Incentive value and number of food units

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Both during pretraining as well as training in a short runway, albino rats on a 22-hr. food deprivation schedule rewarded with five .1 gm food pellets had shorter eating times, but not eating latencies, than Ss which received one .5 gm pellet. Runway latencies, but not running times, were shorter for the .5 gm group than the five .1 gm group. These data are in accord with the consummatory activity hypothesis. It was also noted that the time spent eating was greater during the training than the pretraining period.

There is an extensive literature on the effects of magnitude of food reward, but the total weight of the food is usually the only parameter which has been considered. The oft cited work of Wolfe & Kaplon (1941) in which chicks ran more rapidly for four 1/4 grains of popcorn than to one full grain is the only published study where the units in which the amount of food presented to the animal has been manipulated. Kover and Beier, cited by Logan (1960, p. 35), reported that rats given one piece of a 1/2 gm of food ran more slowly in a runway than if the reward was given in six pieces.

It may also be noted that Hall & Kling (1960) investigated brightness discrimination when rats were given six or 12 drops of a sucrose solution in 1 or 2 cups vs. the same amount distributed over 6 cups. They found that learning in terms of errors was more rapid in the groups which had the greater distribution of the sucrose. They did not present statistical analyses of starting latency or running speed. From the data which they did present it seems that there were no differences between the groups on the time variables. Actually, the Ss requiring less consummatory activity tended to run more rapidly and to have shorter choice point times.

Since some investigators manipulate amount of reward by increasing the number of units while others simply increase the size of a single unit, investigation of the effects of the number of units into which a given amount of food is distributed has methodological implications. The purpose of the present study was to investigate the effects of reward distribution on performance in a runway and to relate this to the total time spent eating in the goal box.

Method

The Ss were 36 adult, experimentally naive male albino rats of a Wistar strain.

The apparatus consisted of a 58 x 3-1/2 x 3 in. runway constructed of unpainted pine wood. The first 8 in. formed the start box which was separated from the remainder of the runway by a plywood drop-door. The last 10 in. formed the goal box which was also separated from the rest of the runway by a plywood drop door.

The entire runway had a Plexiglas top. There were two photocells located 6 in. and 48 in. from the start box, respectively.

When the start box door was lifted, timers were activated and each continued to operate until the photocell controlling them was interrupted by the passage of the S along the runway. The timers thus measured start-box latency, and the time to traverse the entire runway.

Five days prior to the first pretraining trial food was withheld from the S for 22 hr. each day. Each S was then given 2 hr. access to Purina Lab Chow. The schedule of deprivation and feeding was maintained throughout the remainder of the experiment. Water was available ad lib.

All Ss were given 18 days of pretraining to familiarize them with the apparatus and the reward and to assure that the eating latencies and times had stabilized. The animals were divided randomly into two groups. Ss in one group (L) always received one 0.5 gm Noyes food pellet in the goal box, while the Ss in the other group (M) received five 0.1 gm Noyes food pellets. During pretraining S was placed in the goal box and allowed to eat the one large pellet in the case of the L group and the five small pellets in group M. On each of the pretraining trials, latency (the time before the S picked up the pellet and began eating) and eating time (the total time that the S was engaged in eating) were recorded. All Ss received their 2-hr. feeding period 30 min. after each training or pretraining session.

Following pretraining Ss received one training trial per day in the runway for 30 consecutive days. Starting latency, running time, eating latency and eating time were recorded.

Results

During pretraining the groups had similar eating latencies. An analysis of variance produced an F-value of 2.39 ($p > .05$) for groups. Figure 1 presents the eating times. Inspection of Fig. 1 shows that after the first block of three sessions the M group spent less time eating than did the L group. An analysis of variance produced a groups by sessions interaction F-value of 11.83 ($p < .001$). This indicates that after similar eating times on the initial sessions the groups diverged.

An analysis of variance of the eating times during training showed that the group difference as well as the groups by trials interaction were statistically significant ($ps < .05$). In other words, overall the group receiving the one large reward ate significantly less rapidly than the group receiving the five small pellets; but at the end of 30 trials the two groups reached the same level. An analysis of variance was also performed on the differ-

Fig. 1. Eating times during pretraining and training in blocks of 5 trials.

ences for each animal between its median eating times during pretraining and its eating times during training. This analysis produced a significant value for groups and an F-value of 12.84 ($p < .001$) for the difference between the training and pretraining conditions. The interaction between groups and training conditions was not significant. Thus, the speed of eating during training was slower than the speed of eating during pretraining. Figure 2 presents the mean starting latencies and running times during training. Inspection of the figure as

Fig. 2. Log median starting latencies and running times in blocks of 5 trials.

well as an analysis of the variance shows that there are no significant differences between the reward groups.

From Fig. 2 it is apparent that the group receiving the one large pellet consistently had the shorter latencies. An analysis of variance indicated that the reward variable is highly significant with an F-value of 8.60 ($p < .01$). The analysis also indicates that the trials and interaction of the trials and groups had F-values of 37.70 and 4.70 ($ps < .01$), respectively.

Discussion

The present experiment indicates that if the amount of reward is manipulated in terms of the number of pellets, it does have an effect on eating time as well as running latency in a runway. The data support Spence's hypothesis in that the animals which spent more time in eating actually had shorter runway latencies. However, running times did not differentiate between the two groups. These data are similar to Dyal's study (1960) in that he also found significantly shorter start-box latencies but no differences in running time between the animals which had a large amount of food in the goal box and those that had just a small amount.

It appears that runway behavior actually interferes with the established consummatory behavior of Ss. It may be seen that during pretraining eating times are actually faster than during training. This is contrary to what one would expect and to one of the rationale of pretraining procedures. Another finding of interest is that running time failed here to discriminate between the groups. It would seem that in a short runway, once the animal starts he continues to run unless there is some distracting disturbance from the outside.

References

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Notes

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