

*DETERMINANTS OF PAUSING UNDER VARIABLE-RATIO  
SCHEDULES: REINFORCER MAGNITUDE, RATIO SIZE,  
AND SCHEDULE CONFIGURATION*

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Pigeons pecked a key under two-component multiple variable-ratio schedules that offered 8-s or 2-s access to grain. Phase 1 assessed the effects of differences in reinforcer magnitude on postreinforcement pausing, as a function of ratio size. In Phase 2, postreinforcement pausing and the first five interresponse times in each ratio were measured as a function of differences in reinforcer magnitude under equal variable-ratio schedules consisting of different configurations of individual ratios. Rates were also calculated exclusive of postreinforcement pause times in both phases. The results from Phase 1 showed that as ratio size increased, the differences in pausing educed by unequal reinforcer magnitudes also increased. The results of Phase 2 showed that the effects of reinforcer magnitude on pausing and IRT durations were a function of schedule configuration. Under one configuration, in which the smallest ratio was a fixed-ratio 1, pauses were unaffected by magnitude but the first five interresponse times were affected. Under the other configuration, in which the smallest ratio was a fixed-ratio 7, pauses were affected by reinforcer magnitude but the first five interresponse times were not. The effect of each configuration seemed to be determined by the value of the smallest individual ratio. Rates calculated exclusive of postreinforcement pause times were, in general, directly related to reinforcer magnitude, and the relation was shown to be a function of schedule configuration.

*Key words:* postreinforcement pause, variable-ratio schedule, reinforcer magnitude, ratio size, run rate, interresponse time, key peck, pigeons

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Under fixed-ratio (FR) schedules, a period of reduced responding typically follows delivery of the reinforcer. Most researchers refer to this as a "postreinforcement pause," although some prefer the term "preratio pause" (Griffiths & Thompson, 1973). Studies have shown that the duration of the postreinforcement pause (PRP) is controlled by several factors, among them ratio size (Felton & Lyon, 1966; Ferster & Skinner, 1957) and reinforcer magnitude (Inman & Cheney, 1974; Lowe, Davey, & Harzem, 1974; Meunier & Starratt, 1979; Powell, 1969). In an effort to investigate the interaction of these two variables, Powell (1969) examined the effects of two durations of access to grain under a range of FR values. Results showed an inverse relation between reinforcer magnitude and PRPs; longer PRPs were associated with the briefer access to food and shorter PRPs with the longer access to

food. Both the absolute duration of PRPs and the differences in the PRPs associated with the two reinforcer magnitudes were directly related to FR size.

Relatively few studies have investigated PRPs under variable-ratio (VR) schedules. Ferster and Skinner (1957) studied responding under VR schedules in pigeons and reported no relation between PRPs and VR size. In fact, response rates were high immediately after reinforcement, even at comparatively high ratios (e.g., VR 360). More recently, Priddle-Higson, Lowe, and Harzem (1976), using rats, studied PRPs under VR schedules of milk delivery. Their results showed a direct relation between reinforcer magnitude (i.e., percentage of milk concentration) and PRP duration. This finding is contrary to Powell's (1969) results with FR schedules and pigeons but consistent with the results of other research with rats responding under FR schedules of milk delivery (e.g., Lowe et al., 1974; but see Meunier & Starratt, 1979). Priddle-Higson et al. (1976) also reported that both the absolute PRP duration and differences in PRPs educed by unequal concentrations of milk increased with ratio size. These results are consistent with those reported by Powell (1969).

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To investigate PRPs under VR schedules further, the present study used pigeons to examine the effects of ratio size and reinforcer magnitude. In Phase 1, the effects of differences in reinforcer magnitude were assessed across a range of VR sizes (i.e., VR 10, VR 30, VR 50, and VR 70). This phase extended Powell's (1969) study of PRPs under FR schedules with pigeons and the investigation by Priddle-Higson et al. (1976) of PRPs under VR schedules with rats.

