Ineffectiveness of "time out" punishment in suppressing human operant behavior¹

ALAN BARON, ARNOLD KAUFMAN, AND IRENE RAKAUSKAS

UNIVERSITY OF WISCONSIN-MILWAUKEE

Human Ss procured monetary reinforcement on a fixed-ratio schedule. In one component of the schedule, rather than procuring reinforcement responding produced either 0, 1, or 4 min of time out from reinforcement. Response-contingent time outs of these durations did not reduce rates below levels in other components of the schedule. The failure of time out punishment to produce response suppression was attributed to the fact that reductions in rate would have been accompanied by reductions in reinforcement frequencies as well.

Holz, Azrin, & Ayllon (1963) investigated the extent to which a period of "time out" (TO) from positive reinforcement can suppress human operant behavior. Four female mental patients were trained to pull a plunger to obtain cigarettes on either a 30- or 90-sec variable interval schedule. When this behavior was established, a 30-sec period of TO from cigarette reinforcement followed each 10th response. This procedure produced suppression of responding in two of the four Ss (both trained with the 30-sec schedule).

The present study was designed to investigate further the effects of response-contingent TO on human behavior. The procedures differed from those of Holz et al in a number of ways potentially relevant to the punitive effects of TO. Differences included: (a) use of college students as Ss, (b) fixed ratio programming of monetary reinforcement, and (c) use of longer TO durations.

Method

Subjects. Four female college students served as paid Ss for a series of 50-min sessions. They participated with the understanding that amounts of money earned per session would be revealed only at the very end of the study.

Apparatus. The S sat before a table in a 6-ft sq sound-attenuated room. Attached to the table was a sloping panel on which were mounted three ground-glass screens and a plastic push button.

Instructions. Written instructions which remained in the room indicated that: (a) a green light on the center panel signalled payment at the continuous rate of 4 cents/min for as long as the light was on; (b) once on, the green light remained on for a fixed period and could not be prolonged; (c) a blue light on the left panel signalled that button-pressing would produce the green light; (d) a yellow light on the right panel indicated that the session was in progress.

Initial training. Ss were trained on a chained schedule in which 25 responses (initially 10 responses) in the presence of the blue light terminated the blue

light and produced the green light for a 15-sec period. After 15 sec the green light terminated and the blue light reappeared. Training continued on this basis for at least five sessions.

Punishment training with 0-, 1-, and 4-min TO's. During this phase, following each two occurrences of the blue-green sequence described above, a red light appeared on the left panel. After 25 responses in the presence of the red light, the blue light reappeared (i.e., TO = 0 min) and the entire cycle then was repeated, i.e., blue, green, blue, green, red. Training continued for each S under the 0-min TO condition until rates stabilized in the various components of the schedule (23, 22, 11, and 18 sessions, respectively).

During subsequent training, 1- and 4-min periods of TO were made contingent upon completion of 25 responses in the red-light component. For the duration of the TO period, all panel lights were off except for the yellow session-light. Upon completion of the TO period, the blue light reappeared and the entire cycle then was repeated, i.e., blue, green, blue, green, red, TO. Ss 1, 2, and 3 were trained first with the 1-min TO duration (9, 8, and 10 sessions, respectively), and then with the 4-min TO duration (8, 11, and 12 sessions, respectively). S 4 was trained only with the 4-min TO duration (13 sessions).

Results and Discussion

Table 1 gives mean responses per sec during the last five days of training with each TO duration and

Table 1. Responses/sec as a function of TO duration

Subject	Component*	Time Out Duration		
		0 min	1 min	4 min
1	1	5.9 $\pm$.1	5.2 $\pm$.3	5.5 $\pm$.1
	2	5.7 $\pm$.1	5.2 $\pm$.4	5.4 $\pm$.2
	3	5.7 $\pm$.1	5.4 $\pm$.5	5.2 $\pm$.5
2	1	4.9 $\pm$.6	6.0 $\pm$.1	4.2 $\pm$ 1.0
	2	4.9 $\pm$.7	6.0 $\pm$.1	5.3 $\pm$.6
	3	5.0 $\pm$.8	5.9 $\pm$.1	5.6 $\pm$.4
3	1	5.7 $\pm$.1	5.2 $\pm$.2	4.8 $\pm$.5
	2	5.3 $\pm$.1	5.1 $\pm$.3	5.4 $\pm$.1
	3	5.3 $\pm$.1	5.2 $\pm$.3	5.3 $\pm$.1
4	1	4.1 $\pm$.6		4.4 $\pm$.1
	2	3.9 $\pm$.6		4.3 $\pm$.3
	3	3.8 $\pm$.8		4.6 $\pm$.1

