MOMENTARY MAXIMIZING IN CONCURRENT SCHEDULES WITH A MINIMUM INTERCHANGEOVER INTERVAL

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Eight pigeons were trained on concurrent variable-interval variable-interval schedules with a minimum interchangeover time programmed as a consequence of changeovers. In Experiment 1 the reinforcement schedules remained constant while the minimum interchangeover time varied from 0 to 200 s. Relative response rates and relative time deviated from relative reinforcement rates toward indifference with long minimum interchangeover times. In Experiment 2 different reinforcement ratios were scheduled in successive experimental conditions with the minimum interchangeover time constant at 0, 2, 10, or 120 s. The exponent of the generalized matching equation was close to 1.0 when the minimum interchangeover time was 0 s (the typical procedure for concurrent schedules without a changeover delay) and decreased as that duration was increased. The data support the momentary maximizing theory and contradict molar maximizing theories and the melioration theory.

Key words: concurrent schedules, multiple schedules, minimum interchangeover time, momentary maximizing theory, molar maximizing theories, melioration theory, simultaneous discrimination, successive discrimination, key peck, pigeons

Todorov and Souza (1978) investigated the effects of component duration on concurrent variable-interval variable-interval (VI VI) performances introducing a minimum interchangeover time (MICT) as a consequence of switching responses. Each changeover response initiated a period of time during which another changeover was not effective. Concurrent VI 1 min VI 3 min were assigned, respectively, to a green and a red key that were simultaneously available (two-key procedure, Skinner, 1950). While the MICT was in effect, the other key was dark (signaled MICT), or it was lit but not effective in producing a reinforcer (unsignaled MICT). Increases in the MICT duration resulted in increased exposure to each concurrent VI; under such conditions relative response rates increased as component duration (i.e., duration of each exposure between switches) decreased, approximating the relative reinforcement rate when the MICT was equal to or less than 10 s and deviating towards indifference at longer durations. The results were interpreted in terms of the programmed contingencies. The higher the duration of the MICT, the greater the probability that a reinforcer would be set up by the other schedule while the MICT was in force (Myerson & Miezin, 1980; Pliskoff, 1971; Shimp, 1966; Silberberg, Hamilton, Ziriax, & Casey, 1978; Silberberg & Ziriax, 1982; Stubbs, Pliskoff, & Reid, 1977). Thus, at the end of the MICT, the probability of reinforcement after a changeover was higher than the probability on the schedule in which the subject was responding during the MICT. This difference in probability tended to increase with increases in MICT length. Because changeovers occurred as soon as the MICT elapsed for most durations used, subjects were actually responding under de facto multiple schedules, in spite of the formal definition and scheduling as concurrent VI VI.

The present research was intended to replicate previous work (using the changeover-key procedure; Findley, 1958) and to extend it in order to verify the effects of component duration on the sensitivity to reinforcement distribution, as assessed by the generalized matching equation (Baum, 1974, 1979):

$$B1/B2 = c(R1/R2)^a, \qquad (1)$$

This research was carried out at the Universidade Federal de São Carlos and the data reported are part of the doctoral dissertation submitted by D. G. Souza and approved by Universidade de São Paulo (Brazil). The research was supported by grants from FAPESP (85/0954-2), CAPES (1271/83), and CNPq (300222/87) to D. G. Souza, and from the Fulbright Commission to J. C. Todorov, sponsored by H. Rachlin. We are grateful to Miriam A. C. Liborio, José Carlos Gaban, Aparecido Franco, and Paulo Russo for help in collecting data. We also thank Elenice S. Hanna for computer assistance and help with the figures. Reprints may be obtained from D. G. Souza or J. C. Todorov, Instituto de Psicologia, Universidade de Brasília, 70910-900, Brasília, DF, Brazil.

which relates response or time ratios ($B1/B2$) to reinforcer frequency ratios ($R1/R2$). The constants a and c are empirically determined. The exponent a is interpreted as behavior's sensitivity to the distribution of reinforcers between the alternatives; c describes a constant proportional preference (bias) for one component, determined by other factors than reinforcement distribution between components (cf. Baum, 1974; de Villiers, 1977). If the functional similarity between concurrent and multiple schedules obtained under short component durations (cf. Williams, 1982, 1989) were to hold for variations along a continuum of durations, it seems plausible to expect that the exponent value of Equation 1 would decrease with increases in component duration.

The question addressed here is related to other studies that have attempted to integrate findings from procedures on simultaneous and successive discriminations of reinforcement distributions (e.g., Herrnstein, 1970; McSweeney, Farmer, Dougan, & Whipple, 1986; Rachlin, 1973; Staddon, 1982; Williams, 1980, 1988a). Also at issue is the question of the appropriate level of analysis for choice behavior and how to interpret the organization of behavior at those levels. Competing reinforcement theories of choice have in common the general idea that animals behave to receive the maximum amount of reinforcement possible. Theories differ as to the level of analysis: Some look at individual choice responses (Shimp, 1966), some investigate behavior and consequences over limited periods of time (Herrnstein & Vaughan, 1980), and others analyze data over long time periods (Rachlin, Battalio, Kagel, & Green, 1981; Staddon & Motheral, 1978). Williams (1988b) classifies these theories as momentary matching (Catania, 1973; Herrnstein, 1970; Killeen, 1982; Myerson & Miezin, 1980), momentary maximizing (Herrnstein & Vaughan, 1980; Hinson & Staddon, 1983; Shimp, 1966), and molar maximizing (Rachlin et al., 1981; Staddon & Motheral, 1978). Momentary matching explains choice as a result of each response alternative occurring according to some underlying law of response strength, assuming that the best estimates of local response probabilities are their molar probabilities. Momentary maximizing explains choice as a result of adjustments to changing contingencies affecting individual responses, without an assumption of an underlying law of response strength; molar matching of response distribution to reinforcement distribution would be a by-product of such local adjustments. Molar maximizing assumes that the controlling variable is the total return in reinforcement that results from a given choice pattern over some extended period of time; animals behave so as to maximize obtained reinforcement rate, regardless of local contingencies (Williams, 1988b).

Imposing a minimum interchangeover time in concurrent schedules and manipulating the length of this imposed stay in each alternative result in different predictions derived from the competing theories of choice. Molar maximizing predicts that animals will cease to switch between schedules and stay at the most favorable one as MICT duration reaches a point at which changing over results in a loss in total reinforcement rate. Momentary matching predicts that the relationship between response and obtained reinforcement distributions will not change, regardless of losses in total reinforcement rate. Momentary maximizing predicts that animals will switch to the alternate schedule as soon as possible when the MICT duration is increased and the probability of a reinforcement after a changeover is higher than the probability of the next response in the same schedule, regardless of total reinforcement losses or deviations in the relationship between response and obtained reinforcement distributions.

Experiment 1 investigated the effects of varying symmetrical component durations when component reinforcement rates were unequal and constant; in Experiment 2, component reinforcement rates were varied along with symmetrical component durations.

