

# The effect of strychnine sulfate on maze learning as a function of task difficulty<sup>1</sup>

DANIEL L. COKER AND DAVID W. ABBOTT<sup>2</sup>  
STETSON UNIVERSITY

*Strychnine sulfate injected Ss reached criterion performance in a Lashley III maze in significantly fewer trials than their saline injected controls. No significant difference was observed between performance of experimental and control groups with the less complex Lashley I maze.*

Research on the effects of strychnine sulfate on learning in rats has not produced consistent results. McGaugh & Petrino (1959) report a significant facilitative effect of the drug on learning in a Lashley III maze. McGaugh (1961) found a significant facilitative effect in a complex alley maze only for experimental Ss who were at or below median performance for their group. Carlson (1966) found no significant effect on initial or reversal learning in a simple maze. Carlson suggests that these divergent results may be accounted for by a consideration of task difficulty, with the facilitative effect being present only for relatively difficult tasks.

## Method

Thirty-two experimentally naive male albino rats of the Dublin-Sprague Dawley strain were used as Ss. They were approximately 90 days old and weighed 355 g at the start of the study.

The Ss were assigned randomly to four groups representing a factorial combination of two levels of task difficulty (Lashley I maze, Lashley III maze) and two conditions of drug (0.65 cc of strychnine sulfate, 0.65 cc of saline solution). A detailed description of the mazes can be found in Lashley (1963).

Preliminary training consisted of eight days on the 22 h deprivation schedule, five intraperitoneal injections of the appropriate solution, 18 pretraining trials in a straight runway, and the introduction of wet mash food in both home cage and runway.

On the ninth day of the study, each S was placed on a five trials per day schedule in the appropriate maze with continuous reinforcement consisting of 30 sec access to wet mash in the goalbox. The daily injections were given 10 min prior to the first trial. Ss were run until they reached a criterion of five out of six errorless trials. Number of errors per trial, time per trial, and trials to criterion were recorded.

## Results and Discussion

The mean running times over the last four pretraining trials were compared with an analysis of variance. The largest F value obtained was 1.08. Thus, there were no significant performance differences among groups at the end of preliminary training.

Table 1. Mean Number of Trials to Criterion, Errors and Running Time for Each Group

Measure	Groups			
	Lashley I		Lashley III	
	Drugged	Non-Drugged	Drugged	Non-Drugged
Trials to Criterion	16.38	20.50	28.63	45.63
Errors to Criterion	13.13	19.75	59.00	94.38
Running Time (last 4 errorless trials)	3.72	3.24	8.98	8.02

The means for each group of trials to criterion, total errors to criterion, and running time over the last four errorless trials are presented in Table 1. Analysis of variance on these response measures showed that the combined groups required significantly fewer trials to reach criterion ( $F=5.62$ ,  $df=1/24$ ,  $p<0.05$ ), made significantly fewer errors in reaching criterion ( $F=6.62$ ,  $df=1/24$ ,  $p<0.05$ ), but did not perform at significantly faster speed ( $F=0.32$ ,  $df=1/24$ ,  $p>0.20$ ). A significant interaction was found between drug condition and task difficulty for both trials to criterion ( $F=23.44$ ,  $df=1/24$ ,  $p<0.01$ ) and errors to criterion ( $F=17.40$ ,  $df=1/24$ ,  $p<0.01$ ). Further analyses of this interaction were carried out through individual t tests. These results showed, for both measures, that with the less difficult maze the performance of drugged Ss did not differ significantly from that of non-drugged Ss (trials to criterion,  $t=0.774$ ,  $df=1/7$ ,  $p>0.40$ ; errors to criterion,  $t=1.006$ ,  $df=1/7$ ,  $p>0.30$ ). With the more difficult maze, however, the drugged Ss did make significantly fewer errors in reaching criterion than non-drugged Ss ( $t=2.454$ ,  $df=1/7$ ,  $p<0.05$ ) and the difference between drugged and non-drugged Ss in trials to criterion approached significance ( $t=2.149$ ,  $df=1/7$ ,  $p<0.08$ ).

This pattern of results supports the hypothesis by Carlson (1966) that strychnine sulfate facilitates learning only for tasks of certain complexity levels.

## References

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## Notes

1. This experiment was conducted according to the APA statement of "Guiding Principles for the Humane Care and Use of Animals," December 15, 1962.
2. Now at the School of Education, University of Virginia.