*Numbered Components refer to contingencies of chained schedule as follows: (1) Blue light (25 responses produce reinforcement); (2) Blue light (25 responses produce reinforcement); (3) Red light (25 responses produce TO).

the average deviation of the last five days. If TO from positive reinforcement had suppressive effects, then one or both of the following outcomes would be expected: (a) rates in the S_3 (red light) component should be lower than rates in the S_1 and S_2 (blue light) components, and (b) rates in the S_3 component should decrease as the TO duration was increased from 0 min to 1 and 4 min.

The data in Table 1 provide little support for either of these hypotheses. It may be seen that response rates by the four Ss did not vary systematically either as a function of schedule component or duration of TO associated with S_3 . In general, rates of response were fairly uniform, not only across experimental conditions but also from S to S and from day to day.

Examination of the cumulative records obtained during each session did not provide a basis for altering the above conclusions. Local rates, both initially and at the end of training with each TO duration, did not differ systematically as a function of schedule component. The records indicated that the TO period was effectively discriminated by all four Ss, although S 3 occasionally showed bursts of responding midway in the period.

Analysis of the present procedures, as well as those of the previously-cited Holz et al (1963) study, suggests important reasons why TO punishment, even if aversive, would not necessarily suppress behavior (see also Leitenberg, 1965). Punishing a response by withholding the fixed-ratio reinforcement which sustains it creates an arrangement in which non-responding, while serving to avoid a period of non-reinforcement actually results in a longer period of non-reinforcement since the S must respond to be reinforced. Thus, in the present study, decreased rates in reaction to TO-punishment would have reduced still further the frequency of reinforcement. By comparison, continued high rates produced as many of the reinforcements as were potentially available within the limits of the schedule and the TO durations.

It is instructive to note that when variable-interval schedules are used, as in the Holz et al study, decreased rates in reaction to TO-punishment may have the opposite result of increasing reinforcement frequencies. Consider, for example, the most extreme case of suppression reported by Holz et al where TO punishment reduced rates from 108 to 10 responses/min. Since reinforcement was programmed on a 30-sec variable interval schedule, either of these rates was

sufficient to procure most of the available reinforcements when time was in. But, since 30 sec of TO followed each 10 responses, the lower rate had the further consequence of increasing substantially the proportion of the session when time was in, and thus the overall frequency of reinforcement.

The present procedures and results suggest important functional differences between punishment by TO and punishment by noxious stimuli, such as electric shock. When shock punishment is used, variations in response rates influence frequencies of both positive reinforcement and shock. Whether shock is effective in suppressing human behavior under these circumstances appears to depend on whether the shock is sufficiently intense to offset the properties of the positive reinforcer (Kaufman, 1964). When, however, the punishing event is TO from positive reinforcement, variations in response rates only can influence the frequency of positive reinforcement. In situations with TO-punishment, where maintenance of high response rates procures higher frequencies of positive reinforcement than lower rates, it is not surprising that TO is ineffective in suppressing high rates of response.

Assuming that TO from positive reinforcement has aversive properties for human Ss, under what circumstances might response-contingent TO suppress behavior to the extent of reducing overall reinforcement frequencies? One possibility would be in situations in which the S cannot effectively discriminate that reductions in rate are accompanied by reductions in reinforcement frequency. An effort was made to hinder such a discrimination in the present study by concealing from the S how much money actually was earned per session. But obviously such a procedure did not conceal correlations between response rates and reinforcement frequencies during the course of the session itself.

References

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