EXPERIMENT 1

METHOD

Subjects

Seven male adult *Columba livia* pigeons served as subjects. Birds P-9, P-10, P-11, and P-12 were experimentally naive; Birds P-3, P-5, and P-8 had previous histories on concurrent-schedule procedures. The birds were maintained at approximately 80% of their free-feeding body weights. Water and grit were always available in their home cages. When necessary, supplementary feeding occurred

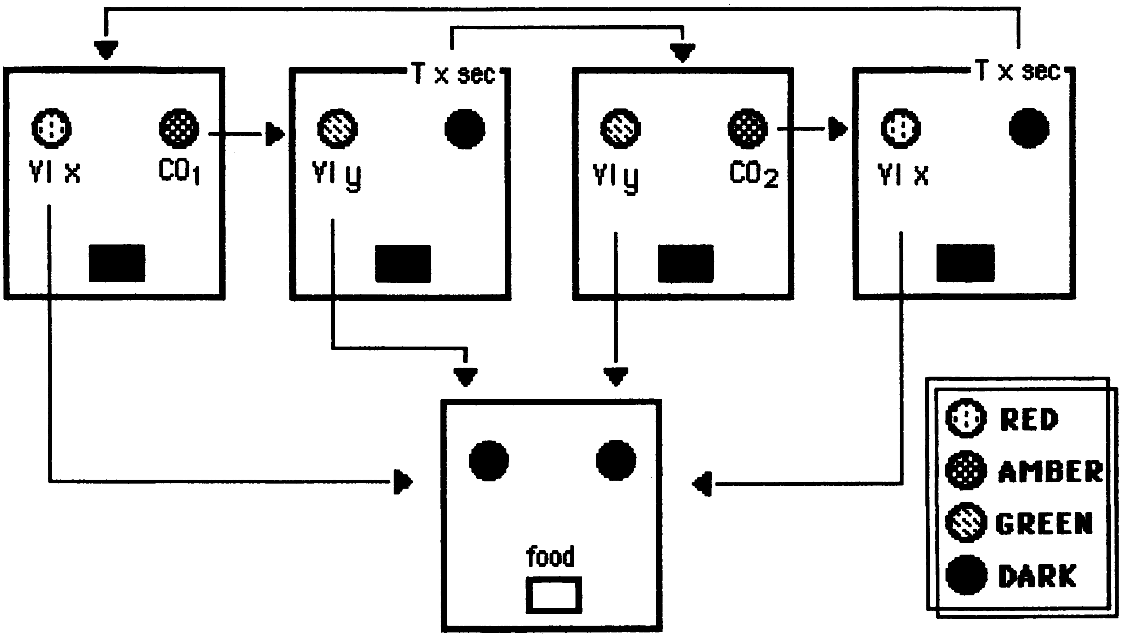

Fig. 1. Diagram of the procedure. Concurrent VI VI schedules with signaled minimum interchangeover time (MICT). CO1 and CO2 indicate changeovers. The interchangeover interval is represented by "T × sec." Responses on the left key were reinforced according to VI schedules, and responses on the right key changed the VI schedule in operation and the color in the left key and initiated the MICT. The changeover key was dark and inoperative during the MICT. (In actuality, the left key was in the center of the response panel.)

immediately after the daily sessions. Every other week a vitamin complex was added to water (20 mL/L).

Apparatus

A standard experimental chamber for pigeons (Grason-Stadler Model 1122, Series 1101) with three response keys was used. The keys were transilluminated from behind the response panel by Grason-Stadler (Model 1-1066-3) multistimulus projectors. The right key was lit by an amber light. The center key could be lit by a red or a green light. The left key was always dark and inoperative. The houselight, located on the upper left corner of the front panel, remained lit throughout the session, except during feeder operation.

The opening of the feeder was centrally located below the three keys and 7 cm above the floor. During feeder operation (3-s access to mixed grain), the houselight and keylights were off and the feeder light was lit. A minimum force of about 0.1 N operated the response keys and produced auditory feedback by operating a relay.

The chamber was enclosed in a sound-attenuating box that contained a fan for ventilation and for masking noise. Standard electromechanical circuits housed in an adjacent room controlled events.

Procedure

Two concurrent VI VI schedules were programmed with a changeover-key procedure (Catania, 1966; Findley, 1958) and a minimum interchangeover interval as a consequence of changeover responses (Todorov & Souza, 1978). The right key was lit amber and was used as the changeover key; the reinforcement schedules were assigned to the center key. VI 1 min was associated with green light and VI 3 min with red light. The VI schedules, based on the exponential distribution of Fleshler and Hoffman (1962), involved 11 separate reinforcement intervals.

A single peck on the changeover key alternated the color of the main key and the associated VI schedule and initiated a period of time during which another changeover was not effective (MICT). During this period the changeover key remained on but was inoperative (unsignaled MICT) or it was turned off

Table 1

Order of conditions and number of sessions (in parentheses) for each subject under signaled and unsignaled MICT.

MICT duration (s)	Signaled				Unsignaled		
	P-5	P-9	P-10	P-12	P-3	P-8	P-11
0	1 (9)[a] 9 (33)	1 (9)[a] 13 (15)	2 (40) 16 (21)	1 (27) 16 (17)	1 (9)[a] 13 (16)	1 (13)[a] 9 (72) 12 (28) 22 (16)	12 (22)
2	2 (21)	2 (35) 12 (19)	1 (33) 3 (22)	2 (20)	2 (28)	2 (23) 21 (19)	1 (14)
3	15 (15)	18 (23)	15 (15)	15 (14)		11 (18) 20 (17)	11 (23)
5	14 (17)	11 (31) 17 (16)	14 (18)	14 (31)		10 (17) 19 (21)	10 (17)
7	13 (17)	16 (28)	13 (14)	13 (20)	12 (15)	18 (14) 13 (18)	
10	3 (22) 12 (17)	3 (19) 10 (16)	4 (18) 12 (19)	3 (14)	3 (18) 11 (15)	3 (14) 14 (14)	2 (22)
12	11 (21)	15 (21)	11 (22)	12 (23)	10 (16)	15 (18)	9 (16)
20	4 (15) 10 (15)	4 (16) 9 (14)	5 (20)	4 (42) 11 (22)	4 (17)	4 (14) 16 (17)	3 (14)
30	5 (17)	5 (14) 14 (36)	6 (21) 10 (17)	5 (24)	5 (15) 9 (30)	5 (20) 17 (17)	4 (20) 8 (44)
50	6 (15)	6 (16)	7 (34)	6 (30)	6 (32)	6 (15)	5 (18)
100	7 (18)	7 (18)	8 (18)	7 (62) 9 (17)	7 (27)	7 (17)	6 (20)
200	8 (22)	8 (19)	9 (63)	8 (15) 10 (22)	8 (103)	8 (38)	7 (28)

[a] Due to technical problems with the equipment, the first condition for some subjects was stopped before 14 sessions had been reached.

and inoperative (signaled MICT). A reinforcer scheduled while the subject was responding on the other schedule was held, and the VI tape was stopped until the bird changed over to that schedule. No changeover delay (COD; Herrnstein, 1961) was used. Figure 1 shows a schematic diagram of the procedure with signaled MICT. For Birds P-5, P-9, P-10, and P-12, the MICT was signaled. For Birds P-3, P-8, and P-11, it was unsignaled. MICT duration was varied in a range from 0 to 200 s. Table 1 presents the order of conditions and number of sessions in each condition for individual birds.

Experimental sessions were conducted 6 days a week, and ended when 60 reinforcers had been delivered. Each experimental condition was maintained for a minimum of 14 sessions, and until a stability criterion was reached. The stability criterion specified that in the last five sessions, relative response rates in each session should be within a range of ±5% of the average of the five consecutive sessions, and no systematic ascending or descending trends should be observed in relative response measures.

Results

Analyses are based on data from the final five sessions of each experimental condition in which individual subjects had reached the stability criterion. A table of raw data for individual birds is presented in Appendix 1. In all analyses employing logarithmic transformation of MICT duration, conditions without a MICT were considered to have a 1-s MICT.