Phase 2 examined the effects of reinforcer magnitude as a function of the distribution of individual ratios composing VR 70 schedules. The results of previous research suggested that responding under aperiodic schedules is affected by the distribution of interreinforcement intervals (IRIs). For example, Catania and Reynolds (1968) showed that local response rates under arithmetic variable-interval (VI) schedules differed from those under constant-probability VI schedules. Specifically, the value of the shortest IRI affected the rate of responding immediately after reinforcement. In addition, pilot data from our laboratory suggested that the effects of reinforcer magnitude on PRPs under VR schedules depended on the configuration of the individual ratios. In Phase 2 of the present investigation, two VR 70 schedules were studied, each consisting of 10 individual ratios. In one, the smallest ratio was an FR 1; in the other, FR 7. Postreinforcement pausing was measured as a function of reinforcement magnitude under both configurations. The first five interresponse times (IRTs) in each ratio were recorded to detect shifts of pausing from immediately after reinforcement to after the first few responses following reinforcement. To examine other effects of reinforcer magnitude, VR size, and schedule configuration, rates exclusive of postreinforcement pause time ("run rates") were also collected in both phases.

## METHOD

### *Subjects*

Five female White Carneau pigeons, maintained at approximately 80% of their free-feeding weights, served as subjects. Four birds (P2300, P1654, P523, and P414) were used in Phase 1. Because P523 died after Phase 1, another bird (P5916) was added for Phase 2. Birds were housed individually with unlimited

access to water and grit in a constantly illuminated room. All birds had previous exposure to VR schedules.

### *Apparatus*

Sessions were conducted in four three-key chambers, each measuring 38 cm high, 41 cm wide, and 40 cm long. The right key (BRS/LVE) of each chamber was used. It could be transilluminated red or green by an IEE projector and operated with 0.2 N of force. The key was approximately 11 cm from the side wall and 25 cm from the floor. A 6-cm by 6-cm aperture, centered on the front wall 10 cm from the floor, permitted feeding from the grain hopper. When raised, the hopper was illuminated with a 7-W bulb and provided access to mixed grain. The keylight was extinguished when access to grain was available. A 7-W houselight was centrally located on the ceiling of each chamber. Masking noise was provided by a Grason-Stadler White Noise Generator (Model 901B) through a speaker mounted on the back wall, and ventilation was provided by an exhaust fan mounted behind the intelligence panel. Data collection and experimental events were controlled by a PDP-8<sup>®</sup> minicomputer (Digital Equipment Corporation) with SUPERSKED<sup>®</sup> software (State Systems, Kalamazoo, Michigan) in concert with electromechanical interfacing.

### *Procedure*

Birds were exposed to a multiple (mult) VR VR schedule in which the ratio size in the two components was always the same, and 2-s or 8-s access to grain alternated in successive components. Within each condition, key color was correlated with one of the two magnitudes of reinforcement. VR schedules were composed of 10 individual ratios presented in a random order within blocks of 10 reinforcers. An independent VR schedule operated in each component. At the beginning of each daily session the right key was illuminated either red or green, with the initial color determined at random. Thereafter, key color and the prevailing magnitude of reinforcement changed following every 10th food delivery. Sessions terminated after 40 reinforcers.

In Phase 1, birds were exposed to mult VR 10 VR 10, mult VR 30 VR 30, mult VR 50 VR 50, and mult VR 70 VR 70 schedules. Each bird received all schedules in a different

Table 1  
The individual ratios of List A and List B.

Schedule	Individual ratios									
VR 10 (List A)	1	3	5	7	9	11	13	15	17	19
VR 30 (List A)	3	9	15	21	27	33	39	45	51	57
VR 50 (List A)	5	15	25	35	45	55	65	75	85	95
VR 70 (List A)	7	21	35	49	63	77	91	105	119	133
VR 70 (List B)	1	16	32	47	63	78	93	108	123	139

irregular order across conditions. The individual ratios of each schedule (see Table 1) constituted an arithmetic progression and were computed using the method reported by Pridle-Higson et al. (1976). For the present study, this is designated as the List A method. The key color correlated with 2-s access to grain was red for two birds and green for the other two, and was not changed across conditions.

In Phase 2, subjects were exposed to a mult VR 70 VR 70 schedule. In the first condition, individual ratios (i.e., VR 70 List B values shown in Table 1) approximated an arithmetic progression in which the smallest ratio was FR 1. Some individual ratios were adjusted to ensure that the schedule was a VR 70; as a result, the progression incremented by either 15 or 16 responses. In the next condition, individual ratios were computed using the same

method as that in Phase 1 (i.e., VR 70 List A values). In the third condition, List B values were reinstated. The key color correlated with 2-s access to grain was red in all three conditions for two birds and green for the other two.

