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Introduction:

Psychologists agree, in general, that the role of motivation in determining the behavior of organisms is an important one. However, different interpretations arise when one attempts to specify precisely what this role may be. Some psychologists believe that motivation serves only as a forcer or activator of behavior. Others hold that in addition to being an activator of behavior motivation must be reduced for learning to occur.

Thus, field theorists such as Tolman and Leeper state that the acquisition of learning is not a function of the number of reinforcements, or drive state reductions. Rather, acquisition is dependent upon the temporal contiguity of the organism's perceptions of successive stimuli, or signs and their significates. Once acquired, however, utilization of learning in the performance of a task is activated by an organism's drive state.

Reinforcement theorists such as Thorndike and Hull, on the other hand, state that reinforcement is necessary for learning to occur and that learning is an increasing function of the number of reinforcements.

A series of studies on latent learning using a single choice point maze were instituted at The State University of Iowa to test the divergent implications of the two viewpoints.

The first experiment in this series was conducted by Spence and Lippitt[3] employing a single choice point Y-maze in which two groups of rats were run. The first group was motivated for water while satiated for food and found water in the right goal box and food in the left goal box. The second group was under the same drive state but it found the left goal box empty while the right goal box contained water as before. The animals were given 5 trials per day, 2 free and 3 forced for 12 days. Both groups were then satiated for water and motivated for food.

According to Tolman's non-reinforcement theory, the rats in Group I should run to the side containing the desired goal, food, since they had been exposed to the relationship "left-alley-leads-to-food" during the training trials. The prediction was not confirmed. All the animals continued running to the right or water side, although they were no longer motivated for water. Continued training of Groups I and II showed that Group I did not learn to run to the food side more rapidly. That is, they did not benefit from their additional experience of running left to food while satiated.

An experiment by Kendler[2] compared two groups of rats, one simultaneously hungry and thirsty, the other satiated for food and water. The animals of both groups were given 4 trials per day, 2 free and 2 forced for 7 days. During the test trials animals of both groups

were motivated for one goal while satiated for the other. It was found that a significantly smaller number of errors were made by the group motivated and rewarded during training than the satiated and non-rewarded group. These results indicate that reinforced animals learn faster than non-reinforced animals.

The present experiment, which is modified somewhat in procedure from an experiment by Spence and Lippitt[4], is designed to determine whether animals not motivated for goal objects are capable of learning their position as indicated by correct responses when the appropriate motivation is induced at a later time. Certain objections to procedures in studies in which animals motivated for a single goal object while satiated for another are also avoided in the present study.

It has been objected that when animals are running under fairly strong motivation their field of perception is so narrowed that they do not notice the undesired goal object. Conditions are therefore not optimal for the formation of associations of what sign leads to what goal object. Furthermore, close temporal contiguity between signs may not be obtained, since strongly motivated animals will take a longer time to run to the undesired goal box on their forced trials than to the desired goal box on their free choice.

These criticisms may be avoided if animals are activated by irrelevant weak drives which afford non-differential reinforcement while satiated for the goal objects for which they will be motivated during the later test trials.

In an attempt to fulfill these conditions, the following satiation procedure was employed: Throughout the preliminary and training periods the animals were satiated by placing a large quantity of dog chow biscuits in their home cages two hours before they were to run in the experiment. One-half hour prior to running the animals were placed in individual feeding cages and given dishes containing wet mash to complete the satiation. Water was always present in the home and feeding cages. In order to motivate the animals to run when placed in the maze, they were confined in small cages for 15 minutes immediately before running, and returned to these cages after the first trial in the course of the preliminary and training series. An additional motive for running was presumably induced by running the animals to cage mates which were found in a large cage attached to each goal box. The success of this satiation procedure is indicated by the fact that approximately 20 occasions of eating or drinking were observed out of the total of 1200 trials.

Subjects:

Thirty hooded and albino animals were used in the experiment, 15 males and 15 females.

Apparatus:

The apparatus employed was a single choice point T-maze. The right alley led to a goal box containing a large water dish; the left

alley led to a goal box containing large food pellets forming a barrier on the floor.

Preliminary Training Procedure:

There were two days of preliminary training, two trials per day, in which the animals satiated for food and water ran down a straight runway into a social cage containing a cage mate.

Training Procedure:

The training series consisted of two trials per day for 20 days. The first trial each day was free, the second was forced to the opposite side. Immediately after the first trial the animals were returned to the small confinement cages; after the second trial they were returned to the home cages. Prior to each day's running the animals were satiated for food and water by the technique previously described.

Test Trials Procedure:

The test series began the day following the 40th trial. Animals deprived of either food or water for 22 hours while satiated for the other goal objject were given one test trial on each of 4 successive days. The drive conditions were alternated in the following order, THHT or HTTH, depending upon the initial assignment.

Results:

TABLE I

PERCENT CORRECT RESPONSES ON EACH OF THE TEST TRIALS

Trial:	% Correct Responses:
I	56.7
II	63.3
III	60.0
IV	50.0
Total	57.5

Two tests of significance were applied to the results of the first or critical test trial. The first test was to determine whether the frequency of correct responses on this test trial differed from a chance expectancy. It resulted in a chi-square of .532 which has as its significance level approximately 48%. A second test was to determine whether the behavior on the first trial represented a significant change from the behavior on the last free training trial. It was found that on their last free training trial the animals chose the side for which they would be motivated 43.3%. On the first test trial they chose the side for which they were motivated 56.7%. The difference of 13.4% is only 1.5 times its standard error. Therefore, the results of both tests indicate that the hypothesis that the num-

ber of correct choices on the first test trial is a chance variation cannot be reasonably rejected.

Discussion:

The theoretical position of the field theorists suggests that unmotivated animals given the opportunity to perceive potential goal objects without receiving differential reinforcement will learn the paths leading to the goal objects as indicated by their running correctly when subsequently motivated for them.

A different implication is derived from the reinforcement position. Animals simply perceiving potential goal objects which do not produce any differential reinforcement will not learn the correct paths as indicated by their failure to run correctly when motivated for them.

The results of the present study which was designed to test these divergent implications do not support the non-reinforcement interpretation of learning as a function of the number of contiguous perceptions of an organism. The results do lend support to the definition of learning as a function of the number of reinforcements obtained.

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REFERENCES

1. Kendler, H. H. A comparison of learning under motivated and satiated conditions in the white rat. J. exp. Psychol., 1947, 37, 545-549.
2. Kendler, H. H. An investigation of latent learning in a T-maze. J. comp. Psychol., 1947, 40, 265-270.
3. Spence, K. W. and Lippitt, R. An experimental test of the sign-gestalt theory of trial and error learning. J. exp. Psychol., 1946, 36, 491-502.
4. Spence, K. W. and Lippitt, R. "Latent" learning of a simple maze problem with relevant needs satiated. Psychol. Bull., 1940, 37, 429.