Figure 2 shows how the total reinforcement rate (the sum of reinforcements obtained from each schedule divided by session time) changed with changes in MICT duration. For both the signaled and the unsignaled groups, total reinforcement rate systematically and equally decreased with increases in MICT duration. However, the ratio of obtained reinforcements (reinforcements from the VI 1-min schedule divided by reinforcements from the VI 3-min schedule) did not change systematically with

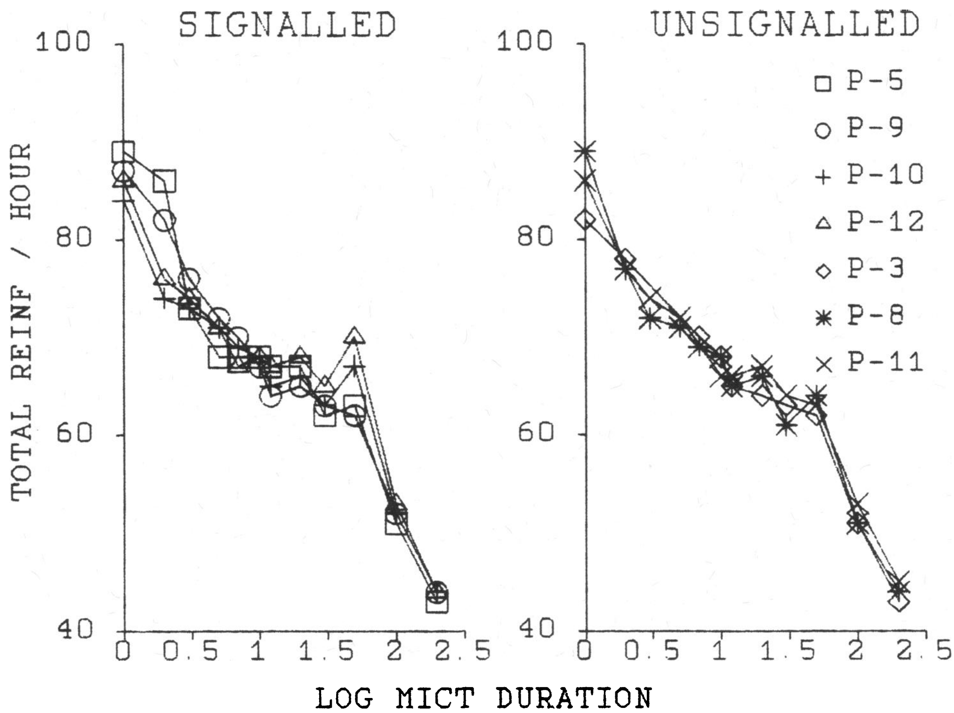

Fig. 2. Total obtained reinforcement rates (reinf/hour) as a function of MICT duration (s) for the birds of the signaled and the unsignaled groups (Experiment 1).

MICT durations from 0 to 50 s but decreased at MICT durations of 100 and 200 s (Figure 3). These results were similar for both groups.

Figure 4 shows how the response ratio (responses associated with the VI 1-min schedule divided by responses associated with the VI 3-min schedule) decreased with increases in MICT duration, even when reinforcement ratios did not change (Figure 3). For time ratios, the function is steeper than for response ratios (Figure 5). With MICT durations of 10 s and higher, all birds distributed their time about equally between the schedules of the concurrent pair. Results were similar for both the signaled and the unsignaled groups.

Local reinforcement rates (reinforcements obtained in one schedule divided by the time spent responding in that schedule) were differentially affected by changes in MICT duration. Figure 6 shows that local reinforcement rates were approximately constant for MICT durations varying from 0 to 50 s and decreased with durations of 100 and 200 s, about equally for both groups. In the VI 3-min schedule, however, local reinforcement rates systematically decreased with increases in MICT duration (Figure 7).

Figures 8 and 9 show interchangeover time divided by MICT duration as a function of the probability of reinforcement for a changeover at the end of MICT. When the ratio was 1.0, subjects changed over as soon as the MICT contingency permitted; ratios greater than one mean that the subject stayed on one schedule after a changeover was possible. Figures 8 (VI 1-min schedule) and 9 (VI 3-min schedule) show no systematic differences between the signaled and the unsignaled groups. For short MICT durations, birds continued to respond on the schedule after the MICT requirement was met. Generally, the subjects switched to the other schedule whenever the probability of reinforcement after a switch was higher than the probability of reinforcement for the next response in the same schedule (.016 in VI 1 min and .005 in VI 3 min).

Discussion

The results of the present experiment replicate and extend the findings of Todorov and Souza (1978) regarding MICT duration and performance in concurrent schedules. With short MICT durations, time and response ratios tend to match reinforcement ratios; as the

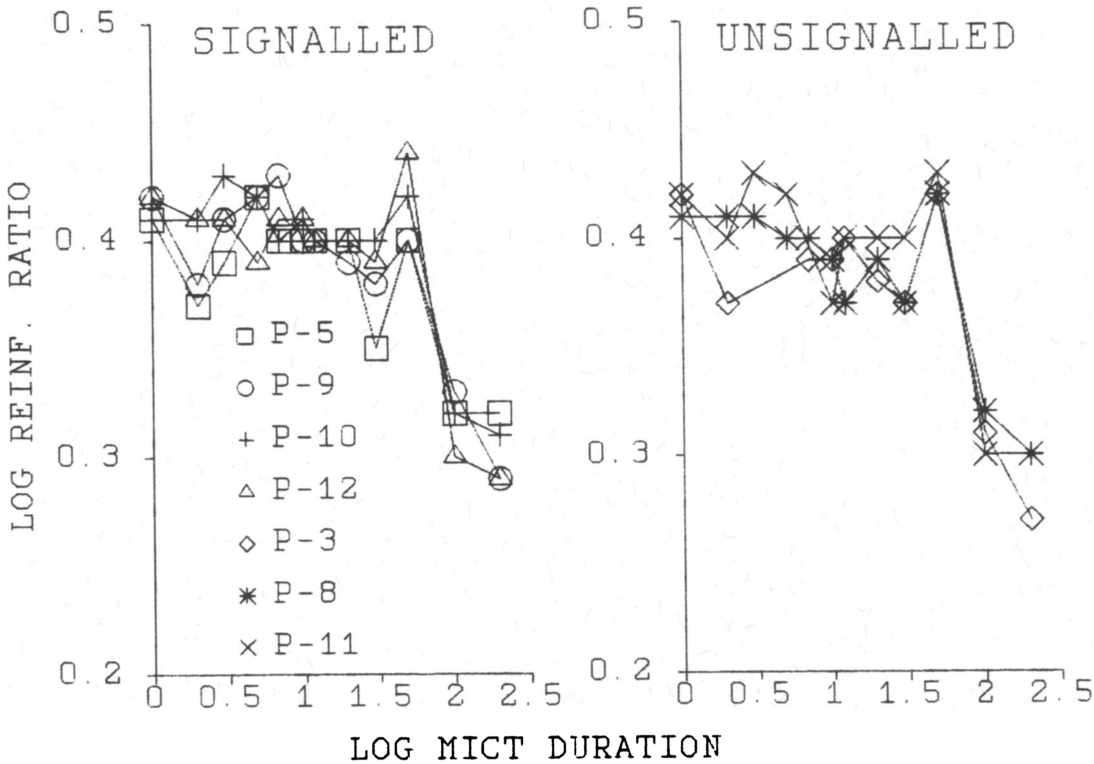

Fig. 3. Logarithm of the ratio of obtained reinforcement rates (VI 1/VI 3) as a function of MICT duration (s) for the birds of the signaled and the unsignaled groups (Experiment 1).

MICT duration increased, both relative measures of performance tend to indifference (Figures 4 and 5), regardless of changes in obtained reinforcement ratios (Figure 3).

As the MICT duration increased, changeover responses tended to occur as soon as the contingency permitted (Figures 8 and 9), even though this choice pattern resulted in a loss of total obtained reinforcement rate (Figure 2) and in increasing differences in local obtained reinforcement rates in the schedules of the concurrent pair (Figures 6 and 7).

