JOURNAL OF THE EXPERIMENTAL ANALYSIS OF BEHAVIOR VOLUME 7, NUMBER 1 JANUARY, 1964

TWO PATTERNS OF AVOIDANCE RESPONDING

PAUL ELLEN AND ARTHUR S. WILSON

VETERANS ADMINISTRATION CENTER, JACKSON, MISSISSIPPI

In a study of lesion effects on avoidance behavior in rats (Ellen and Wilson, 1963), utilizing a Sidman avoidance schedule (Sidman, 1953), we have observed two patterns of bar-pressing behavior—a continual-responding pattern and a burst-responding pattern.

During the Sidman schedule, shock appears at regular intervals and a bar-press delays the appearance of the next shock. Our training technique involved no response-shaping or other form of pre-training.

A pulsating shock (.8 ma and 0.5 sec train duration) was applied only to the subject's (*S*'s) feet with no shock appearing on the walls or bar of the experimental chamber. A response occurring during the shock-train did not shorten the train. Moreover, if the *S*s held the bar down continually shocks were not postponed. Finally, no exteroceptive stimulus was programmed to accompany the bar-pressing.

Fig. 1A is a 15-min sample of avoidance behavior, typically reported (Sidman, 1956). This behavior was generated with an S-S interval of 3 sec and an R-S interval of 13 sec. There is a relatively continuous bar-pressing with a concomitantly high degree of shock-reduction, (97% of shocks were eliminated in a 45-min run). Bar-press duration for this kind of performance is of the order of 2.3 sec.

In the other pattern of behavior (Fig. 1B), which occurred under the same schedule, a burst of bar-pressing behavior appeared only after shock-onset and was followed by a fairly long pause until the next shock was applied; then there would be another burst of responding, a pause, *etc.* Such a behavior pattern reduced the number of shocks received in the avoidance task since any response was capable of delaying the shock. However, this pattern of responding was relatively ineffective (only 79% of shocks were eliminated in a 45-min run), as compared to the shock-reduction achieved by *S*s which show the continual-responding pattern. In addition, the bar-press duration under this type of responding pattern is longer (5.1 sec) than under the continual-responding pattern, suggesting that there is a greater degree of bar-holding.

With our training procedures, the burst-responding behavior pattern is more frequent than the continual-responding pattern. When the results of two separate experiments were combined it was found that 13 out of 15 normal *S*s emitted this particular pattern of response.

Since the behavioral records shown in Fig. 1 are based upon the same values of the avoidance parameters and since these two basic patterns have also been seen with another set of values of the avoidance parameters (S-S interval: 10 sec; R-S interval: 15 sec) it seems that the appearance of the two patterns of bar-pressing behavior does not depend on the particular values of the schedule.

There is not sufficient data to determine whether their relative frequency can be altered by changes in the value of the S-S and R-S intervals, nor is it possible to specify the reduction in shock frequency that occurs when these two patterns of bar-pressing occur at other values of the avoidance parameters. These are problems for systematic investigation.

Our experience also indicates that once the *S* has learned the burst-responding pattern it does not shift into the continual-responding pattern even after three weeks of daily 45-min sessions. In other words, two discrete modes of behavior in the avoidance situation are involved.

Since the *S*s have not been run on these schedules longer than three weeks, a maximum time over which this phenomenon persists cannot be indicated. However, the greater prevalence of the burst-responding

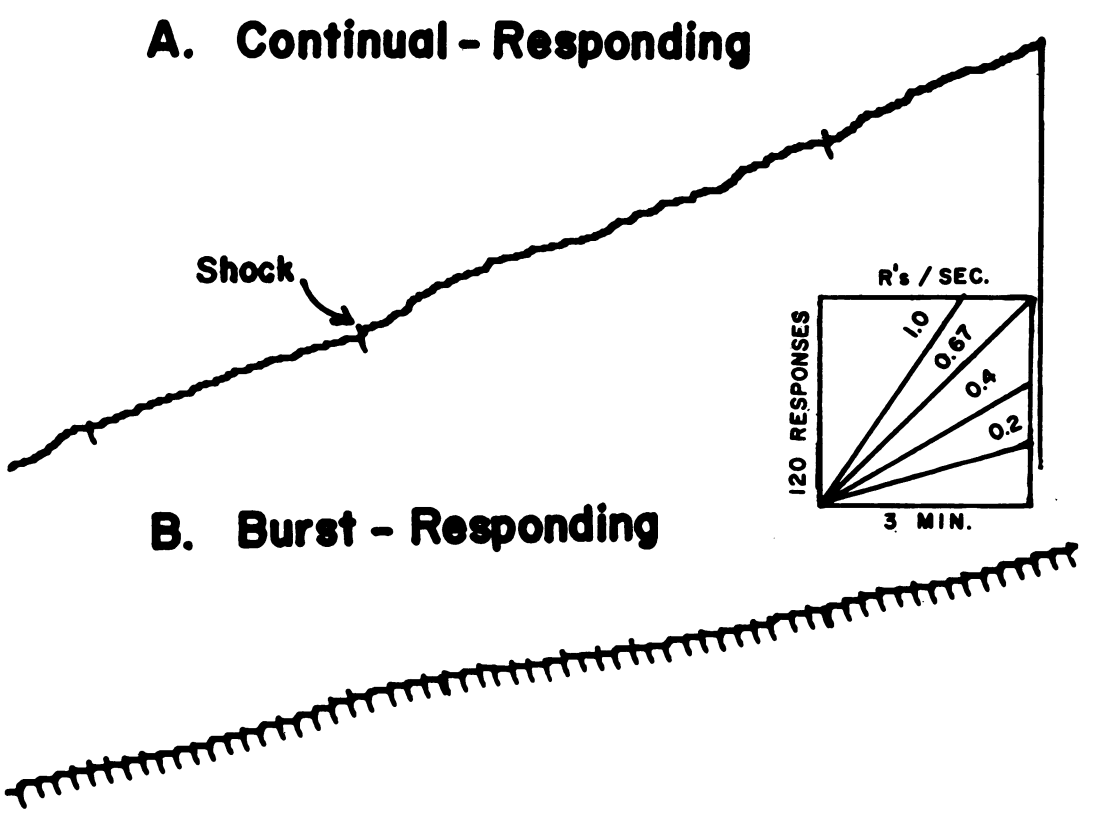

Fig. 1. Cumulative response curves during Sidman avoidance conditioning. Vertical deflection in each curve indicates occurrences of shock: A. Continual-responding pattern with relatively few shocks; B. Burst-responding pattern with bar-pressing occurring only after shock-onset.

relative to the continual-responding pattern suggests that the former is the more basic adjustment to the situation. To what extent these different behavior patterns can be accounted for in terms of the physical arrangements within the test chamber is at present undetermined.

Whether the frequency of the burst-responding pattern and the concomitant bar-holding behavior could be reduced by electrification, for example, of the walls of the chamber and the bar remains a problem for investigation.

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