OPERANT-LEVEL LEVER PRESSING BY A MONKEY AS A FUNCTION OF INTERTEST INTERVAL

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Schoenfeld et al. (1950) found operant-level bar pressing in the rat to decrease with repeated tests, though on each test an initial recovery was noted and the possibility considered that the extent of the recovery might vary with the interval between successive tests. The effect of the intertest interval on operant-level lever pressing in a monkey is reported here.

METHOD

Subject and Apparatus

A 3-pound, experimentally naive, cinnamon Cebus was used. This species does not have food pouches, and is described by Klüver (1933) as being especially manipulative.

Apparatus consisted of a large cage (54 by 26 by 36 inches), in which *S* was both housed and tested, and of the lever on which *S* was tested. A lever, built of 0.5-inch aluminum stock, was introduced through a normally closed port in the side of the cage; it projected about 3.5 inches into the cage, at a distance of about 18 inches from the base of the cage. The lever responded to a force of about 55 grams. When moved through an arc of about 5 inches, it operated an electric counter.

Procedure

The interval between tests was arranged by testing daily, on alternate days, and every third day. To accelerate data collection, *S* was given three lever sessions on each test day. Sessions lasted 30 minutes and were at 8 A.M., noon, and 4 P.M. From the end of the last session on any test day to the beginning of the first session on the next test day is about: 15 hours when testing occurs daily; 39 hours when testing occurs on alternate days; and 63 hours when testing occurs every third day.

S was always given a block of seven consecutive test days at any interval before being shifted to a different interval. A block of seven test days at each of the three intervals, thus 21 test days, was treated as a replication. Four such replications were run, in the following order: 15, 39, 63; 39, 15, 63; 15, 63, 39; and 63, 39, 15. With 84 test days being required by the four replications, and three sessions being given on each test day, *S* was tested a total of 252 half-hour sessions on the same lever.

Food maintenance was designed to prevent direct food-lever associations. Thirty days prior to, and for the duration of the study, *S* was fed twice daily, 30 minutes per feeding, after which all scraps were removed from the cage. Water was removed from the cage during testing, but was otherwise present.

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RESULTS

In Fig. 1, results for the first replication are shown by test day, responses (Rs) for the three sessions per test day having been summed. The first third of the record, showing the operant rate to decrease from test to test, confirms results reported for the rat. But that this decrement depends upon the intertest interval is shown by succeeding thirds of the record. Shifting *S* from daily testing to tests on alternate days produced a partial recovery in the operant rate, and testing on every third day carried the recovery further.

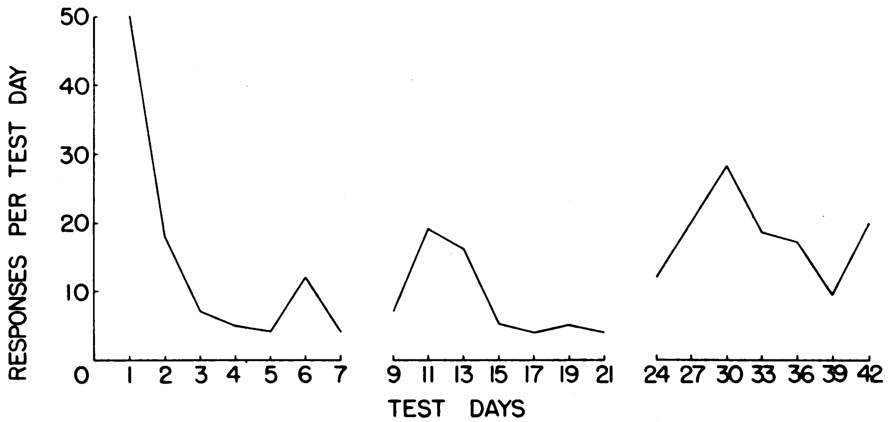

Figure 1. Frequency of lever pressing on the first replication; testing by blocks of seven test days, given daily, on alternate days, and every third day.

The full scope of the recovery and the over-all control of frequency by the intertest interval are better indicated in Fig. 2, where only the first session per test day is considered. The A.M. session is the only one for which time between sessions differs, time between noon and 4 P.M. sessions being the same for all test days. In Fig. 2, total Rs per block of seven test days (A.M. sessions) are plotted as a function of the intertest interval, with replications as a parameter. *S* responded most on the 63-hour interval on all replications. The smaller differences between the 15- and 39-hour intervals, and particularly their inversion on the fourth replication, may be the result of an order effect. Tests which followed a 63-hour block appear to have been suppressed, and 39 followed 63 three times, while 15 followed only once. On the third replication, when the 15-hour block did follow the 63-hour block, responding was lower than on the preceding 16-hour block, despite an increment across successive replications.

A replication's increment is evident in Fig. 2. Total number of Rs from the first through the fourth replication were: 856, 881, 974, and 1398.[3] A determinate interpretation of this effect is precluded by the 5-month age change *S* underwent across the span of tests.

[3]An analysis of variance in which intertest interval, test days, and replications were main effects showed that the effect of the intertest interval was significant at $P < 0.001$ ($F = 20.86$, df 2/36); the replications effect significant at $P < 0.01$ ($F = 11.33$, df 3/36).