The data from Experiment 1 clearly deviate from the prediction derived from molar maximization theories. If birds stop changing over and remain on the VI 1-min schedule, a reinforcement rate of 60 reinforcers per hour would result; actual behavior resulted in about 40 reinforcers per hour when the MICT was 200 s. Thus, overall reinforcement rate was not the major controlling variable in Experiment 1. Momentary matching theories predict that response distribution will match obtained reinforcement distribution; this prediction was approached only at short MICT durations. The present data clearly support momentary maximization: All subjects changed over as soon as the MICT requirement permitted—whenever the probability of a reinforcement after a changeover was higher than the probability of the next response in the same schedule. However, these results support Shimp's (1966) molecular theory but not Herrnstein and Vaughan's (1980) melioration theory. Shimp's momentary maximizing theory predicts that subjects will always emit whichever response alternative has the higher probability of being reinforced at the moment, irrespective of the consequences at a molar level. Melioration theory states that animals will change over to a different source of reinforcement whenever the switch will improve the local reinforcement rate. In the present experiment, the birds switched over when switching had a higher probability of being reinforced than staying did (supporting Shimp), even when this behavior pattern resulted in the contrary of melioration: With long MICT durations, changing over

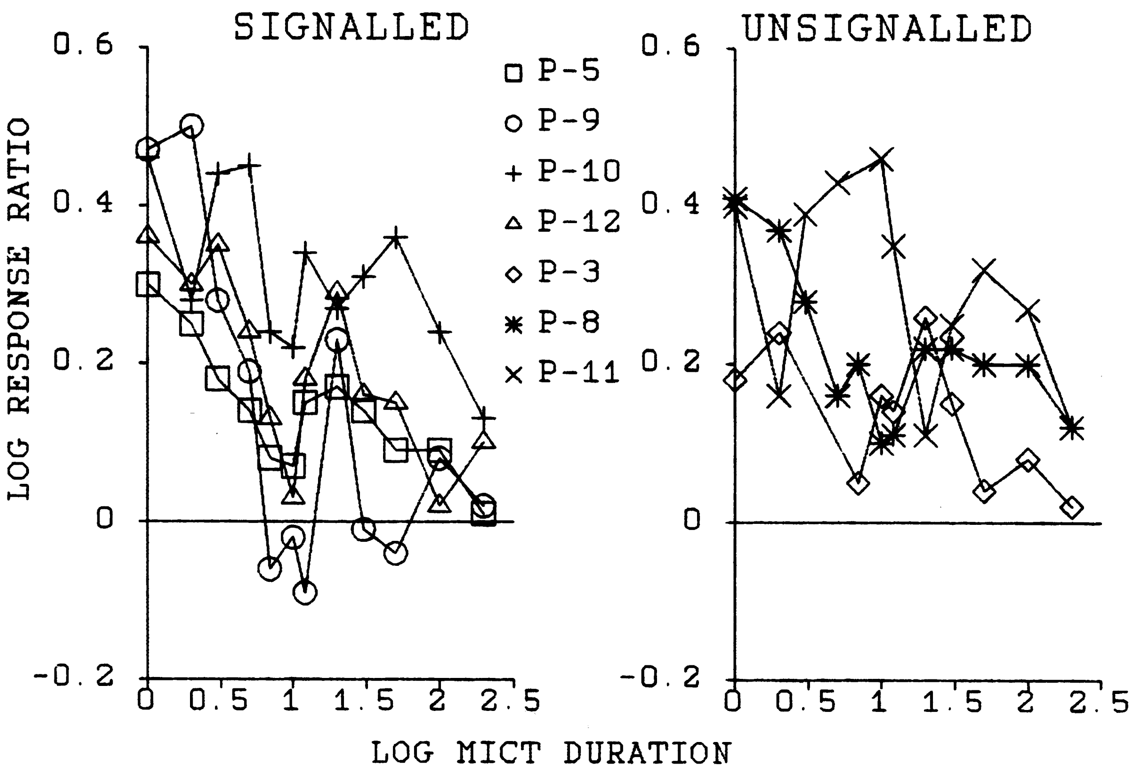

Fig. 4. Logarithm of response ratios (responses associated with VI 1 min divided by responses associated with VI 3 min) as a function of the logarithm of MICT duration (s) for the birds of the signaled and the unsignaled groups (Experiment 1).

from VI 1 min to VI 3 min occurred as soon as the contingency permitted, even if it resulted in going from a high local reinforcement rate (about 60 reinforcers per hour in VI 1 min) to a lower local reinforcement rate (about 20 reinforcers per hour in VI 3 min).

Although pecks at the changeover key were not recorded when that key was inoperative, the absence of differences in the behavior of pigeons in the signaled and the unsignaled groups justifies the inference that birds in the unsignaled group continued to peck at the changeover key, alternating with pecks at the main key, until a peck changed the color of the main key; for those birds, the MICT acted as a fixed-interval schedule of conditioned reinforcement.

Given that in Experiment 1 only VI 1-min VI 3-min schedules of reinforcement were used, the present data are not suitable for an evaluation in terms of the generalized matching law (Equation 1). The prediction that the exponent value of the equation should be an inverse relation of component duration requires variations in relative reinforcement parameters. With the present data it is not possible to ascertain whether MICT duration affected sensitivity, bias, or both. In Experiment 2 four values of MICT duration were used, and at least five different pairs of concurrent VI VI schedules were associated with each MICT duration.

EXPERIMENT 2

METHOD

Subjects

Six pigeons served. Birds P-5, P-9, P-10, P-11, and P-12 were the same as those used in Experiment 1; Bird P-13 was experimentally naive.

Apparatus and Procedure

The apparatus was the same as that used in Experiment 1, and the procedure for concurrent scheduling was the signaled MICT procedure represented in Figure 1. MICT du-

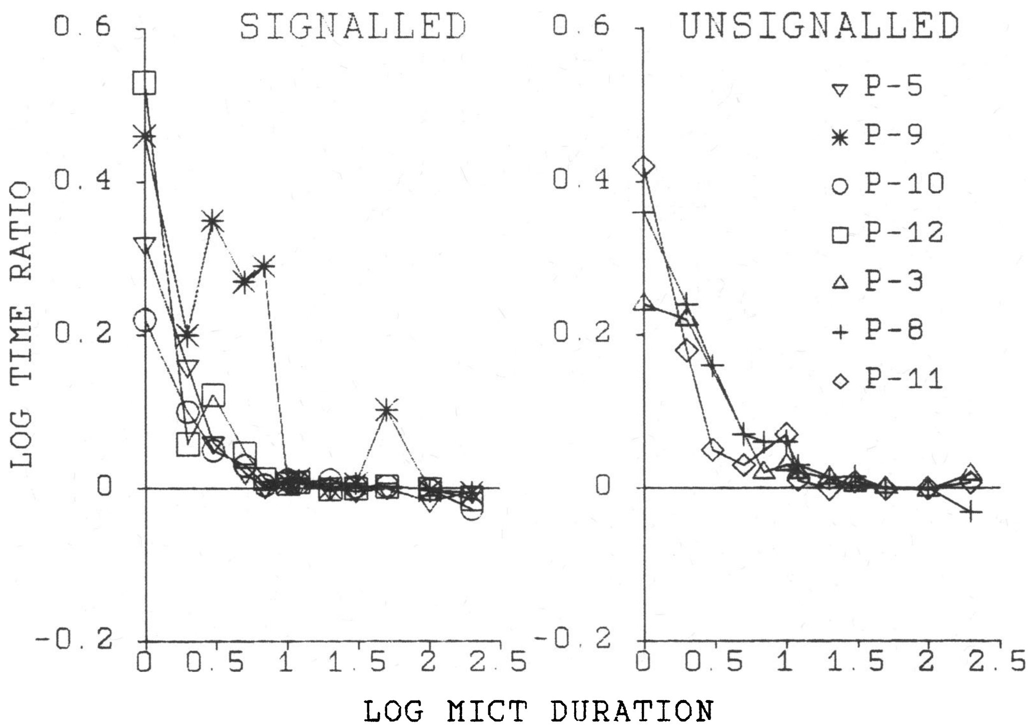

Fig. 5. Logarithm of time ratios (time spent responding in the VI 1-min schedule divided by time spent responding in the VI 3-min schedule) as a function of the logarithm of MICT duration (s) for the birds of the signaled and the unsignaled groups (Experiment 1).

