Leverpecking elicited by signaled presentation of grain*

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The pairing of a keylight with food elicited downward-pecking movements directly in front of the key. These pecks were recorded, using an appropriately positioned lever. Leverpecks and keypecks, which developed later, were maintained by stimulus-reinforcer pairings; occurrence of either response extended the trial duration and postponed food, thereby precluding adventitious reinforcement. Pecking movements, approach to the key, and keypecking may be considered three distinct response classes because approach to the key does not insure that ongoing pecking will be directed at it.

RESULTS

When transillumination of a response key signals access to grain, naive pigeons come to peck the transilluminated key. This phenomenon, termed "auto-shaping," usually occurs within 120 stimulus-reinforcer pairings (Brown & Jenkins, 1968). Williams and Williams (1969) reported that keypecking persists even when it prevents food presentation; they concluded that responding was maintained by stimulus-reinforcer pairings and not by adventitious response-reinforcer pairings. Recently, Hursh, Navarick, and Fantino (1974) have questioned this interpretation and demonstrated that response-contingent stimulus termination may reinforce keypecking in the Williams and Williams (1969) "automaintenance" procedure.

In the present experiment, keypecking failed to develop within 120 trials. Observation of the bird over the next 60 trials revealed that pecking movements were occurring. However, they were directed downward in front of the key rather than at it. An operandum was introduced and appropriately positioned so that downward pecks might be recorded.

METHOD

The S was an experimentally naive White Carneaux pigeon maintained at 80% ad lib weight. A standard two-key operant conditioning chamber was used. Beginning in the fourth session, a lever, consisting of a 3.0 x 3.5 cm white plastic rectangle attached to a microswitch was positioned directly below the right key and parallel to the floor.

Following magazine training, transillumination of the right key always preceded grain presentation. If no response occurred within 10 sec, transillumination terminated and grain was accessible for 3 sec; pecks on either the key or the lever during transillumination of the key postponed reinforcement for 10 sec during which time the key remained lit. The duration of intertrial intervals was variable with a mean of 30 sec. Sessions consisted of 60 stimulus-reinforcer pairings; white noise was present throughout.

Immediately following introduction of the lever, the rate of pecking this operandum was lower than the rate of downward pecking movements previously observed. Leverpecking tended to increase in frequency with successive sessions until reaching a maximum of 77 responses in the 17th session (Fig. 1). Leverpecking decreased in frequency during the subsequent seven sessions.

No keypecks occurred during the first four sessions, and after 1 week, only nine responses had occurred. The frequency of keypecking increased over days reaching a maximum of 52 responses in the final session. For the last four sessions, the number of keypecks exceeded the number of leverpecks (Fig. 1).

DISCUSSION

Brown and Jenkins (1968) observed that various prepecking behaviors are generated by stimulus-reinforcer pairings, but that these responses are eventually supplanted by keypecking. The present results differ principally in the time scale on which this transition occurred. This difference made it possible to arrange the recording of downward pecking movements while controlling their consequences. It is possible, of course, that if leverpecking had not postponed food presentation, it would not ultimately have been surpassed in strength.

Generation and maintenance of leverpecking and keypecking occurred despite the consequences of responding. Response-contingent trial extension precluded adventitious food reinforcement as in autoshaping (Brown & Jenkins, 1968), possible conditioned reinforcements as in automaintenance (Williams & Williams, 1969; Schwartz, 1972; Hursh et al, 1974), as well as possible sensory reinforcement (Herrnstein & Loveland, 1972), while maintaining a perfect correlation between signal and food.

The present study suggests that the autoshaping procedure elicits behaviors of at least three functionally distinct classes. Pecking movements, the first class, are generated by intermittent response-independent grain presentation and will also occur when food is unsignaled (Staddon & Simmelhag, 1971). Signaling grain presentation elicits approaches to the stimulus object (Wessels, 1974), the second behavior class, and pecking movements directed at it occur. However, keypecking is a distinct third class and not just a simple combination of the preceding two classes. The present results demonstrate that while

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Fig. 1. Number of responses as a function of sessions. Circles show the frequency of leverpecks, and squares show the frequency of keypecks.

keypecking may presuppose approach to the key, such approach does not insure that ongoing pecking movements will be directed at the key.

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