MODIFICATION OF ESCAPE RESPONDING IN HUMANS BY INCREASING THE MAGNITUDE OF AN AVERSIVE EVENT¹

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Escape responding of humans on an avoidance-escape schedule was replaced by avoidance responding by increasing the magnitude of the aversive stimulus. The aversive stimulus consisted of a point loss period. The shift from escape to avoidance responding was effected under a condition of response cost.

In a previous study (Weiner, 1963b), a number of escape responses were emitted by normal human subjects on an avoidance-escape schedule under a response cost condition. The present study attempted to shift such escape behavior to avoidance behavior by increasing the magnitude of the aversive event maintaining the behavior.

METHOD

Subjects

Two male humans, S19 and S23, aged 31 and 19 years respectively, and a 21-year old female human, S24, each received \$4.00 for the first hour and \$1.50 for each additional hour for each day of testing.

Procedure

In a preliminary training phase, the Ss participated in a direct replication of a previous study (Weiner, 1963b). Details concerning the apparatus, task, instructions, aversive contingencies, and experimental procedures used in this preliminary phase are included in the earlier study. In general, the Ss were provided with a maximum score on an add-subtract electronic counter and instructed to maintain this score as high as possible by pressing a microswitch key (with a force of approximately 20 g through a distance of 1 cm). They were told nothing about the purpose of the experiment, the nature of the aversive contingencies

and cost conditions, or how to press the microswitch key. Key presses were defined as the closure of the microswitch.

The key presses were conditioned initially under avoidance, escape, and avoidance-escape components in a three-ply multiple schedule under no-cost (no point loss per response). The aversive stimulus was a 20-sec point loss period during which 86 points were subtracted one at a time from the score on the counter. The point loss periods were scheduled every 10-sec, either from a previous key press or from the termination of a previous point loss period.

Under the avoidance component of the three-ply multiple schedule, the Ss could only avoid a point loss period by emitting a single key press within the 10-sec interval between point loss periods. Under the escape component of the three-ply multiple schedule, the Ss could only escape a point loss period by emitting a key press following its onset. The amount of points lost per escape response depended upon the latency of the response (*i.e.*, the time interval between the onset of a point loss period and the escape response). For the avoidance-escape component, the contingencies of the avoidance component and escape component were combined. Thus, the Ss could either avoid or escape point loss periods by appropriate key pressing responses.

Following stabilization of the three-ply multiple schedule under no-cost (4 hr), a six-ply multiple schedule was put into effect (5 hr) by introducing a cost condition (in addition to no-cost) during the avoidance, escape and avoidance-escape components of the three-ply multiple schedule. Under the cost condition, one point was deducted from an S's score for each key press.

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Distinctive SPs (colored light circles) were associated with each component of the six-ply schedule. In addition, a distinctive SP (colored light) was on during the point loss periods. It was extinguished when the point loss periods terminated.

Final Training Phase. The present study commenced following conditioning under the six-ply multiple schedule described above and involved only the avoidance-escape component.

An attempt was made to shift the escape responding of the Ss under cost to avoidance responding by increasing the total amount of 1-point subtractions during a complete 20-sec point loss period from 86 points to 800 and 1500 points. The Ss, therefore, were conditioned for six additional hours (three 1-hr experimental sessions daily) on a new six-ply multiple avoidance-escape schedule. The components of this new schedule were presented in

a fixed order as follows: a 10-min avoidance-escape no-cost component under the 86-point loss period; a 10-min avoidance-escape cost component under the 86-point loss period, a 10-min avoidance-escape cost component under the 800-point loss period; a 10-min avoidance-escape cost component under the 1500-point loss period; a 10-min avoidance-escape cost component under the 86-point loss period; a 10-min avoidance-escape no-cost component under the 86-point loss period.

The SPs (colored lights) associated with the no-cost and cost avoidance-escape components under the 86-point loss period during the preliminary training phase were also employed for the six-ply multiple avoidance-escape schedule. In addition, distinctive SPs (colored lights) were associated with the 800 and 1500 point loss periods under cost.

Transistorized digital elements and networks (Weiner, 1963a) were used to program

Fig. 1. The final performances of S19 (Record A) and S23 (Record B) on the six-ply multiple avoidance-escape schedule. The recording pen was displaced downward after the onset of a point loss period. While displaced, the pen continued to make a cumulative record of responses. The pen reset following termination, either by the S or the programming equipment, of the point loss period.

the aversive contingencies and the no-cost and cost conditions. Responses were continuously recorded on a Gerbrands cumulative recorder.

RESULTS AND DISCUSSION

During the first hour of conditioning under the six-ply multiple avoidance-escape schedule, all Ss exhibited some escape responding under all cost components. The latencies of these (and all subsequent) escape responses were fairly constant at approximately 1-sec. At this latency, therefore, point loss before the escape response was approximately four points under the 86-point loss period, 40 points under the 800-point loss period, and 75 points under the 1500-point loss period.

The records obtained from S19 and S23 after the first hour of conditioning were similar to the fifth (final) hour shown in Fig. 1. The first two components of Fig. 1A and Fig. 1B show S19's and S23's respective no-cost and cost performances maintained under the 86-point loss period. Inspection of these components reveals that both Ss successfully avoided all point loss periods under no-cost by emitting a relatively high constant avoidance rate. Under cost, however, attenuated response rates produced a number of escape responses.

Inspection of the third and fourth components in Fig. 1A and Fig. 1B reveals that the escape responding of S19 and S23 under cost was shifted to avoidance responding under the 800 and 1500 point loss periods. Such avoidance responding was sufficient to avoid all programmed point loss periods.

Effects similar to those described above characterized the performance of S24, except that the 800 and 1500 point loss periods re-

duced rather than eliminated S24's escape responding. Under cost, S24 had 16 escape responses under the 86-point loss period. These were reduced to four under the 800-point loss period and one under the 1500-point loss period. Otherwise, S24's response rates under all components of the six-ply multiple avoidance-escape schedule were similar to S23.

The no-cost and cost performances of all Ss under the 86-point loss period were not altered after the introduction of the 800 and 1500 point loss periods. Components five and six in Fig. 1A and Fig. 1B show the complete recovery of these baseline performances for S19 and S23.

This success at shifting human escape behavior to avoidance behavior under cost on an avoidance-escape schedule by increasing the magnitude of an aversive event, contrasts, to some extent, with the findings of Azrin (1958). Azrin reported that increases in the intensity of aversive noise failed to result in the substitution of avoidance responding for escape responding on an avoidance-escape schedule in a human subject. Data on possible response cost conditions were not obtainable from this study.

REFERENCES

- Azrin, H. H. Some effects of noise on human behavior. *J. exp. Anal. Behav.*, 1958, 1, 183-200.
- Weiner, H. Operant programming with transistorized digital elements. *J. exp. Anal. Behav.*, 1963a, 6, 193-195.
- Weiner, H. Response cost and the aversive control of human operant behavior. *J. exp. Anal. Behav.*, 1963b, 415-421.

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