In each session, the mean and median PRP were recorded in each schedule component for Phase 1. The duration of the first five IRTs following each reinforcer, as well as the mean and median PRP, were collected in Phase 2. Equipment limitations precluded calculating median IRTs; thus, only mean IRT data were computed. Run rates (PRP and reinforcer durations were excluded) were also measured in each phase. Conditions in both phases were changed after a minimum of 10 sessions with no visible trend in pausing over the last five sessions. Table 2 shows the key color associ-

Table 2  
The key color and number of sessions in each condition for each bird.

Subject	Phase 1						Phase 2							
VR value	10		30		50		70		70		70		70	
List	A		A		A		A		B		A		B	
SR duration	2	8	2	8	2	8	2	8	2	8	2	8	2	8
P2300	Key color		Key color		Key color		Key color		Key color		Key color		Key color	
	R	G	R	G	R	G	R	G	R	G	R	G	R	G
Sessions	11		16		25		30		36		44		12	
P523	Key color		Key color		Key color		Key color							
	G	R	G	R	G	R	G	R						
Sessions	12		13		22		19							
P1654	Key color		Key color		Key color		Key color		Key color		Key color		Key color	
	R	G	R	G	R	G	R	G	R	G	R	G	R	G
Sessions	16		27		52		42		59		99		11	
P414	Key color		Key color		Key color		Key color		Key color		Key color		Key color	
	G	R	G	R	G	R	G	R	G	R	G	R	G	R
Sessions	19		22		40		18		32		29		33	
P5916	Key color		Key color		Key color		Key color		Key color		Key color		Key color	
									G	R	G	R	G	R
Sessions									42		19		52	