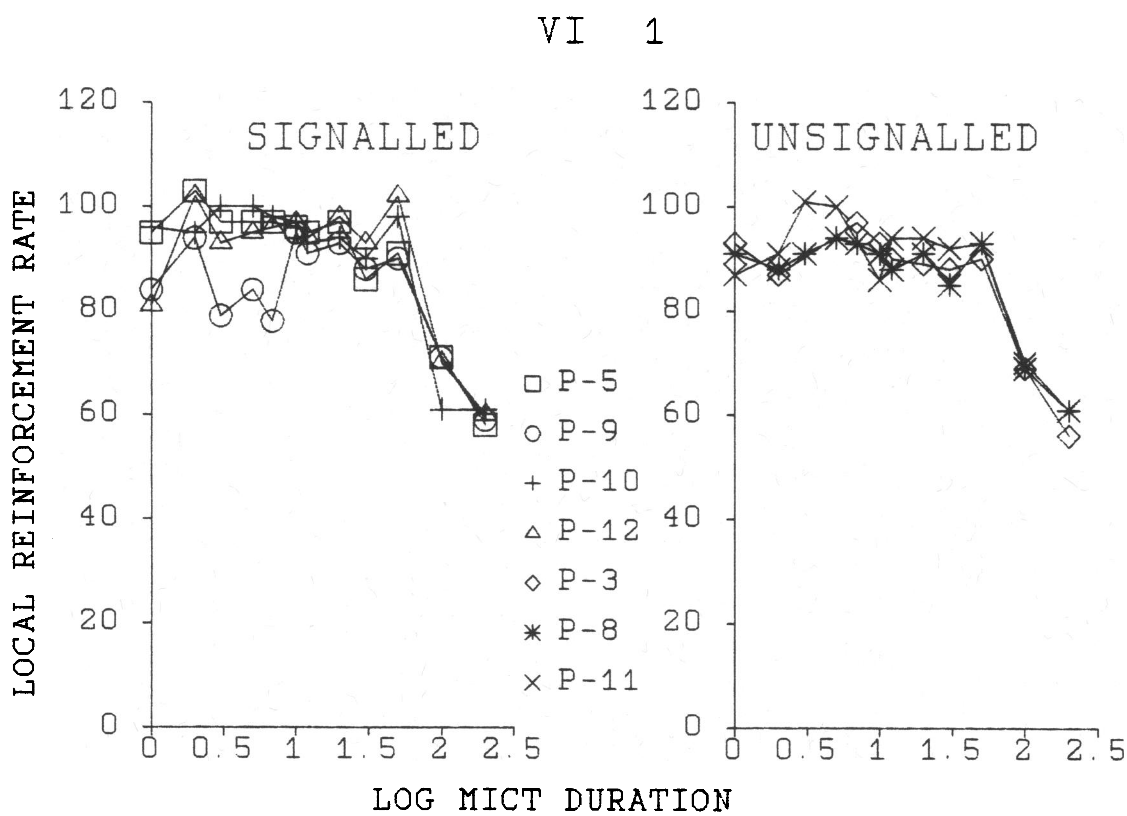

Fig. 6. Obtained local reinforcement rates in the VI 1-min schedule as a function of the logarithm of MICT duration (s) of the birds of the signaled and the unsignaled groups (Experiment 1).

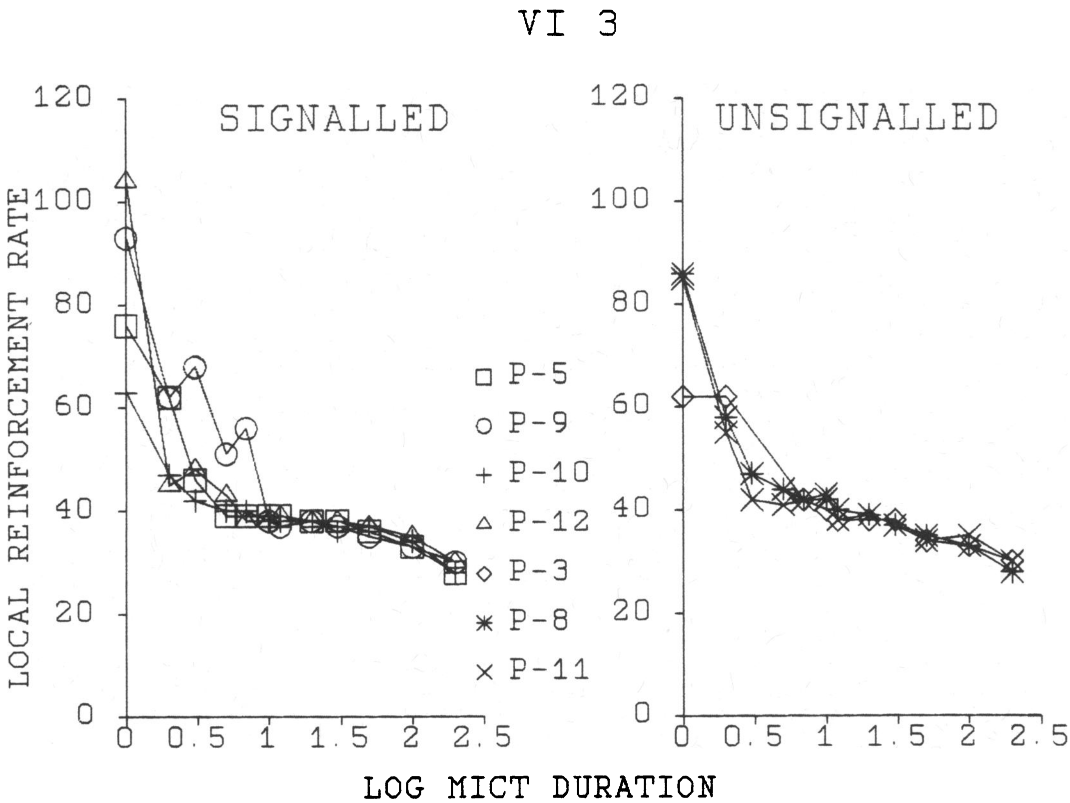

Fig. 7. Obtained local reinforcement rates in the VI 3-min schedule as a function of the logarithm of MICT duration (s) for the birds of the signaled and the unsignaled groups (Experiment 1).

ration was maintained as a parameter, while component reinforcement rates varied. For each of four MICT durations (0, 2, 10, or 120 s), at least five pairs of VI schedules were in effect. The stability criterion for ending each condition was the same as that described for Experiment 1. Table 2 summarizes the order and parameters of experimental conditions.

Results

Detailed results from the last five sessions of each condition are shown in Appendix 2. Figure 10 shows, for individual birds, values of the response sensitivity parameter as a function of the minimum interchangeover interval. In the 0-s MICT condition, the exponent was close to 1.0 for 5 of the 6 birds (the exception was P-9) and generally decreased with increases in MICT durations (except for the 120-s condition for P-11, P-12, and P-13). Figure 11 shows the values of the time sensitivity parameter. The exponent was close to 1.0 in the 0-s MICT condition and decreased as a function of MICT duration, but the decreasing function was steeper for time than for response. Also, intersubject variability was much smaller for time than for responses.

