 23½-h deprived rats; for 47-h deprived rats, Day 8 alone was used. A t for paired observations (Edwards, 1968, p. 164) and r_m , a measure of magnitude of experimental effect (Friedman, 1968), were calculated for the difference between water baseline and first day of saccharin. The ad lib animals significantly increased their intake ($t = 3.27$

with 4 df, $r_m = .85$), while the animals under 23½-h deprivation significantly decreased their intake ($t = -4.49$ with 4 df, $r_m = .91$). The 47-h deprived animals decreased fluid intake, but not significantly ($t = -1.03$ with 4 df, $r_m = .46$). Thus, the relationship between thirst and initial affective value of .2% sodium saccharin seems to be inverse. This inverse relationship is consistent with the effects of thirst on saccharin preference relative to water in the two-bottle situation; as number of hours of deprivation increases, water becomes preferred to saccharin (Strouthes & Navarick, 1967).

The sodium chloride solution did not produce a similar effect. Ad lib animals significantly increased their first-day intake over baseline water intake ($t = 3.35$ with 4 df, $r_m = .85$), but not over baseline saccharin (average of last 2 saccharin days) ($t = -.82$ with 4 df, $r_m = .38$). The 23½-h animals showed similar results: increased sodium chloride intake over baseline water ($t = 2.73$ with 4 df, $r_m = .81$), but not over baseline saccharin ($t = .71$ with 4 df, $r_m = .34$). The 47-h deprived group significantly increased their intake of first day sodium chloride over both baseline water ($t = 3.16$ with 4 df, $r_m = .84$) and baseline saccharin ($t = 3.42$ with 4 df, $r_m = .86$). Thus, the stimulus change itself probably was not the cause of the temporary depressing effect of saccharin on deprived animals.

This experiment contradicts one aspect of the emotional change hypothesis, previously proposed by Rosen (1968) and Bauer & Bauer (1969), which states that deprivation should cause a change in emotional reactivity to stimulation. The hypothesis asserts that as a consequence of such manipulations the normal response to such stimulation becomes exaggerated. As applied to the present experiment, this hypothesis predicts that deprivation increases affective value when in fact deprivation initially decreased saccharin intake.

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