Spatial probability learning and brain stimulation in rats

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Five rats were run for 3,000 trials with ICS as a reinforcer on a 70:30 spatial probability problem employing a correction procedure. All Ss responded to the more frequently rewarded side most of the time. However, none completely maximized.

A previous experiment (Johnson & Levy, 1969) examined probability learning in rats run for an extensive number of trials (up to 8,000), in which reinforcement consisted of brain stimulation. The use of spatial discriminations and a noncorrection procedure was expected to favor maximizing behavior (Bitterman, Wodinsky, & Candland, 1958; Parducci & Polt, 1958; Poland & Warren, 1967). However, only one rat out of eight clearly maximized. The present experiment was carried out in a similar fashion except that a correction procedure was used in an effort to obtain more systematic behavior.

SUBJECTS

Five male Long-Evans rats, about 100 days old, were stereotaxically implanted with bipolar electrodes, .014 in. in diam, aimed at the lateral hypothalamus (flat brain coordinates: 1.5 mm lateral, 3.5 mm behind bregma, 8.5 mm below skull surface).

APPARATUS AND PROCEDURE

The apparatus is the same one previously described (Johnson, 1968; Johnson &

Levy, 1969). Briefly, rats were shaped to poke their noses through either of two holes in a black wall and press white response panels immediately behind. After Ss had learned to respond, 70% of left responses and 30% of right responses were reinforced with 0.5 sec of 60-cycle sine-wave current. A light behind each panel went out during the 3.0-sec intertrial interval. Each S was run in three sessions of about 1,000 trials each.

RESULTS AND DISCUSSION

Figure 1 shows the mean per cent of initial responses to the more frequently rewarded side. The performance of all five rats was similar, and the group curve may be taken as being representative. It is interesting to note that, even after 3,000 trials, all rats continued to respond to both panels and failed to show 100% maximizing. As a group, Ss responded to the more frequently rewarded side 94.0% of the time over the last block of 1,000 trials. These findings are consistent with

Fig. 1. Mean per cent of initial responses to the more frequently rewarded side in a 70:30 spatial problem.

others (Mackintosh, 1967; Poland & Warren, 1968) noting the failure to obtain clear maximizing, and tend to support Mackintosh's interpretation that probability-learning scores represent quantitative rather than qualitative differences in learning.

More surprising than the final level of performance under the conditions of the present experiment (massed trials, ICS reinforcement) is the speed at which it is reached. After 500 trials, Ss are still clearly matching, and it is only after about 1,000 trials that they reach the 90% level. This contrasts with the data of Bitterman, Wodinsky, & Candland (1958), which show that, with a 70:30 spatial problem and guidance procedure, rats reach the 90% level after about 120 trials. It would appear that training conditions can be as important as species differences in determining overall performance.

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NOTE

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