GENERAL DISCUSSION

The effects of variations in MICT durations, which resulted in changes in obtained component durations in concurrent VI VI schedules, were similar to those resulting from variations in component durations in multiple VI VI schedules (Charman & Davison, 1982; Killeen, 1972; Shimp & Wheatley, 1971; Silberberg & Schrot, 1974; Todorov, 1972; Todorov & Ferreira, 1977; Williams, 1979, 1989, 1990). The response and time distributions deviated from matching to undermatching as component durations increased, as indicated by the value of the exponent of Equation 1, which was an inverse function of MICT duration in Experiment 2. As in Todorov and Souza (1978), these effects can be understood in terms of the programmed contingencies. The higher the duration of the MICT, the greater

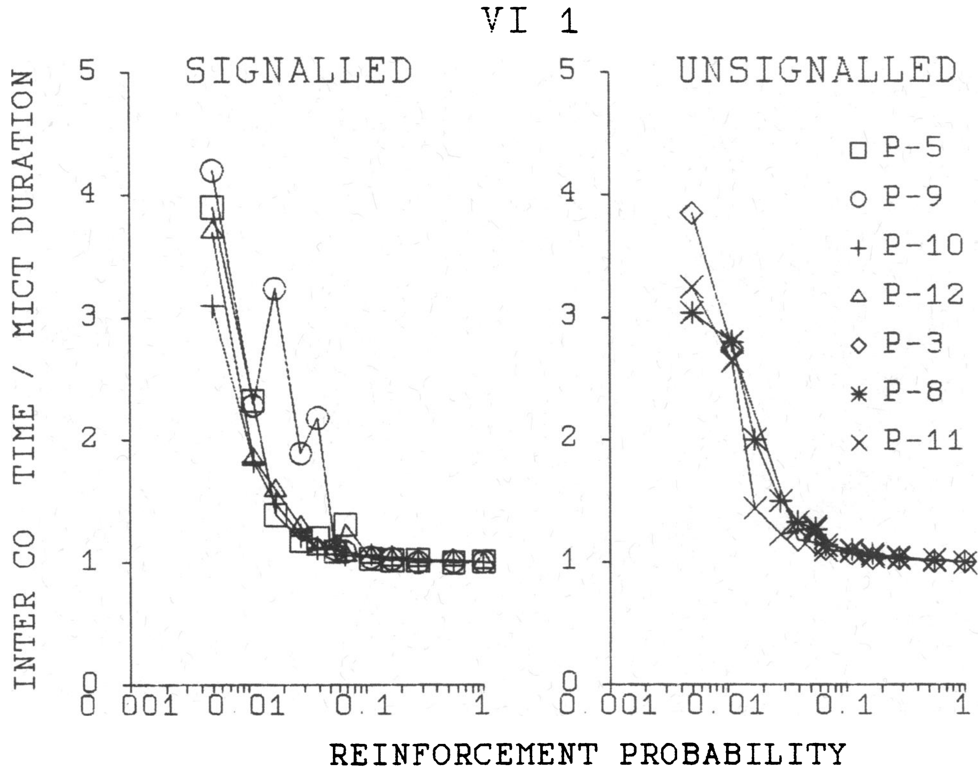

Fig. 8. Interchangeover time in the VI 1-min schedule divided by MICT duration as a function of the probability of reinforcement for a changeover at the end of the MICT for birds of the signaled and the unsignaled groups (Experiment 1).

the probability of reinforcement after a changeover (Newby, 1980; Pliskoff, 1971; Shimp, 1966). This contingency was enough to keep the birds changing over even though the overall rate of reinforcement was reduced to almost half its initial value. Thus, the imposition of minimum and uniform interchangeover intervals had the effect of imposing severe constraints on time allocation. Because the MICT intervals were equal and because subjects tended to change over at the first opportunity (for MICT values greater than about 10 s), time allocation was constrained at 50:50. This distribution was not entirely forced by the procedure, because subjects could hypothetically increase interchangeover time on the preferred key to show a preference and, by doing so, increase overall reinforcement rate. The present data clearly support Shimp's (1966) molecular maximizing theory and contradict molar maximizing theories (Rachlin et al., 1981; Staddon & Motheral, 1978) and the melioration theory (Herrnstein & Vaughan, 1980).

Even with time allocation constrained at 50:50 (as a consequence of the subject's behavior) the possibility of response matching was still left open, but response matching also disappeared as time allocation was constrained. This finding supports the notion that time allocation is the more fundamental process governing responding under concurrent VI VI schedules (e.g., Baum & Rachlin, 1969).

The present results suggest that as the procedure of concurrent VI VI schedules becomes more like the procedure of most multiple schedules that incorporate equal component durations, the more the results mimic those seen under multiple schedules. The data support interpretations of time-related discrimination decrements in successive discriminations as a function of time since component transition (Redman & White, 1985; White, 1990; White & Redman, 1983), and are com-

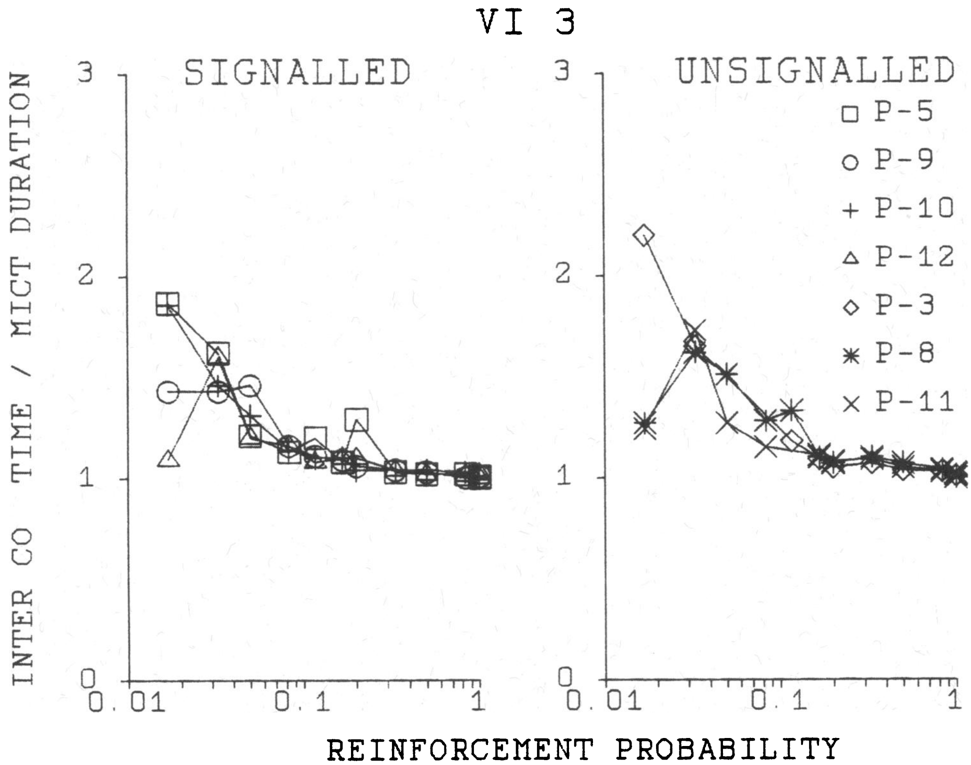

Fig. 9. Interchangeover time in the VI 3-min schedule divided by MICT duration as a function of the probability of reinforcement for a changeover at the end of the MICT for birds of the signaled and the unsignaled groups (Experiment 1).

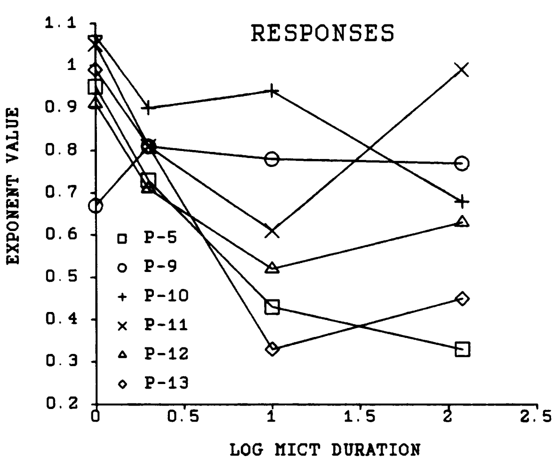

Fig. 10. Values of the response sensitivity parameter (exponent in Equation 1) as a function of the logarithm of MICT duration (Experiment 2).

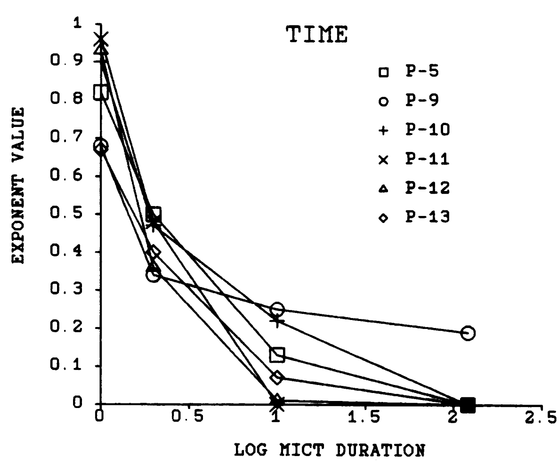

Fig. 11. Values of the time sensitivity parameter (exponent in Equation 1) as a function of the logarithm of MICT duration (Experiment 2).