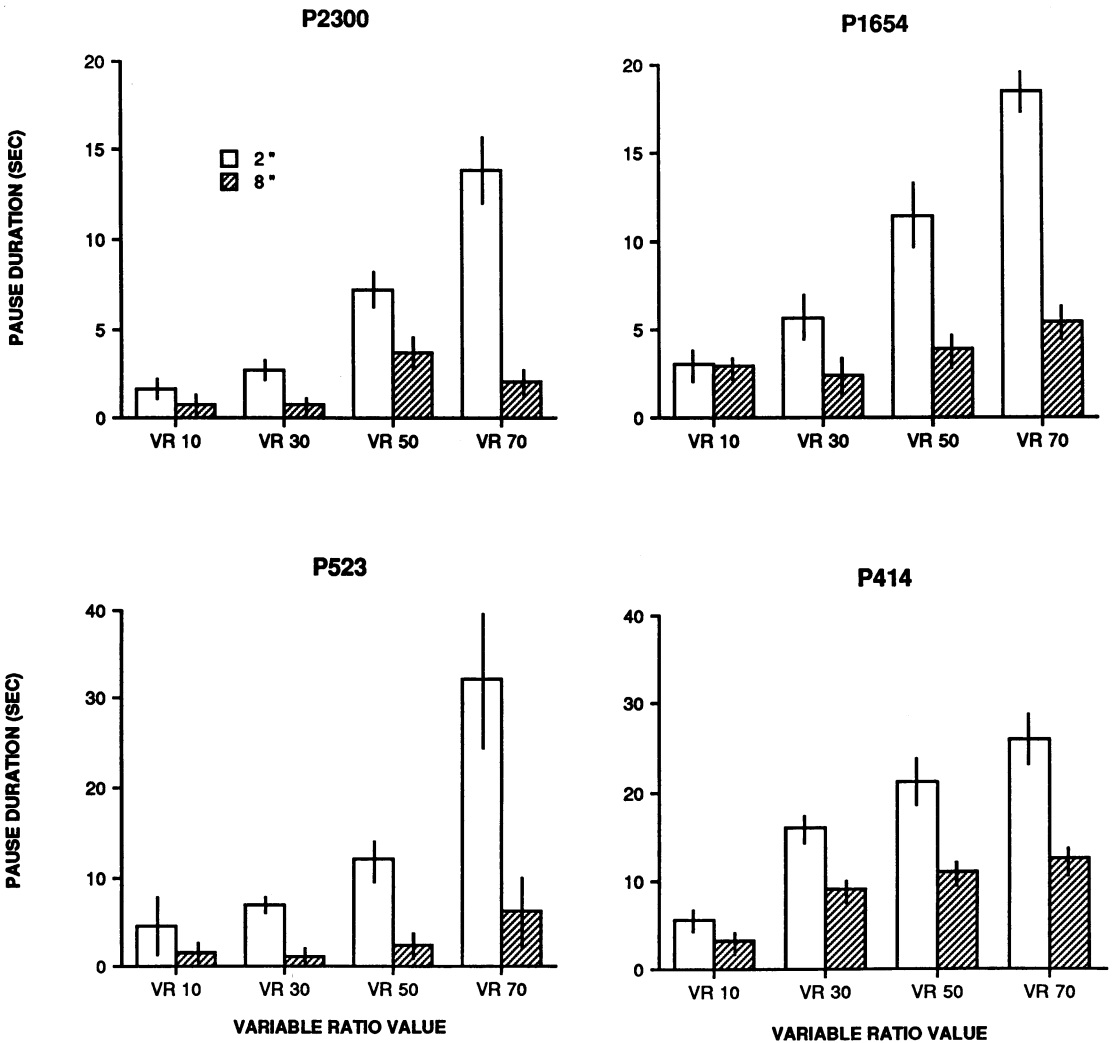


Fig. 1. Mean postreinforcement pause in each schedule component as a function of variable-ratio size in Phase 1. One component offered 2-s access to grain; the other, 8-s access to grain. The mean of the last five sessions for each condition is presented for each schedule component. Vertical lines through the bars are the standard deviations. Note the different ordinate scales on the top and bottom pairs of graphs.

ated with each reinforcer magnitude and the number of sessions in each condition for both phases.

## RESULTS

Figure 1 shows the mean PRP under each schedule component in Phase 1. For all birds, differences in the mean PRP increased with VR size, primarily due to longer PRPs in the component with the 2-s reinforcer. Occasionally, there were small increases in PRP duration with VR size in the component with the 8-s reinforcer. Median PRP data for P2300,

P1654, and P523 in Phase 1 (see Table 3) show similar results. Median PRP data for P414 were quite different. Differences in median PRPs increased with VR size, but longer PRPs were associated with the 8-s grain deliveries under the VR 30 and VR 50 conditions. Only small differences in median PRPs were obtained under VR 70.

Table 3 shows mean run rates under each schedule component in Phase 1. Higher run rates usually, although not always, occurred in the component with the 8-s reinforcer. The effect of VR size was less consistent. For P523, run rates increased slightly with VR size. For

Table 3

Median postreinforcement pause (s) and run rate (r/min) for Phase 1. Median postreinforcement pause, mean duration of the first IRT (s), and run rate for Phase 2.

