Effects of dark preference on attention to the positive cue in posterior neodecorticated albino rats

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Transfer of attention to the relevant stimulus dimensions of a successive brightness discrimination was assessed by the "acquired distinctiveness of cues" method in posterior neodecorticated rats. Attention to the relevant cue was retarded when Ss responded trophically toward the dark in a simultaneous brightness problem. Dark preference was negatively correlated with effective performance of a subsequent successive problem.

Two-stage models of discrimination learning predict that rats will solve a problem more rapidly when they have first learned to attend to the relevant stimulus dimension (Mackintosh, 1965). Stratton & Edwards (1971) found that occipitlectomized rats have a persistent dark preference which facilitates performance of a simultaneous (SI) problem when dark is the positive cue and retards performance when light is positive. Hypothetically, rats trained to respond toward their preferred cue would learn little about the stimulus dimensions of the problem, whereas rats responding against their preference would be forced to notice both cue dimensions of the task. Lawrence (1949) demonstrated that rats trained to respond to brightness cues on a SI discrimination were facilitated in learning a successive (SU) discrimination which followed. The present study used Lawrence's paradigm to evaluate transfer of attention from a SI to a SU problem when a preferred (dark) vs nonpreferred cue (light) was positive on a SI problem.

SUBJECTS AND APPARATUS

The Ss were 16 adult male Sprague-Dawley albino rats. Before training, all Ss received bilateral posterior neodecortication by the suction method under Nembutal sedation. Krieg's (1946) Areas 17, 18, 18a, and parts of the surrounding tissue were removed, and extent of lesion was determined by autopsy at the end of the experiment (Fig. 1). After a 4-week recovery period, Ss were assigned randomly to either a dark (D) or light (L) positive group for the SI problem.

The Ss were trained in a Plexiglas-enclosed T-maze with shock avoidance motivation. A detailed

description of the maze is found in Thompson et al (1961). Two 20-W cool white fluorescent bulbs installed 5 in. from the back of each arm illuminated the length of each alley. Milk-glass inserts separated maze and lights. A Grossen tri-lux meter placed at the choice point registered 9 fc when directed at a lighted alley and 0 fc when directed at a dark alley.

PROCEDURE

The Ss were preadapted to the maze and pretrained to knock down goalbox (GB) doors under room light conditions. During SI acquisition, six trials a day were run to a criterion of 11/12 correct responses in 2 days. The L or D positive cue was alternated according to a Gellerman series. Training on the SU problem began

immediately after 5 days of overtraining on SI. For the SU problem, the right GB was correct when both sets of lights were on, and the left GB was correct with both lights off. An error was recorded when a S's foot contacted the negative GB grid.

RESULTS AND DISCUSSION

Mean errors to criterion were 23.0 for L and 3.6 for D rats ($p < .001$). These results agree with those of Stratton & Edwards (1971), in which L positive albinos made about six times as many errors as did Ds in learning a SI problem when high differential levels of illumination were used. The SU problem, generally more difficult for rats, took 19.0 errors for Ls and 25.7 for Ds ($p < .01$). A correlation coefficient calculated on errors for the two problems indicated a +.66 correlation for L ($p < .01$) and $-.53$ ($p < .08$) for D rats.

Ablated albino rats prefer the dark, and posteriorly ablated rats have difficulty in overcoming their preference in order to learn a SI problem (Krechevsky, 1936). Apparently D Ss having the strongest dark preference learn the least about the sensory cues of the task and take longer to learn a second problem based on the same cues. The fact that L rats had more SI learning trials does not explain their superior performance on SU, because Ss which learned SI most rapidly made the fewest errors on SU. Also, D positive rats were superior to

Fig. 1. Representative posterior lesions.

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LS on overlearning trials ($\bar{X}L = 4.6$; $\bar{X}D = 2.8$), so performance was not improved as a function of number of SI trials per se. The important factor contributing to learning SU was the ability to overcome preference responding in order to attend to the relevant stimulus source.

Following cortical ablation, brightness (luminous flux) discrimination is performed subcortically in the rat, probably in the pretecto-diencephalon (Thorne, 1970; Thompson & Rich, 1961; Horel, 1968). Subcortical processing of visual information may account for the persistent negative phototropic responding of ablated Ss. Trophic responding interferes with attention to

the cues which guide choice behavior.

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