Table 2

Subjects, order of experimental conditions, MICT duration, reinforcement schedules, and number of sessions per condition.

Subject	Condition order	MICT (s)	VI schedules (s) Red	VI schedules (s) Green	Sessions
P-5	3	0	60	360	14
	4	0	75	150	18
	9	0	50	600	20
	10	0	90	115	29
	31	0	450	50	25
	32	0	180	60	14
	33	0	150	75	15
	1	2	60	360	14
	5	2	75	150	14
	8	2	50	600	17
	11	2	90	115	23
	18	2	60	180	16
	19	2	90	120	35
	20	2	60	300	26
	21	2	75	150	14
	22	2	50	450	24
	23	2	450	50	42
	24	2	180	60	15
	25	2	150	75	16
	30	2	50	450	16
	2	10	60	360	17
	6	10	75	150	14
	7	10	50	600	15
	12	10	90	115	16
	13	10	50	900	41
	14	10	90	115	22
	15	10	75	150	14
	16	10	60	300	29
	17	10	60	180	14
	26	10	150	75	18
	27	10	450	50	25
	28	10	180	60	26
	29	10	50	450	23
	34	120	50	450	14
	35	120	360	50	21
	36	120	90	90	15
	37	120	68	136	17
	38	120	180	60	14
P-9	2	0	60	360	18
	27	0	60	360	42
	28	0	360	60	17
	29	0	90	90	14
	30	0	50	450	21
	31	0	450	50	18
	1	2	60	360	21
	9	2	60	180	20
	10	2	90	120	36
	11	2	60	300	22
	12	2	75	150	15
	13	2	50	450	24
	14	2	450	50	40
	15	2	180	60	15
	16	2	150	75	14
	21	2	50	450	15
	3	10	60	360	85
	4	10	75	150	23

Table 2 (*Continued*)

Subject	Condition order	MICT (s)	VI schedules (s) Red	VI schedules (s) Green	Sessions
	5	10	50	600	39
	6	10	90	115	19
	7	10	60	300	26
	8	10	60	180	28
	17	10	150	75	29
	18	10	450	50	14
	19	10	180	60	26
	20	10	50	450	19
	22	120	50	450	22
	23	120	360	50	19
	24	120	90	90	15
	25	120	68	136	37
	26	120	180	60	23
P-10	1	0	60	360	15
	6	0	75	150	15
	7	0	50	600	17
	32	0	600	50	19
	33	0	90	90	19
	34	0	360	60	21
	2	2	60	360	23
	5	2	75	150	21
	8	2	50	600	19
	15	2	60	180	17
	16	2	90	120	19
	17	2	60	300	28
	18	2	75	150	18
	19	2	50	450	23
	20	2	450	50	30
	21	2	180	60	25
	22	2	150	75	23
	3	10	60	360	19
	4	10	75	150	22
	9	10	50	600	15
	10	10	90	115	17
	11	10	50	900	39
	12	10	75	150	15
	13	10	60	360	17
	14	10	60	180	19
	23	10	150	75	19
	24	10	450	50	34
	25	10	180	60	20
	26	10	50	450	28
	27	120	50	450	15
	28	120	360	50	15
	29	120	90	90	28
	30	120	68	136	20
	31	120	180	60	14
P-11	1	0	60	360	18
	6	0	75	150	52
	7	0	50	600	33
	8	0	60	180	16
	9	0	90	120	33
	10	0	60	300	14
	20	0	180	60	20
	21	0	450	50	15
	22	0	150	75	27
	23	0	50	450	27
	2	2	60	360	40
	5	2	75	150	22

Table 2 (*Continued*)

Subject	Condition order	MICT (s)	VI schedules (s) Red	Green	Sessions
	19	2	150	75	20
	29	2	50	450	15
	30	2	90	90	14
	31	2	360	60	25
	3	10	60	360	22
	4	10	75	150	21
	11	10	60	180	14
	12	10	90	120	48
	13	10	60	300	38
	14	10	75	150	20
	15	10	50	450	20
	16	10	450	50	43
	17	10	180	60	18
	18	10	150	75	29
	24	120	50	450	25
	25	120	360	50	31
	26	120	90	90	16
	27	120	68	136	17
	28	120	180	60	14
P-12	1	0	50	900	14
	2	0	50	450	14
	3	0	90	120	31
	4	0	60	300	24
	5	0	75	150	20
	6	0	60	180	20
	17	0	450	50	15
	18	0	150	75	19
	15	2	150	75	18
	16	2	180	60	17
	24	2	60	180	15
	25	2	360	50	23
	26	2	50	450	37
	7	10	60	180	30
	8	10	90	120	17
	9	10	60	300	24
	10	10	75	150	17
	11	10	50	450	27
	12	10	450	50	30
	13	10	180	60	21
	14	10	150	75	29
	19	120	50	450	24
	20	120	360	50	24
	21	120	90	90	17
	22	120	68	136	36
	23	120	180	60	14
P-13	3	0	60	360	18
	7	0	60	180	30
	8	0	75	150	18
	9	0	50	600	16
	10	0	90	115	18
	11	0	50	900	23
	12	0	60	300	27
	24	0	450	50	16
	25	0	180	60	22
	26	0	50	450	31
	27	0	60	180	17
	1	2	60	360	21
	6	2	60	180	50
	21	2	150	75	25

Table 2 (*Continued*)

Subject	Condition order	MICT (s)	VI schedules (s) Red	Green	Sessions
	22	2	180	60	15
	23	2	450	50	22
	2	10	60	360	17
	4	10	60	360	42
	5	10	60	180	24
	13	10	60	180	18
	14	10	90	120	20
	15	10	60	300	18
	16	10	75	150	41
	17	10	50	450	40
	18	10	450	50	52
	19	10	180	60	18
	20	10	150	75	15
	28	120	50	450	15
	29	120	360	50	28
	30	120	90	90	28
	31	120	68	136	20
	32	120	180	60	14

patible with interpretations of multiple, concurrent, and autoshaping performances in terms of temporal constraints on the effects of reinforcement context on response strength. In the present procedure, long MICT durations resulted in high probability of reinforcement in the other component as soon as the changeover was possible, that other component being either a high- or a low-density component, because reinforcement could be set up during the MICT. Increasing MICT length thus resulted in decreasing differences in obtained reinforcement density after a changeover to either schedule of the concurrent pair. On the other hand, increased component durations resulted in lower contrast effects (White, 1990; Williams, 1989).

The present procedure combines, along a continuum of MICT lengths, procedures for simultaneous and successive discriminations. In simultaneous discriminations, as in concurrent schedules, behavior under the control of a stimulus is influenced maximally by the distribution of reinforcement density between the simultaneously presented stimuli (Herrnstein, 1961, 1970). In successive discriminations, as in multiple schedules, the control of behavior by a discriminative stimulus is temporally constrained: Temporally distant stimuli may have low or no effect on the control exerted by the present stimulus (McLean & White, 1981, 1983; Staddon, 1982; Todorov, 1972; Todorov & Ferreira, 1977; White, 1978, 1990; Williams, 1988a, 1989). Temporal constraints that depend on the relative length of components have also been shown in autoshaping. Gibbon, Baldock, Locurto, Gold, and Terrace (1977) found faster conditioning when the conditional stimulus was short relative to the average interreinforcement interval. The present results are also compatible with those reported by Tustin and Davison (1979) in an experiment in which the components of concurrent schedules were separated temporally by placing interval schedules on the changeover key. The sensitivity to main-key performance decreased with increases in the time separating the component schedules.

