The effects of simultaneous CS/US versus .5 seconds CS/US interval on the acquisition of a conditioned escape response

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Abstract

A group of 28 naive male rats were conditioned under either a simultaneous or .5 sec. CS/US interstimulus interval to determine the comparability of the two intervals on classical aversive conditioning. Results indicated no differences between the two interstimulus intervals.

Introduction

Even though there is considerable evidence (Stevens, 1960) suggesting that .5 sec. is the optimum CS/US interval in classical aversive conditioning, numerous exceptions are found (Black, 1963; Boice & Denny, 1965; Longo, Klempay, & Bitterman, 1964; Noble & Adams, 1963; Noble & Harding, 1963; and Wolffe, 1932). In spite of the general acceptance of the .5 sec. CS/US interval, two studies (Prokasy, Fawcett, & Hall, 1962 and White & Schlosberg, 1952) have attempted to make direct comparisons between simultaneous and .5 sec. CS/US. Both of these studies involved measuring the magnitude of GSR responses and in both .5 sec. interstimulus interval (ISI) was found superior to simultaneous CS/US. The study reported below was conducted to investigate further the comparability of simultaneous versus .5 sec. CS/US on classical aversive conditioning, utilizing a different apparatus and Ss than employed in the above two studies.

Method

The subjects (Ss) were 28, 90-day-old, naive male rats (Long-Evans strain) maintained on an ad libitum food and water diet. At the beginning of the study, the Ss were divided into two groups: (1) those conditioned on simultaneous CS/US; and (2) those conditioned on .5 sec. CS/US.

The procedure involved giving the Ss in each respective group 20 acquisition trials on each of two consecutive days in a modified Skinner Box equipped with an electric grid floor and a revolving wheel by which the S could terminate the shock. On the third consecutive day both groups were given 20 test trials with a .5 sec. CS/US interval. The CS was a 102 db bell placed 3 ft from the apparatus; the US was a 100 ma shock administered through the box's electrified grid floor. The intertrial interval (ITI) was 1 min. Response latencies were recorded for each trial and if initially the S made no response within 1 min. the shock was terminated by the experimenter and reapplied after a 1 min. ITI.

Results and Discussion

The results indicated that there was no difference between simultaneous and .5 sec. CS/US interval in

acquiring the conditioned escape response ($F=3.27$; $df=1/26$; $p>.05$). To determine, however, whether the Ss were responding to the bell which is a necessary condition in classical conditioning rather than the shock only, the data from the 20 test trials were analyzed. The results indicated that: (1) 13 of the 14 Ss in both groups had at least two (range=2-13) avoidance responses; and (2) the groups did not differ in the number of avoidance responses during the 20 test trials ($F=1.4$; $df=1/13$; $p>.5$). These data suggest that both groups were responding to the bell.

One can account for the disparity between this finding and that of Prokasy et al (1962) and White & Schlosberg (1952) on the basis of an earlier postulation by Hull (1943) which stated that conditioning is most efficient when the CS/US interval is such that the receptor discharge of the CS is at its maximum frequency at the time of occurrence of the UCR. It may well be, in other words, that the time required for escaping the shock is much less than the time required to develop maximum GSR responses (Kimble, 1947 and Stevens, 1960, p. 527).

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