Response variability in the quail (Coturnix coturnix Japonica)[1]

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Abstract

Twenty two Coturnix quails were tested in mazes involving a single forced turn preceding the choice point. With turn preference and direction of forced turn balanced the Ss showed a significant number of choices in the direction opposite the forced turn on all trials except the first two.

Problem

A number of studies have investigated response variability in the choice behavior of many vertebrate and invertebrate forms using a technique of forcing one or more right (or left) turns preceding the choice point with the general finding that Ss tend to turn in the direction opposite the preceding forced turn or turns (Ballachey & Buel, 1934; Bitterman & Bretz, 1946; Buel & Ballachey, 1934; Dingle, 1965; Estes & Schoeffler, 1955; Grosslight & Harrison, 1961; Grosslight & Ticknor, 1953; Lepley & Rice, 1952; Rice & Lawless, 1961; Shinkman & Hertzler, 1964; Thompson, 1952; Schneirla, 1929; Wantabe & Iwata, 1956; Wayner & Zellner, 1958; Witkin & Schneirla, 1937).

Recently, however Hayes & Warren (1963) reported negative findings with chicks. Their suggestion is that the phenomenon of spontaneous alternation may not be as universal as some behavior theories imply.

The present experiment was designed to further test the phyletic generality of response variability by investigating the behavior of Coturnix quail in mazes involving a single forced turn preceding the choice point.

Method

The Ss were 22 adult male and female quails 49 days old at the beginning of the experiment. They were run on a 20 hr. food-deprivation schedule and remained on this schedule throughout the experiment. The apparatus was a gray enclosed rotating + maze used as a T. An initial arm was added to the stem of each T, one forcing a right turn and one forcing a left turn. The overall lengths of the arms and stem of the T were 48 in and 20 in respectively. Each initial section leading to a forced turn was 10 in long. The alleys were 4 in wide, 5 in high, and covered with Plexiglas.

Procedure

Preliminary training consisted of two 5 min. exploratory sessions in the T maze with the initial section blocked and food in both goal boxes. Following this each S was given one trial in the same maze to determine initial turning preference. The 12 Ss turning right on this trial were randomly divided into two groups, 6 Ss to be tested on the T maze with the preceding forced right turn and 6 Ss to be tested on the T maze with the preceding forced left turn. The same procedure was followed in assigning the 10 Ss turning left on the preference trial.

The experimental session began on the day following the preliminary training and consisted of one trial on each of the first two days and two trials per day with a 30-min. intertrial interval for the next nine days. On Day 12 each S was given one trial with a reversal of the forced turn used for the first 20 trials. On each of the 21 trials both goal boxes were baited with Purina Game Bird Chow and Ss were allowed to eat for 5-sec. All trials were started from the south side of the room.

Results and Discussion

A 2 by 2 analysis of variance test based on the first 20 trials indicated that neither initial preference nor direction of the forced turn significantly affected choice behavior. As a result of this finding the four groups were combined and all additional statistical treatment was based on the pooled data. A t-test comparing chance expectance (50%) with the mean number of choices on the 20 trials involving turns in the direction opposite the forced turn yielded a t of 3.21, df = 21, $p < .01$.

With turn preference and direction of forced turn balanced, the results support the previous findings of numerous studies on the effect of a forced turn on subsequent choice. Forcing an animal in one direction increases the probability of a subsequent choice in the direction opposite the forced turn. Based on an expected frequency of 50% of total turns opposite the preceding forced turn, a chi-square was computed for each block of two trials and for trial 21 when the forced turn was reversed. Deviation from the expected value was significant at or beyond the .05 level for each block of two trials except the first (Table 1).

In general, the number of choices in the direction opposite the forced turn increased as a function of trials. However, there was no tendency to choose the side opposite the forced turn on the first trial (50%) or the first two trials. Thus, the quail responded as did the chicks run by Hayes & Warren (1963). These results are incompatible with the findings of most experiments with rats, humans, and invertebrates in that a forced turn did not immediately affect choice behavior. However, the behavior of the quail on the

third and subsequent trials is similar to that of other species.

The results indicate that Hayes & Warren may have been correct in suggesting that species may show large variations in their initial adjustments to new environments. However, their argument that the role of spontaneous alternation in current behavior theory may rest on a very unsubstantial comparative basis, does not appear to be valid.

It is interesting to note that on trial 21, when the direction of the forced turn was reversed, the percentage of alternation remained at about the same level as on the preceding trials, indicating that the forced turn rather than some intra or extra-maze cues provides the major basis for the choice behavior.

TABLE I
Number and Percentage Choice Turns Opposite to Preceding Forced Turn

Trials	Number	Percentage	$\chi 2$
1-2	22	50	0.00
3-4	29	66	4.45*
5-6	31	70	7.36*
7-8	30	68	5.82*
9-10	29	66	4.45*
11-12	31	70	7.36*
13-14	31	70	7.36*
15-16	32	73	9.09*
17-18	35	80	26.27*
19-20	32	73	9.09*
21	17	77	6.54*

* *Significant beyond .05 level with 1 d.f.*

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Note

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