A further examination of collateral behavior in humans¹

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Abstract

Rates and patterns of human collateral responding were examined during acquisition and extinction. Response rates typical of behavior generated by ratio contingencies were obtained. Pattern analysis of responding during extinction showed some similarity between these data and data obtained in concept formation tasks.

Problem

Several investigators have reported chains of responses (collateral behavior) which intervene between emissions of experimentally specified DRL responses. Brunner & Revusky (1951) and Kapostins (1963) have reported this phenomenon in humans, Wilson & Keller (1953) in rats, and Hodos et al. (1962) in monkeys.

The present paper attempts a more exhaustive description of these behavioral chains, particularly with respect to the rate of responding during the DRL schedule, and the changes which occur in the rate and pattern of responding after reinforcement is discontinued.

Method

The Ss were 27 introductory psychology students. The only negotiable reinforcement they received was class credit for the amount of time spent in the experiment. The Ss were told that they were participating in a "computer controlled problem solving experiment," and that they were to obtain as many points as possible. They were also instructed to press only one key at a time, and not to hold the key down. Evasive answers were given to all peripheral questions.

The response console, isolated from the programming and recording equipment, was a small aluminum chassis

on which four pushbuttons, spaced 1-1/2 in apart, a light, and a counter were mounted. The light and counter were activated as non-negotiable, response contingent, reinforcements.

Each key was connected to a separate channel of an event recorder, and an additional channel recorded reinforcements. The second key from the S's left, K3 on the event records, provided signals for the programming equipment. Each response on this key was recorded as a hatch mark on the cumulative record. The remaining three keys defined collateral responses and advanced the pen of the cumulative recorder.

No points were available for the first 5 min. of the session. Following this period points were delivered on a DRL-8 sec. schedule, for responses on key 3, until the S had obtained a few reinforcements. A limited hold of 2.5 sec. was then instituted. After a stable "system" for obtaining points had developed, or when 45 min. had elapsed, the S was placed on extinction for 45 min.

An informal interview was conducted at the end of the session.

Results and Discussion

Seventy percent of the Ss developed patterns of collateral behavior on the keys similar to those reported by Brunner & Revusky (1961). Data are presented for a single representative S.

Figure 1 is the cumulative record of a total session. The high linear rates of collateral responding, in conjunction with the "break and go" pattern during extinction, are typical of data obtained in experiments with ratio schedules of reinforcement (Ferster & Skinner, 1957). They also agree with the S's verbal-

Fig. 1. Cumulative record showing all responses for a single session. Points were made available at Acq. The limited hold was instituted at L. H. Points were discontinued at Ext. Reinforcements are marked with dots.

Fig. 2. Event record showing responses on each key for the terminal portion of acquisition. Time runs from right to left in successive sections down the figure. Reinforcements are recorded in the channel labeled Rf.

zation of the task during the post session interview. Similar high linear rates of verbal collateral responding during DRL reinforcement of specific words have been reported by Kapostins (1963).

Figure 2 is an event record for the latter portion of the acquisition period. The shift in the locus of responding during the middle of the record is a return to an earlier form of behavior. This kind of shift was common after several unsuccessful DRL responses.

Figure 3 is a continuation of Fig. 2, and shows the beginning of the extinction period, marked by the arrow. The pip marks in the reinforcement channel following the onset of extinction are the result of a temporary failure to turn off this portion of the reinforcement circuit. They do not represent reinforcements delivered

Fig. 4. Event record for a portion of extinction immediately following Fig. 3.

to the S. Figure 4 is a continuation of Fig. 3.

The internal cohesiveness of the pattern of collateral behavior (in Fig. 3 and Fig. 4), combined with the shifting locus of emission, were common in the first 20-30 min. of extinction. A similar phenomenon may occur in studies of concept formation, and could account for reversal-nonreversal shift differences in adult humans.

Ss who did not form patterns of responses on the keys reported engaging in some form of counting behavior between responses on the DRL key. Population differences, and differences in the nature of the reinforcement employed, preclude any explanation of the failure to replicate the data of Brunner & Revusky (1961) in all Ss.

The implications of these data for the classical area of time perception are obvious.

Fig. 3. Event record showing the initial portion of extinction. See text for explanation of reinforcement record.

References

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Note

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