Subject	Phase 1				Phase 2						
	Median pause		Run rate		Median pause		First IRT		Run rate		
	2 s	8 s	2 s	8 s	2 s	8 s	2 s	8 s	2 s	8 s	
P2300 VR 10	1.7 (0.07)	0.8 (0.03)	231 (18.8)	223 (6.7)	P2300 List B	0.7 (0.05)	0.8 (0.04)	8.1 (2.7)	2.2 (0.3)	190 (18.2)	270 (16.6)
VR 30	1.4 (0.25)	0.7 (0.03)	143 (15.2)	207 (5.0)	List A	4 (0.8)	1.3 (0.2)	0.6 (0.6)	0.3 (0.1)	258 (15.2)	297 (7.5)
VR 50	2.3 (0.37)	1.0 (0.08)	138 (11.1)	184 (9.7)	List B	0.7 (0.1)	0.7 (0.04)	6.8 (2.0)	1.2 (0.2)	170 (15.9)	263 (13.6)
VR 70	3.2 (0.52)	1.0 (0.16)	157 (5.9)	182 (6.5)							
P1654 VR 10	1.7 (0.12)	1.4 (0.14)	123 (8.7)	132 (18.8)	P1654 List B	1.3 (0.04)	1.4 (0.07)	1.4 (0.8)	1.6 (0.6)	118 (4.8)	138 (4.4)
VR 30	1.5 (0.18)	0.9 (0.07)	139 (4.9)	156 (6.4)	List A	10.2 (1.2)	5.8 (1.0)	1.4 (0.7)	0.4 (0.1)	141 (4.8)	155 (9.1)
VR 50	2.0 (0.23)	1.1 (0.06)	125 (13.3)	128 (10.9)	List B	1.40 (0.1)	1.30 (0.04)	4.5 (1.2)	1.7 (0.5)	107 (5.9)	157 (6.3)
VR 70	7.6 (1.2)	1.3 (0.05)	87 (2.9)	119 (4.0)							
P523 VR 10	0.8 (0.15)	0.9 (0.10)	182 (13.7)	169 (10.4)	P5916 List B	1.5 (0.05)	1.4 (0.04)	1.7 (0.5)	1.1 (0.2)	77 (2.4)	107 (2.6)
VR 30	1.8 (0.14)	0.9 (0.10)	159 (19.1)	199 (3.4)	List A	3.8 (0.4)	2 (0.1)	0.8 (0.6)	0.5 (0.2)	108 (8.3)	126 (4.6)
VR 50	2.0 (0.14)	1.2 (0.30)	189 (12.4)	217 (10.4)	List B	1.4 (0.04)	1.3 (0.08)	7.3 (5.4)	1.4 (0.3)	78 (12.6)	111 (7.3)
VR 70	2.6 (0.55)	1.1 (0.11)	204 (25.5)	209 (18.1)							
P414 VR 10	1.8 (0.16)	1.8 (0.15)	134 (27.5)	189 (14.8)	P414 List B	1.7 (0.1)	1.8 (0.05)	6.9 (2.7)	2.0 (0.8)	78 (2.3)	106 (3.4)
VR 30	2.3 (0.13)	5.2 (0.29)	138 (8.4)	125 (9.0)	List A	10.4 (0.7)	6.2 (0.7)	1.4 (0.7)	0.8 (0.2)	102 (15.7)	121 (4.9)
VR 50	4.4 (0.94)	6.2 (0.22)	125 (13.8)	150 (5.3)	List B	1.6 (0.08)	1.8 (0.05)	5.7 (1.2)	1.1 (0.7)	87 (5.0)	115 (4.7)
VR 70	7.3 (1.1)	7.0 (0.40)	136 (11.2)	151 (4.7)							

Note. The value in each cell represents the mean of the last five sessions of each condition. Numbers in parentheses are standard deviations.

the other three birds, the run rates under VR 70 were usually lower than those under VR 10.

Figure 2 shows the mean PRP and the mean duration of the first five IRTs of each ratio in each schedule component for Phase 2. Differences in the mean PRP in the two components were greater under List A than under List B. Larger differences in pausing under List A values reflected, in general, longer PRPs in the component with the 2-s reinforcer, although pause duration also increased in the component with the 8-s reinforcer. A similar effect was shown on the median PRP (Table 3). Differences between the means of the first five IRTs in the two components, by contrast,

were greater under List B than under List A. Longer IRTs in the component offering the 2-s reinforcer accounted for much of the difference between List B and List A.

Table 3 also shows the mean duration of the first postreinforcement IRT in each schedule component under List B and List A for Phase 2. For P2300 and P414, the first IRT was longer in the component with the 2-s reinforcer than in the component with the 8-s reinforcer, and the differences between the two components were larger under List B than under List A. The data for P2300 and P414 are similar to the first five IRT data for these two birds shown in Figure 2. For P5916, substantial differences did not develop until the

