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Quantification of Steady-State Operant Behaviour
C.M. Bradshaw, E. Szabadi and C.F. Lowe, editors

TEMPORAL REGULATION IN THE TURTLE DOVE : A COMPARATIVE STUDY

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INTRODUCTION

Very few systematic studies have been devoted to comparing members of different species under contingencies of reinforcement typically generating temporal regulation of behaviour, such as Fixed-Interval (FI) or Differential Reinforcement of Low rates (DRL) schedules. Recent studies give comparative data for rats and pigeons in FI[1], rats and pigeons in DRL[2], and pigeons and crows in DRL[3]. The differences observed are assigned either to the nature of the response used and their peculiar status in the species repertoire, or to the position of the species being considered on the phyletic scale.

Under similar lines, the present study extends the scarce data to another species, that is the turtle dove, as compared with rats and pigeons in FI schedule.

MATERIALS AND METHODS

Subjects. The subjects were four adult male rats (Wistar strain), four homing pigeons and four domestic turtle doves, *(streptopelia risoria)*. They all were maintained at 90 percent of *ad lib* body weight throughout the experiment.

Apparatus. Two different kinds of conditioning chambers were used, each being appropriate to a given species. The rat cage (25 x 20 x 20 cm) was equipped with a lever protruding from the wall 3 cm above the floor, and with a pellet dispenser. The birds cages (40 x 40 x 40 cm) were equipped with a plexiglas response-key (2 cm diameter) and a grain dispenser located on the same wall. Both the key and the dispenser were illuminated from behind the wall by a 60 watts bulb. The key was located at 20 cm from the floor in the pigeon cage, at 12 cm in the turtle dove cage. On the pigeon as well as the turtle dove key, a force of 20 g was enough to close a microswitch. The control (integrated circuits) and recording equipment was located in an outside room.

Procedure. All subjects were initially shaped to produce the required response, lever press for rats, key-peck for birds. They were maintained on a CRF schedule during 3 sessions, then switched to FI contingencies, with interval increasing by steps of 10 s from one session to the next up to 2 min. The behaviour was then stabilized for 40 sessions at 2 min, 30 sessions at 4 min, 30

sessions at 6 min and 40 sessions at 8 min successively. The duration of the sessions was limited to 15 reinforced intervals up to FI 6 and to 12 intervals at 8 min. The reinforcer consisted of one 45 mg pellet for rats, and a 3 s access to the grain for birds.

Subjects were run in the experimental cages at approximately the same hour each day, 6 days per week. Responses and reinforcements were recorded by means of cumulative recorders. In addition, total number of responses emitted in each fourth of the interval were recorded on digital counters. Response rate and the curvature index[4] were computed from the recorded data.

RESULTS

Response rate. The average response rate per minute was computed in each group for the last ten sessions on each value of the interval from 2 to 8 min. The results are plotted in Figure 1. An inverse relationship was observed in all species between the response rate and the length of the interval. For all values of the interval, turtle doves and pigeons exhibited a higher response rate than rats. At intervals of 4 min and beyond, turtle doves showed higher rates than rats and pigeons.

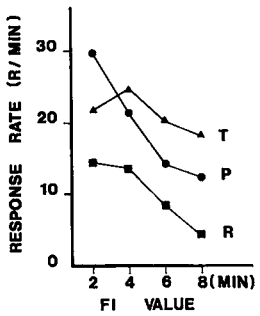

Fig. 1. Average response rates for turtle doves (T), pigeons (P) and rats (R) at the different FI values.

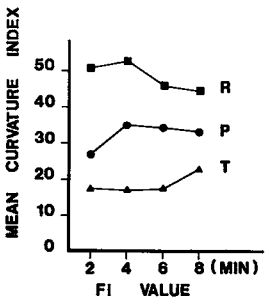

Fig. 2. Average curvature indices for turtle doves (T), pigeons (P) and rats (R) at the different FI values.

Temporal regulation. The curvature index, using four fractions of the interval, can take any value between - . 75 and + . 75. Averaged values for the last

ten sessions on each value of the interval were computed in each species. Results are shown in Figure 2.

At all values of the interval, rats exhibited a much better temporal regulation than birds, though they showed a slight decrease with the intervals extending over 6 and 8 min. The two species of birds were clearly different in this respect, with pigeons exhibiting a better performance than turtle doves. In both species, however, an improvement was observed when passing from 2 min to 4 min in pigeons, and when reaching 8 min in turtle doves.

Analysis of individual data reveals highly homogenous results within species for interval values up to 6 min. At 8 min, interindividal differences were more pronounced, though no overlapping was observed between rats and turtle doves. Pigeons remained in between. They also showed a greater day-to-day and interval-to-interval variability than the other species.

For all values of the interval also, rats and pigeons showed the well-known patterning of responses, either in scallops or break-and-run (more common in pigeons). By contrast, turtle doves did not exhibit the typical post-reinforcement pause, except at FI 8 min in 3 birds which began to respond occasionaly with usual pause-responding alternations. Turtle doves often responded by short bursts, giving the cumulative record a stairlike aspect rarely found in pigeons and rats.

An intriguing behaviour has been repeatedly observed in doves, and more specifically in two individuals : they continued to peck the key during the reinforcement, the noise of the grain dispenser producing a burst of responses that lasted sometimes for the whole duration of access to food. Il should be reminded that no change in key nor magazine illumination occurred when the reinforcement was delivered.

DISCUSSION

The cross-species generality of the typical pattern(s) generated by the FI contingencies, though scarcely documented, has rarely been questioned. Previous results, in fact, seemed to support this view,[5,6] except for second-order details (such as dominance of scallop or break-and-run patterns[7]) or for occasional reports on poorly performing species such as bees[8]. The differences observed in the present experiment are all the more striking as turtle doves are close to pigeons on the phyletic scale. Their performances with regard to temporal regulation might be due to accessory factors, rather than to some intrinsic species deficiency in adjusting to periodic schedules. Possibly, the performances might have improved if the birds had been run on small values of the interval for a

larger number of sessions. The nature of the response might also be the crucial factor, as has been suggested in other contexts for key-pecking in pigeons[9]. Were this the case, it would remain to account for the difference between pigeons and turtle doves, using a similar response. This would require subtle analysis of the topography and the temporal distribution of key pecking in the natural repertoire of each species. Finally, our results do not confirm Bayes' assertion that turtle doves could be used in the operant laboratory interchangeally with pigeons.[10,11] Bayes, however, did not study FI behaviour in his subjects.

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ACKNOWLEDGEMENTS

A group of psychology students has contributed to this research. They deserve the gratefulness of the authors.