ACCURATE AND RAPID RECONDITIONING OF SPACED RESPONDING¹

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The performance maintained by reinforcing responses only when they terminated inter-response times (IRTs) of 20 sec or greater (DRL schedule) was almost the same during the first session of reconditioning as before extinction. As few as two reinforcements accurately reinstated both the pre-extinction rate of responding and the function relating the duration of an IRT to its conditional probability of occurrence (IRTs/op).

The present data show an extraordinarily accurate and rapid reconditioning of a complex performance that had just been extinguished. The effect seems to be due in large part to the function of the reinforcer as a discriminative stimulus.

METHOD

Subjects

Three adult, white Carneaux pigeons were maintained at 80% of their free-feeding weights.

Apparatus

The ventilated and illuminated chamber contained a magazine for delivering grain below a response key which was transilluminated with green light except during reinforcement. Operation of the key by an effective force of about 15 g activated the programming and recording equipment located in a separate room. Fresh water was available during experimental sessions.

Procedure

Key pecking was reinforced on a 20-sec DRL schedule. A peck was reinforced with a 3-sec presentation of grain whenever it followed the preceding peck by 20 sec or more. Each 2 to 3-hr session ended when five pecks had been reinforced. After 50 daily sessions, the behavior generated by this schedule was stable

from day to day. Pecking was extinguished by withholding reinforcement for five sessions. Each extinction session ended after 15 reinforcements would have occurred. There followed one session of reconditioning during which five reinforcements were actually presented.

RESULTS

Frequency distributions of IRTs were obtained in 2-sec class intervals and were transformed to conditional probability (IRTs/op) distributions to take into account the unequal numbers of opportunities for IRTs of each length (Anger, 1956). These are shown for the three birds (A, B, C) in Fig. 1 for the last session before extinction (unfilled circles), the last session of extinction (triangles), and the session of reconditioning (filled circles). Class intervals of 2 sec compose the abscissa. Points based on fewer than 20 opportunities have not been connected by lines to indicate their relative unreliability.

The striking result in Fig. 1 is the close correspondence between the function obtained in the first session of reconditioning and the function prevailing before extinction (filled and unfilled circles). The average differences between these two functions, using only data based on at least 20 opportunities, are .052, .031, and .049 for birds A, B, and C, respectively. These values are small absolutely and less by far than the variation within each of the two functions, or the difference between either function and that prevailing during extinction (triangles). Extinction differentially decreased the IRTs/op of short IRTs relative

¹Research supported by grant B-316 from the National Science Foundation to the University of Chicago. Reprints may be obtained from G. S. Reynolds, Dept. of Psychology, University of Chicago, Chicago 37, Illinois.

Fig. 1. The number of interresponse times per opportunity for three pigeons (A, B, and C) in three sessions: the one before extinction (unfilled circles), the last of extinction (triangles), and the first of reconditioning (filled circles). Points based on at least 20 opportunities are connected with lines. The schedule of reinforcement was DRL 20 sec.

to the IRTs/op of longer IRTs; reconditioning very accurately reinstated the pre-extinction IRTs/op of both short and longer IRTs.

The overall rate of responding was also closely reproduced. The number of responses per minute in the pre-extinction, extinction, and reconditioning sessions were, respectively, 10.8, 2.8, and 11.5 (bird A), 9.5, 4.2, and 9.8 (bird B), and 12.4, 6.2, and 12.1 (bird C).

Reconditioning followed two or three reinforcements, as has been noted previously (Skinner, 1938). This is illustrated in Fig. 2, cumulative records of the performance of bird B at the start and at the end of both the pre-extinction session (records *a* and *b*) and the reconditioning session (records *c* and *d*). Record *e* shows the entire final session of

Fig. 2. Cumulative records of the performance at the beginning and at the end of both the pre-extinction session (records *a* and *b*) and the first session of reconditioning (*c* and *d*). Downward deflections of the recording pen indicate the occurrence of reinforcement. Record *e* shows the last session of extinction, with reinforcements indicated where they would have occurred.

extinction. Reinforcements are indicated by momentary downward deflections of the recording pen. The deflections in record *e*, extinction, show when reinforcement would have occurred, had it been programmed. The two reinforcements at the start of record *c*, in the first few minutes of the reconditioning session, were sufficient to generate the behavior shown in the rest of record *c*, which corresponds closely with the pre-extinction records *a* and *b*. Two more reinforcements were delivered during the omitted part of the session, between records *c* and *d*. It is important also that the two reinforcements responsible for reconditioning followed IRTs that were considerably longer than the 20 sec required by the schedule of reinforcement.

DISCUSSION

The rapidity and accuracy of reconditioning suggest that the process is in this instance

related to performance rather than to relearning. From the two reinforcements, the bird does not relearn the temporal spacing of successive pecks that prevailed before extinction any more than it relearns to peck. The performance has not been lost during extinction, rather it lacks one of its conditions of occurrence, the reinforcer. The occurrence of the reinforcer reinstates the conditions that prevailed before extinction, when pecking was reinforced and when the bird learned to space pecks. The pre-extinction conditions immediately occasion an accurate pre-extinction

performance. The present case of reconditioning, and likely many others, appears to be a matter of the re-occasioning of behavior rather than of relearning.

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Received January 6, 1964