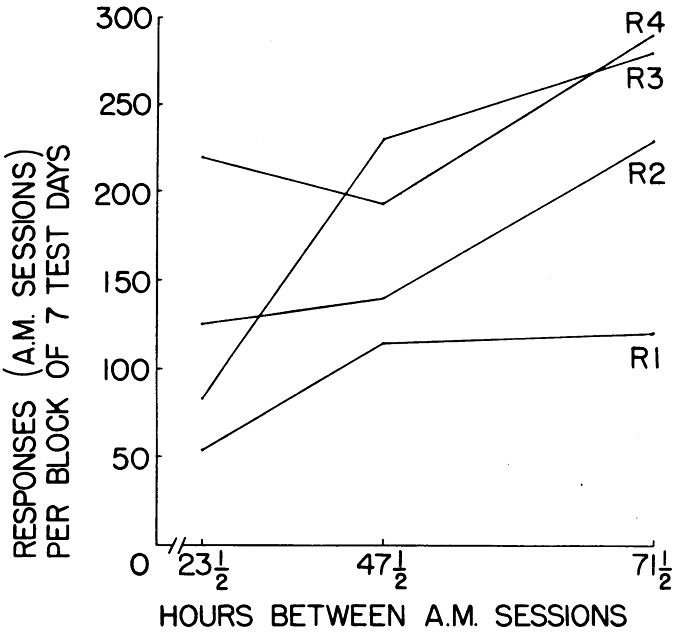

Figure 2. Frequency of lever pressing as a function of the intertest interval, with separate curves showing each of the four replications (Rs).

Response frequency as a joint function of intertest interval and test session is shown in Table 1. Each cell represents total Rs for the 28 half-hour sessions given for each of the interval × session combinations. A monotonic increasing relation may be seen between R-frequency and intertest interval for the first and second sessions of a test day, though by the third session *S* was highest when tested daily. Responding decreased across successive sessions for all intertest intervals. The direct proportionality between magnitude of the decrement and the intertest interval suggests that the across-sessions decrement was not due solely to time of day at which testing occurred.

Table 1

	Intertest Interval			
Sessions	Daily (15)	Alternate Days (39)	Third Days (63)	Total
8 A.M.	481	676	919	2076
Noon	289	304	765	1358
4 P.M.	242	124	160	526
Total	1012	1104	1844	

A last datum is shown in Fig. 3. The left panel contains all curves that resulted when *S* was shifted from smaller to larger intertest intervals, and the right panel all that resulted when *S* was shifted oppositely. Shifts from small to large resulted in the same general curve—one that began low, attained a maximum on either the

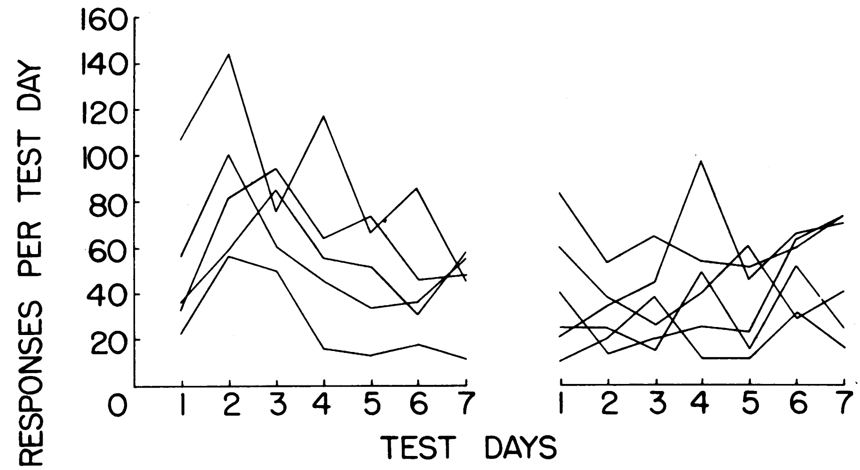

Figure 3. Left panel contains all curves that resulted when *S* was shifted from a smaller to a larger intertest interval, and the right panel all curves that resulted when *S* was shifted oppositely.

second or third test day, and decreased variously thereafter. Shifts in the opposite direction produced no consistency.

DISCUSSION

The results may indicate that in the Cebus the lever press involves a topography for which the decrement with repeated operant-level responding does *not* represent extinction, and for which recovery from the decrement occurs as a function of time rather than reinforcement. On the other hand, the 4109 lever presses may have reflected food-contingent response induction, with the greatest frequency at the largest intertest interval resulting from the greater number of feeding sessions that intervened between lever tests at this interval. The latter would be a more determinate alternative if response induction were better delineated experimentally.

"Activity drive" can be ruled out as an interpretation of the intertest-interval effect. The independent variable was *not* duration of spatial confinement, but simply interval between tests. Further, if caging is equated with confinement, then the replication's component of the design made both degree and duration of confinement equal for all magnitudes of the intertest interval. Finally, no support is given by other data to attributing the replication's increment to cumulative effects of spatial confinement. In the rat, at least, activity is increased by short-term confinement, reduced by long-term confinement (Hill, 1958).

Comparable intertest-interval effects have been obtained with rats, both for the bar and light-contingent bar press (Premack, Collier, & Roberts, 1957; Premack, 1958).

SUMMARY

In a Cebus monkey, tested 252 half-hour sessions on the same lever, lever pressing was a generally increasing function of the intertest interval.

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