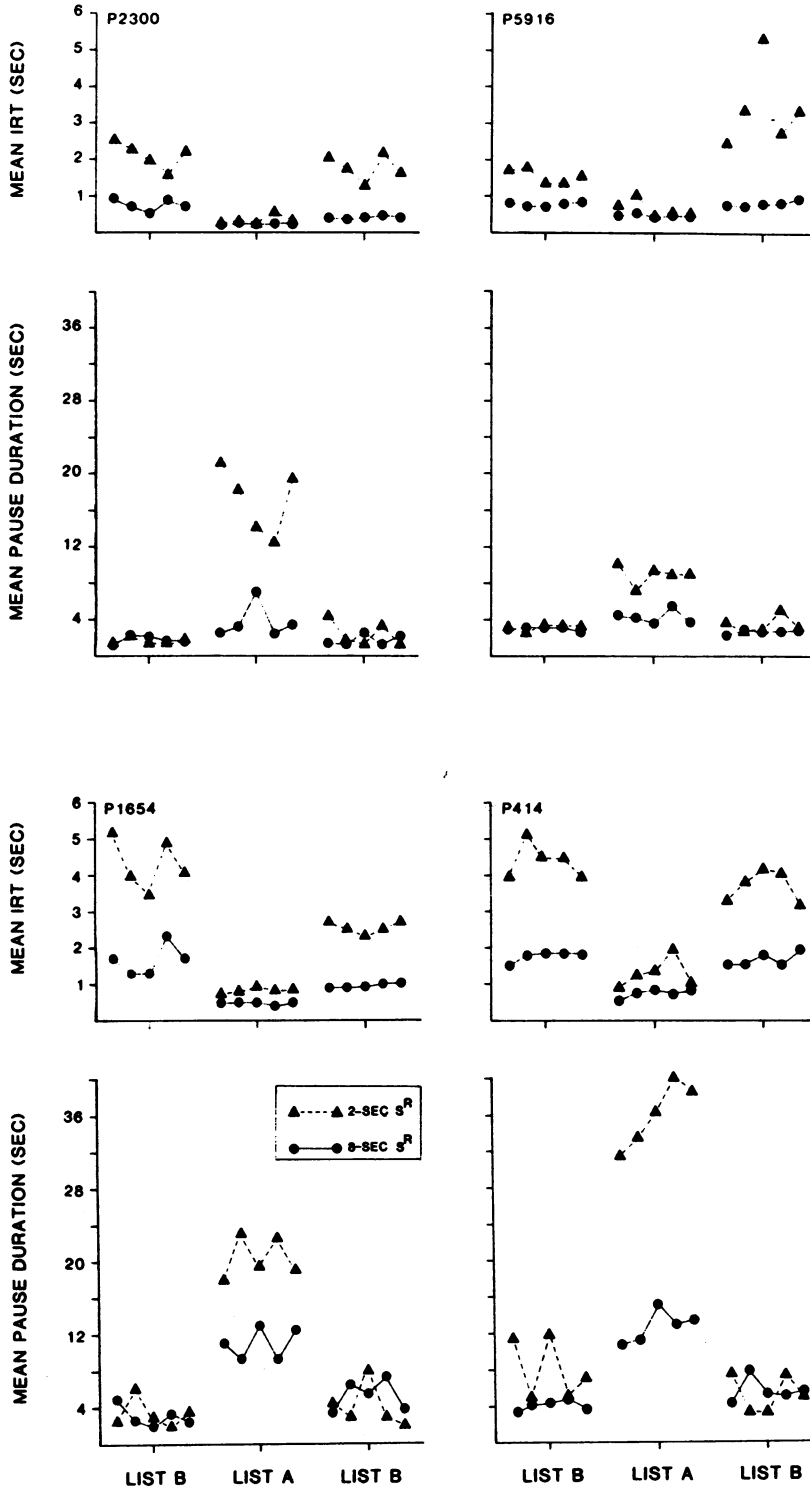


Fig. 2. The mean duration of the first five IRTs and of the postreinforcement pause in each schedule component under List A and List B in Phase 2. One component offered 2-s access to grain; the other, 8-s access to grain. For each bird, data for IRTs are shown in the top graph, and data for pausing are in the bottom graph. Data shown are from the last five sessions in each condition.

second exposure to List B. For P1654, small differences developed under exposure to List A and then increased further under the second exposure to List B.

Table 3 shows the run rates in each schedule component under List B and List A in Phase 2. These data show that run rates were directly related to reinforcer magnitude. Run rates during the component offering 2-s access to grain were consistently higher under List A than under List B; smaller and less consistent effects were observed in the component with 8-s access to grain. Thus, reinforcer magnitude had greater differential effects on run rates under List B than under List A.

