

A STUDY OF VISUAL DISCRIMINATION IN THE OPOSSUM*

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A. INTRODUCTION

Previous studies at the University of Georgia on the behavior of the opossum have shown the animal capable of forming both positive and negative conditioned avoiding responses in a relatively short time (3, 4). The opossum also learned the Guthrie-Horton box with ease (2) and, in fact, due to its undistractibility, performed better than most animals on this problem. A recent study dealt with the behavior of the animal in the Fink Arrow Maze (5), and in this type of performance the opossum showed striking ability to learn spatial relations. In the Fink maze the animal learns to locate food in four side by side alleys which run off a choice area. After food is located in one alley, and the animal runs to a criterion of 10 successive correct trials, food is shifted to another alley. The animal must learn to find food in the new alley, and is run to the same criterion. This process is repeated until all four alleys are learned. The animals studied by Fink were placed in the following order on the basis of his findings: man, pig, dog, goat, chick, cat, rabbit, and four species of turtles. The same apparatus and procedure was used with the opossum and this animal falls between man and the dog. It was quite evident that spatial learning of this type offered little difficulty to the animal.

Although the above experiments have indicated something of the learning ability of the opossum, little is known about discrimination and sensitivity in this animal.

B. PROBLEM

The present study was exploratory in nature to determine the ability of the opossum to discriminate between three pairs of visual stimuli: a white-black vertically striped card (+) versus a white card (—); a white-black horizontally striped card (+) versus a black card; and a black card with a small white triangle in the center (+), versus a white card with a small black triangle in the center (—). Each triangle was equilateral with side approximately $1\frac{1}{4}$ inch. The interest was to determine first whether the

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animal could be used in learning tests of this type, and second, to determine what criteria of learning may be expected from the animal. No definite criteria of learning were set before the experiments started.

C. APPARATUS AND PROCEDURE

The apparatus was composed of a start box, a choice area, and two adjacent choice boxes with swinging doors. The choice box was two feet square. The choice doors were one-way, and could be opened only in the forward direction. The choice area was two feet wide at the start box and broadened to a four-foot width at the entrance of the choice boxes. The distance from the start box to the choice boxes was four feet. One side of the choice area was made of plate glass so that photographs could be taken on selected trials. The choice area was covered by screen wire. The start box and choice boxes were covered by $\frac{1}{4}$ inch plywood lids.

The discrimination signals were made of cardboard $7\frac{1}{2} \times 11\frac{1}{2}$ inches. On the vertically striped cards were six $\frac{1}{2}$ inch black stripes alternating with seven $\frac{3}{4}$ inch white spaces. The horizontally striped card had nine such black stripes and 10 white spaces. The door containing the positive card could be pushed inward permitting the animal to pass through to food and water. The door with the negative card was locked, but it could be opened inward for about two inches. Electrical contacts operated markers on a slow moving kymograph to record the sequence and number of times each door was tried by the animal before entering the food area. The position of the positive card was random. Meat was placed in both end boxes so that the animal would not choose on the basis of odor. Since the opossum eats only once a day, and usually at night, only one trial was run each night. At the beginning of the tests all doors were left open for three nights so the animal could learn that food was found in the end boxes. After this the door with the positive card was unlocked while the negative door was locked. Each morning the animal was removed from the choice box and returned to its cage until the next run.

D. RESULTS

In order to present a total picture of the behavior during the tests, the correct choices are presented in blocks of 10 trials each in Table 1. Performance was evaluated in terms of various successive-errorless-trial criteria. Since the 10-trial block was merely a convenient way of presenting the data, the various criteria was computed on the basis of continued performance. There does not seem to be any doubt on the basis of these data that the opossum was discriminating between the positive and negative signals in each

test. After a period of training the animal would perform while the observer was present, and it was quite evident the opossum was disregarding the negative signals.

TABLE 1
EVALUATION OF THE PERFORMANCE BY VARIOUS SUCCESSIVE-ERRORLESS-TRIAL CRITERIA

Blocks of 10 trials	Test 1 No. Rt.	Test 2 No. Rt.	Test 3 No. Rt.
1	4	7	5
2	4	9 ¹	6
3	3	8 ²	6 ¹
4	5	5	7 ²
5	6 ¹	5	6 ²
6	5	9 ⁴	6
7	7 ¹	10 ⁵	9 ³
8	8 ¹		5 ³
9	6 ^{2*}		

¹ Five consecutive trials, p .03.

² Six consecutive trials, p .01.

³ Seven consecutive trials, p .007.

⁴ Eight consecutive trials, p .0039.

⁵ Ten consecutive trials, p .00097.

* Eleven consecutive trials over 8th and 9th blocks, p .00049.

This study, in addition to others previously mentioned, seems to indicate that the opossum learns better than might be expected, and may be used as subjects in many types of learning tests.

E. SUMMARY

The present experiment was an exploratory study on visual discrimination in the opossum. The object was to determine whether the animal could be used in a two-door discrimination test, and to learn something of the animal's ability to discriminate between visual stimuli. The task set for the animal in the three respective tests was to discriminate between a white-black vertically striped card (+) versus a white card (—); a white-black horizontally striped card (+) versus a black card (—); and a black card with a small white triangle in the center (+) versus a white card with a small black triangle in the center (—). The positive card was shifted from the right to left door of a two-door discrimination box in random order. Food was placed in both food compartments, but only the positive door could be opened wide enough for the animal to enter. One trial was run each day. The animal performed usually at night in the beginning of the tests, but as the experiment progressed the animal would perform as soon as placed in the start box. In all the tests the performance of the animal was evaluated in terms of the successive-errorless-trial criterion. Results indicate that the opossum is a

favorable subject to use in two-door discrimination tests involving various visual patterns.

REFERENCES

1. FINK, H. K. *Mind and Performance*. New York: Vantage Press, 1954.
2. JAMES, W. T. The behavior of the opossum in the Guthrie-Horton puzzle box. *J. Genet. Psychol.*, 1955, **87**, 203-206.
3. ———. An experimental study of the defense mechanism in the opossum with emphasis on natural behavior and its relation to mode of life. *J. Genet. Psychol.* 1937, **51**, 95-100.
4. ———. Conditioned responses in the opossum. *J. Genet. Psychol.*, 1958, **93**, 179-183.
5. ———. The behavior of the opossum in the Fink Arrow maze. (In press.)

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