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NOTES

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Sucrose preference in rats following amygdaloid lesions

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Preference for seven increasingly concentrated sucrose solutions was examined in amygdala-lesioned and control rats. Although the amygdaloid Ss tended to show less preference for .01 and .03 M sucrose, their performance was well within normal limits for the remaining concentrations. It is suggested that amygdaloid hyporeactivity to positive taste stimuli may be brief in duration.

A number of experiments have implicated the amygdaloid complex in motivational processes. Grossman (1963, 1964) found that electrical or chemical stimulation and ablation within the amygdaloid complex of rats reliably altered food and water intake. Schwartzbaum (1960, 1961) has also shown that operant response rates of monkeys are insensitive to changes in magnitude of reward and prolonged food deprivation following extensive amygdaloid lesions. Recently Kemble & Schwartzbaum (1969) found that short-term licking rates for 2%, 8%, and 32% sucrose solutions were reduced, while daily quinine solution consumption was temporarily increased, in rats following amygdaloid lesions. These results suggest the possibility that the amygdaloid complex may function, in part, to modulate the incentive properties of taste

stimuli. The present experiment further explores this possibility, using a wider range of sucrose concentrations and the more traditional two-bottle preference test.

SUBJECTS

The Ss were 17 male albino Sprague-Dawley rats, 140-160 days old at the beginning of the experiment. These Ss previously served in an experiment to determine the effects of amygdaloid lesions on general activity levels.

All operations were carried out under clean conditions with sodium pentobarbital anesthesia (50 mg/kg). Amygdaloid lesions

(N = 10) were produced by passing 2.0-mA current from a Grass radio frequency lesion maker through the uninsulated tip of a 24-ga hypodermic needle for 20 sec. Four Ss received control operations, and the remaining (N = 3) Ss served as normal control Ss. There were no reliable differences between the two control groups, and their data were pooled for further analyses.

All tests were conducted in S's (7 x 14 x 7 in.) home cage, which had been adapted to accept the drinking spouts of two 100-ml drinking cylinders which were mounted on the front of the cage approximately 4 in. apart. Seven sucrose solutions were used as test substances, with concentration increasing in equal log-molar steps (.001, .003, .01, .03, .1, .3, 1.0 M). Ss were tested for 2 days at each sucrose concentration, with the position of the sucrose cylinder reversed each day. The remaining graduated cylinder always contained tap water.

At the conclusion of the experiment, 40-micron coronal sections were prepared and stained with cresyl violet through the area of the amygdaloid lesions.

RESULTS AND DISCUSSION

The amygdaloid lesions in this experiment consistently damaged the cortical, basal, and central amygdaloid nuclei, while the medial (N = 8) and lateral (N = 7) amygdaloid nuclei frequently escaped damage. Occasional damage to the optic tracts (N = 2) and caudate-putamen (N = 3) was also noted but produced no detectable changes in performance.

Initial comparisons failed to suggest any reliable differences between the amygdaloid and control groups in total fluid consumption or body weight. Moreover, both groups showed a reliable increase in fluid consumption with

Figure 1.

increases in sucrose concentration ($F = 101$, $df = 6/90$, $p < .001$) and drank more sucrose solution than water ($F = 1,206$, $df = 1/15$, $p < .001$). Mean sucrose-water differences during preference testing are presented in Fig. 1. Although there were no reliable group differences ($F < 1.0$), analysis of variance indicated a significant Lesion by Sucrose Concentration interaction ($F = 2.74$, $df = 6/90$, $p < .05$). It may be seen in Fig. 1 that this resulted primarily from a decrease in sucrose preference by the amygdaloid Ss at .03 M sucrose ($t = 1.91$, $df = 16$, $p < .10$).

Although the sucrose preference of the amygdaloid Ss in this experiment tended to be somewhat depressed at lower concentrations, their performance for the remaining solutions was within normal

limits. These results suggest that amygdaloid hyporeactivity to taste stimuli may be confined to relatively brief exposures and is obscured by daily consumption measures. Thus Kemble & Schwartzbaum (1969) found that amygdaloid Ss consumed less 32% sucrose than did control Ss during the first 3½ min of testing but that the groups were indistinguishable when consumption was compared for the entire 14-min session. Similarly, 24-h single-bottle saccharin solution consumption failed to discriminate between amygdaloid and control Ss. A more extensive series of experiments is now being conducted.

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NOTES

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