## DISCUSSION

Both phases usually showed an inverse relation between PRPs and magnitude of reinforcement under VR schedules, when magnitude was defined as timed access to grain. These results replicate and extend those obtained with FR schedules of grain (Powell, 1969), water (Inman & Cheney, 1974), and milk (Meunier & Starratt, 1979) deliveries. Other research, however, has found a direct relation between reinforcer magnitude and PRPs under FR and VR schedules when magnitude was defined as percentage of milk concentration (Lowe et al., 1974; Priddle-Higson et al., 1976). Although methodological differences may account for these conflicting results (Meunier & Starratt, 1979), the effects on PRPs of reinforcer magnitude could depend on how "magnitude" is defined.

Interestingly, the median and mean PRP data for P414 differed. Under VR 30 and VR 50 in Phase 1, median PRPs were longer in the component with the 8-s reinforcer than in the component with the 2-s reinforcer (Table 1). Casual observations suggested that this bird pecked in bursts, which often resulted in pecking through the 2-s grain deliveries. Previous research has shown that shorter PRPs followed reinforcement omission under VR and FR schedules of food delivery (Davenport, Flaherty, & Dyrud, 1966; Priddle-Higson et al., 1976). Therefore, the median data for P414 could have arisen from reinforcement "omission," resulting from continued pecking during 2-s grain deliveries. Mean PRPs for this bird, however, were longer in the component with the 2-s reinforcer than in the component with

the 8-s reinforcer. Casual observations also suggested that at the beginning of the component with the 2-s reinforcer (twice each session), PRPs were extremely long. This substantially increased the mean PRP in that component while leaving the median PRP unaffected. Pecking through 2-s grain deliveries was not noted in Phase 2, and both mean and median PRPs were longer in the component with the 2-s reinforcer than in the component with the 8-s reinforcer.

The results also showed that PRP duration increased with VR size, particularly in the component offering the 2-s reinforcer. Similar results were obtained with FR schedules of grain delivery with pigeons (e.g., Felton & Lyon, 1966; Powell, 1968) and VR schedules of milk delivery with rats (Priddle-Higson et al., 1976). The present research extends the generality of these studies by showing the relation with pigeons responding under VR schedules of access to grain. Also, differential effects of unequal reinforcer magnitudes on PRPs generally increased with VR size. The same effect was found with pigeons responding under FR schedules (Powell, 1969) and rats responding under VR schedules (Priddle-Higson et al., 1976). The effect in the present study, as previously discussed, was primarily the result of increases in pausing in the component with 2-s access to grain. It is unclear why PRPs in the component with the 8-s reinforcer were not as sensitive to VR size. Perhaps PRPs that occur with reinforcers as large as 8-s access to grain are less sensitive to other manipulations; or perhaps when reinforcer magnitude is varied within a session, the relatively short PRPs after the larger of the two reinforcers reflect a contrast phenomenon. The resolution of these questions awaits future research.

Data from Phase 2 (Figure 2) show that although unequal magnitudes of reinforcement had little differential effect on PRP duration under List B values, such effects were observed on the duration of the first five IRTs after reinforcement. These results suggest that birds emitted a few responses immediately after reinforcement, probably due to the occasional FR 1. Pauses then occurred that were inversely related to the prevailing reinforcer magnitude. Data for the first postreinforcement IRT (Table 3) suggest that such pauses often occurred after a single response. Similar

within-ratio pausing has been observed in other research with mixed-ratio (MR) schedules (Fantino, 1967) and VR schedules (Ferster & Skinner, 1957) wherein the smallest ratio was an FR 1. The present research extends these studies by showing that within-ratio pausing can be a function of reinforcement magnitude. Figure 2 also shows that the longest mean pauses under List A occurred immediately after reinforcement, the durations of which were inversely related to reinforcer magnitude. Following these pauses, the next five IRTs were relatively brief and unaffected by reinforcer magnitude.

