

Delay of reinforcement for responses which end pauses: Effects on response rate

*Demora del reforzamiento para las respuestas que terminan
pausas: Efectos sobre la tasa de respuesta¹*

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ABSTRACT

Rats' bar pressing was reinforced with water under a variable interval 1-min schedule. Pauses greater than 2 sec were registered and, in alternate experimental conditions, had as a consequence a delay of reinforcement for responses which terminated pausing, in a procedure similar to the changeover delay in concurrent schedules. In different conditions, the delay length was of 3, 5, 8, and 16 sec. Before each delay condition, a no delay procedure was in effect (baseline). For all three rats, a delay of reinforcement contingent on pausing resulted in increases in response rate and decreases in percentage of session time spent in pauses (absence of bar presses). Results parallel those obtained when changeover delay length is manipulated in concurrent schedules, and were interpreted as the effect of differential reinforcement of interresponse times.

DESCRIPTORS: delay of reinforcement, changeover delay, variable-interval schedule, response rate, pausing, bar press, rats.

RESUMEN

La conducta de presionar la palanca en ratas fue reforzada con agua bajo un programa de intervalo variable 1 min. Se registraron las pausas mayores de 2 seg y, en condiciones experimentales alternadas, tuvieron como consecuencia una demora de cambio en programas concurrentes. En condiciones diferentes la longitud de la demora fue de 3, 5, 8 y 16 seg. Antes de cada condición de demora estuvo en efecto un procedimiento de no demora (línea base). Para las tres ratas, una demora de reforzamiento contingente a las pausas resultó en aumentos en la tasa de respuesta y disminuciones en el porcentaje del tiempo de la sesión transcurrido en pausas (ausencia de presiones de palanca). Los resultados son paralelos a los obtenidos cuando se manipula la longitud de la demora de cambio en programas concurrentes, y son interpretados como el efecto del reforzamiento diferencial de los tiempos entre respuesta.

¹ This report is partly based on a portion of a thesis submitted to the Universidad Nacional Autónoma de México in partial fulfillment of the requirements for the Bachelor of Arts degree. We wish to thank Florente López and Francisco Cabrer for their helpful discussions. Reprints may be obtained from J.C. Todorov, Departamento de Psicología, Universidad de Brasília, 70910 Brasília, DF, Brasil.

DESCRIPTORES: demora del reforzamiento, demora de cambio, programa de intervalo variable, tasa de respuesta, pausas, presión de palanca, ratas.

In concurrent variable-interval, variable-interval schedules (conc. VI VI) a changeover delay (COD) contingent on switching responses decreases the frequency of those responses (e.g., Herrnstein, 1961). As the duration of the COD increases, the rate of switching decreases (Shull and Pliskoff, 1967). After a changeover, and for the duration of a COD, response rate is high, decreasing as the COD is completed (Silberberg and Fantino, 1970; Pliskoff, 1971). Overall response rates (rates during and after a COD) first increase and then decrease as COD duration is increased (Pliskoff, 1971). The purpose of the present investigation was to verify whether such effects of a COD are characteristic of concurrent schedules only. A reinforcement delay contingency was programmed for responding on a single variable-interval (VI) schedule, and its duration was manipulated over different experimental conditions.

METHOD

Subjects

Three adult, male, albino rats, experimentally naive, served. Subjects had free access to food in their individual cages, and were water-deprived for 23 hr before sessions.

Apparatus

A standard Foringer rat test chamber (Model RG143-28) was used. Electromechanical programming and standard recording equipment were located in a separate room.

Procedure

In all experimental conditions, the reinforcer was 10 sec access to a drop of water, during which all chamber lights were off. After shaping of the bar press response, subjects were submitted to four sessions of continuous reinforcement (*crf*). From the fifth session and throughout the experiment a VI 1-min schedule of reinforcement was in effect.

On the first experimental condition, response rate and amount of session time spent in pauses greater than 2 sec were recorded (baseline). On the second condition, a COD of 3 sec was made contingent on responses which ended pauses greater than 2 sec. On the third condition, baseline continen-

cies were reestablished (no COD). For the following conditions, COD duration was changed to 5, 8, and 16 sec, always with a return to baseline (no COD) before moving to a new COD value (Table 1).

Whenever possible, 30-min sessions (not included reinforcement time) were conducted daily. Numbers of sessions per experimental condition are indicated in Table 1.

RESULTS

Table 1 presents averages and standard deviations of response rates and time pausing (in sec) per 60 sec of session. Data refer to the last five sessions of each experimental condition.