Phase 2 data showed that the effects of reinforcer magnitude on PRPs and IRT duration depended on schedule configuration. Although most of the individual ratios in List A and List B differed, it seems that an important and perhaps overriding characteristic of the configurations was the value of the smallest ratio. When the smallest ratio in the VR 70 schedule was an FR 1 (i.e., List B), unequal magnitudes of reinforcement had minimal differential effects on PRPs. When the smallest ratio was increased to an FR 7 (List A) while holding VR size constant, unequal magnitudes had relatively large differential effects on PRPs. Although the effects could have resulted from differences in other ratios, it is unlikely. The VR 70 (List B) schedule in Phase 2 and VR 10 (List A) schedule in Phase 1 both offered an occasional FR 1, but the other ratios of the former were all substantially larger than those of the latter. Nevertheless, PRPs were brief and unaffected by reinforcer magnitude under both schedules.

Assuming that the value of the smallest ratio is an important determinant of PRPs, the relation between VR size and PRPs in Phase 1 and in the Priddle-Higson et al. (1976) study may have been caused in part by the increase in the smallest ratio as VR size also increased. Moreover, the insensitivity of PRPs to increases in VR size reported by Ferster and Skinner (1957) may have resulted from holding the smallest ratio constant at FR 1. Although responding under VR schedules has been considered steady with only brief PRPs (e.g., Mazur, 1983; Millenson & Leslie, 1979), the present research showed both PRPs and within-ratio pausing under such schedules (also see Ferster & Skinner, 1957) and that pausing

can be jointly determined by reinforcer magnitude and schedule configuration.

The effects of schedule configuration and the shortest interreinforcement interval have been studied in previous research. Catania and Reynolds (1968) programmed two arithmetic VI schedules, one with a 0-s IRI and one without a 0-s IRI, and reported higher local rates of postreinforcement responding under the former than the latter. More generally, studies have investigated local response rates as a function of local reinforcement rates. For example, the local probability of reinforcement increases throughout the interval under arithmetic VI schedules but remains invariant under constant-probability VI schedules (see Catania & Reynolds, 1968). Research has shown that local response rates increase under arithmetic schedules and remain stable under the constant-probability schedules as time elapses since the last reinforcer (Catania & Reynolds, 1968; Harzem, Lowe, & Priddle-Higson, 1978). Another study showed that PRP duration under VI schedules was inversely related to local reinforcer rate (Leslie, 1981). The present study extends the results of these investigations by suggesting that local reinforcement rate influences pausing under VR schedules, and that high local reinforcement rates can attenuate the effects on pausing of reinforcer magnitude.

Run rates in the present study were usually higher in the component with the 8-s reinforcer. Previous research with pigeons exposed to 2.5-s and 4-s access to grain showed a similar relation in only 1 of 4 subjects (Powell, 1969). The more consistent effect in the present study may have been the result of greater differences in the two reinforcement magnitudes (i.e., 2-s vs. 8-s access to grain). Moreover, larger differential effects of reinforcer magnitude on run rates were observed under List B than under List A (Table 3) due primarily to lower run rates in the component with the 2-s reinforcer in the former schedule. This effect probably reflects a shift in the temporal locus of pausing after 2-s access to grain. Under List A, pauses were confined to the period immediately after reinforcement. But under List B, pauses shifted from the period immediately after reinforcement to that after the first few responses following reinforcement (Figure 2). Such within-ratio pausing then figured into the decrease in run rates. Thus, the effects of reinforcer mag-



nitude on run rates, as well as on pausing, were influenced by schedule configuration.

The effects of VR size on run rates were unclear. Although run rates sometimes decreased with VR size in Phase 1, run rates under VR 70 in Phase 1 and VR 70 (List A) in Phase 2 differed considerably. For P2300 and P1654, the run rates were substantially higher in Phase 2; for P414, they were lower. The origin of these differences is unknown. But because the stability criterion for condition changes involved pause data and not run rates, perhaps the run rates in Phase 1 did not reach stability in each condition.

In summary, the present research showed that with pigeons, PRPs under VR schedules were a function of reinforcer magnitude and VR size. Similar results were obtained in previous studies with pigeons responding under FR schedules. In addition, within-ratio pausing and run rates were a function of reinforcer magnitude. However, the effects of reinforcer magnitude on PRPs, within-ratio pausing, and run rates depended on the configuration of individual ratios, and the value of the smallest individual ratio seemed particularly important. These results extend those of previous investigations with VI schedules in which both the configuration of IRIs and the value of the shortest IRI affected responding.

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