Figure 1 shows, for the three animals, the effects of COD duration on response rate and on the percentage of session time spent pausing. Filled circles refer to data from conditions where a COD was in effect; empty circles refer to baseline conditions (no COD), and are plotted regarding the COD duration on the following condition. Generally, response rates on the COD conditions were higher than on the respective baseline conditions; the exception was the data from rat A17, with 16-sec COD duration. For all subjects and COD values, the time spent pausing was greater in baseline conditions than on COD conditions.

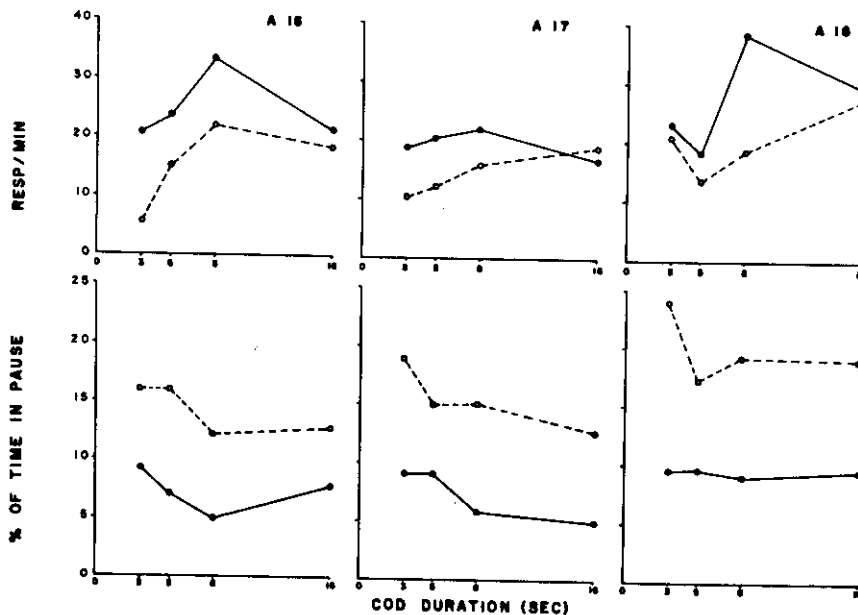


Fig. 1. Effects of COD duration on response rate and on the percentage of time spent pausing.

TABLE 1

Averages and standard deviations of response rates and time pausing.
Data refer to the last five sessions of each experimental condition.

Condition Order	COD Duration (sec)	Response Rate (R/min)		Time Pausing (per 60 sec)	
		Mean	S.D.	Mean	S.D.
Rat A 16					
1	—	5.4	0.6	9.6	0.8
2	3	20.8	2.0	5.6	0.4
3	—	15.2	2.4	9.8	0.9
4	5	23.4	4.2	4.1	0.7
5	—	22.0	7.0	7.4	1.2
6	8	33.1	6.1	3.0	0.4
7	—	18.8	5.4	7.6	0.9
8	16	21.4	2.7	4.8	0.6
Rat A 17					
1	—	10.7	1.6	11.3	0.8
2	3	18.9	4.3	5.4	1.6
3	—	12.2	2.0	9.1	0.8
4	5	20.5	2.0	5.4	0.7
5	—	18.5	3.4	9.0	1.6
6	8	22.0	5.8	3.8	1.1
7	—	19.3	5.9	8.2	0.8
8	16	17.0	3.7	3.4	0.3
Rat A 18					
1	—	20.9	2.4	14.4	1.5
2	3	23.2	4.7	5.2	0.8
3	—	13.1	5.8	10.2	3.0
4	5	18.0	6.1	5.2	1.7
5	—	18.8	4.4	11.4	1.0
6	8	39.2	4.4	4.8	0.8
7	—	27.8	4.4	10.6	0.9
8	16	29.7	2.5	5.5	0.8

DISCUSSION

A delay of reinforcement contingent on pausing in responding maintained by a single VI schedule resulted in increases in response rate and decreases in percentage of session time spent in pauses. The increase in response rates is an effect similar to that observed by Catania (1972) in a multiple VI-Extinction schedule. Both the increase in response rates and the changes in time spent responding parallel the effects of the changeover delay in concurrent schedules (Herrnstein, 1961, Shull and Pliskoff, 1967; Silberberg and Fantino, 1970; Allison and Lloyd, 1971; Pliskoff, 1971). The present results suggest that the effects of COD on concurrent schedules may not depend on the complex contingencies in effect in such schedules.

In the present experiment, the differential reinforcement of short interresponse times (a byproduct of the delay of reinforcement contingent on responses which ended pauses) seems the best explanation for the increase in response rates.

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