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Received December 20, 1990
Final acceptance March 8, 1993

APPENDIX 1

Data from the last five sessions of each experimental condition (Experiment 1).

Subject	MICT (s)	Reinforcements VI 1	Reinforcements VI 3	Responses VI 1	Responses VI 3	Time VI 1	Time VI 3	Time Change-overs
Signaled								
P-5	0	215	85	7,365	3,921	8,640	4,515	3,532
	2	211	89	7,690	4,368	7,371	5,149	3,171
	10	213	87	6,755	6,890	7,938	7,776	1,468
	20	214	86	7,535	4,610	7,886	7,916	773
	30	208	92	7,352	5,285	8,680	8,775	569
	50	215	85	7,922	6,375	8,547	8,555	336
	100	203	97	9,998	8,024	10,274	10,687	207
	200	203	97	10,167	9,961	12,500	12,643	125
	0	218	82	7,717	3,675	7,830	3,404	4,936
	20	216	84	7,063	5,224	8,104	8,088	780
	12	214	86	6,460	4,561	8,074	7,954	1,024
	10	216	84	6,880	4,930	8,117	8,078	1,470
	7	214	86	6,254	5,150	7,935	7,913	1,882
	5	217	83	5,785	4,217	8,047	7,713	2,723
	3	213	87	6,569	4,336	7,872	6,851	3,778
P-9	0	216	84	5,882	2,704	9,769	3,332	3,308
	2	211	89	8,921	3,268	7,634	5,003	4,038
	10	213	87	5,159	7,108	8,236	7,960	1,508
	20	210	90	6,735	5,634	8,321	8,301	808
	30	210	90	5,656	6,418	8,728	8,719	571
	50	215	85	6,212	6,745	8,578	8,772	342
	100	204	96	9,076	7,536	10,398	10,475	207
	200	198	102	9,820	9,443	12,078	12,248	121
	20	217	83	6,615	3,900	8,172	8,158	777
	10	217	83	3,874	2,999	8,048	8,065	1,436
	5	218	82	5,814	2,758	8,882	6,219	2,113
	2	214	86	6,356	1,726	8,594	5,207	3,078
	0	219	81	7,320	1,818	8,770	3,025	5,601
	30	214	86	5,032	4,764	8,559	8,363	550
	12	215	85	4,367	5,318	8,546	8,300	1,305
	7	219	81	4,960	5,735	10,144	5,168	1,330
	5	218	82	5,488	4,823	4,702	5,260	1,829
	3	216	84	5,712	2,952	9,835	4,434	2,023
P-10	2	214	86	5,237	4,825	7,870	6,822	4,964
	0	214	86	5,955	3,528	8,191	4,948	5,949
	2	217	83	8,503	2,542	8,370	6,129	3,931
	10	217	83	8,162	4,789	8,026	7,822	1,425
	20	215	85	6,073	3,263	8,248	8,043	776
	30	216	84	8,617	3,681	8,780	8,694	568
	50	218	82	10,076	4,440	8,031	7,982	312
	100	203	97	12,132	7,002	10,347	10,396	204
	200	202	98	13,282	9,875	11,905	12,672	122
	30	215	85	8,518	4,816	8,388	8,320	536
	12	214	86	8,673	3,991	8,314	8,187	1,305
	10	216	84	9,609	5,063	8,088	7,999	1,500
	7	214	86	9,478	5,399	7,854	7,774	2,006
	5	218	82	9,382	3,362	7,860	7,373	2,578
	3	219	81	9,140	3,293	7,851	6,958	3,528
	0	217	83	13,933	2,883	7,959	4,638	4,372
P-12	0	219	81	6,769	3,442	9,337	2,914	5,076
	2	216	84	5,978	2,987	7,611	6,651	4,145
	10	216	84	6,903	6,375	7,996	7,893	1,437
	20	215	85	8,161	5,150	7,747	7,686	749
	30	213	87	7,384	5,035	8,266	8,271	539
	50	220	80	6,719	4,787	7,768	7,726	306

APPENDIX 1 (*Continued*)

Subject	MICT (s)	Reinforcements VI 1	Reinforcements VI 3	Responses VI 1	Responses VI 3	Time VI 1	Time VI 3	Time Change-overs
	100	199	101	4,638	4,776	10,397	10,474	207
	200	197	103	10,735	7,498	12,046	12,430	122
	100	200	100	6,122	5,482	10,087	10,066	200
	200	200	100	6,689	5,997	11,844	12,257	120
	20	215	85	6,574	2,780	8,100	8,189	783
	12	214	86	4,423	2,881	8,160	8,006	1,278
	7	216	84	5,079	3,767	8,111	7,891	2,083
	5	213	87	4,237	2,447	8,051	7,242	2,495
	3	216	84	6,560	2,946	8,345	6,295	3,499
	0	217	83	8,190	3,075	10,019	2,744	5,298
Unsignaled								
P-3	0	216	84	5,420	4,086	8,439	4,804	4,944
	2	210	90	8,551	4,976	8,636	5,181	3,143
	10	214	86	7,018	4,575	8,369	7,634	1,403
	20	212	88	7,962	4,342	8,549	8,295	800
	30	210	90	8,443	5,164	8,738	8,618	562
	50	217	83	5,667	5,135	8,682	8,669	338
	100	202	98	6,173	5,115	10,556	10,627	209
	200	196	104	9,533	9,161	12,502	12,451	124
	30	211	89	5,333	4,441	8,562	8,526	552
	12	215	85	6,007	4,330	8,554	8,123	1,283
	10	213	87	6,704	4,914	8,065	7,821	1,428
	7	213	87	6,097	5,423	7,875	7,488	1,899
	0	218	82	7,477	4,241	8,306	4,763	3,746
P-8	0	217	83	6,961	2,252	9,834	3,588	4,232
	2	217	83	8,394	3,628	9,272	4,958	2,941
	10	212	88	7,387	5,521	8,561	7,319	1,314
	20	213	87	7,981	5,074	8,450	8,064	764
	30	210	90	8,387	5,085	8,906	8,495	550
	50	218	82	7,266	4,548	8,405	8,415	325
	100	203	97	8,411	5,313	10,527	10,523	206
	200	200	100	8,714	6,647	11,818	12,680	121
	0	216	84	5,280	4,143	7,234	3,841	7,286
	5	215	85	5,481	4,899	8,429	7,060	2,049
	3	215	85	6,472	4,254	8,324	6,810	2,844
	0	215	85	7,873	3,234	7,994	3,120	6,491
	7	214	86	6,622	4,520	8,461	7,166	1,717
	10	215	85	5,535	4,661	8,331	7,441	1,352
	12	211	89	5,786	4,497	8,609	8,075	1,254
	20	213	87	6,891	3,961	8,449	7,929	774
	30	212	88	6,281	3,771	8,968	8,773	567
	7	216	84	6,786	4,009	8,227	7,400	1,879
	5	215	85	6,222	3,336	8,033	6,881	2,309
	3	216	84	7,286	3,056	8,639	6,014	2,797
	2	216	84	7,191	3,060	8,521	5,375	3,411
	0	214	86	8,503	2,368	9,038	3,642	4,400
P-11	2	215	85	6,505	4,494	8,516	5,564	3,221
	10	210	90	11,525	4,011	8,828	7,565	1,365
	20	214	86	6,792	3,573	8,194	8,007	752
	30	214	86	6,998	4,611	8,578	8,283	535
	50	219	81	8,153	3,892	8,503	8,526	330
	100	200	100	9,512	5,141	10,243	10,256	202
	200	200	100	8,743	6,616	11,790	11,981	121
	30	216	84	9,324	4,899	8,325	8,285	542
	12	215	85	6,792	3,055	8,257	7,994	1,247
	5	217	83	7,132	2,664	7,814	7,252	2,531
	3	219	81	7,789	3,141	7,792	6,878	3,609
	0	218	82	9,671	3,121	9,045	3,452	5,560

APPENDIX 2

Data from the last five sessions of each experimental condition (Experiment 2).

Subject	MICT (s)	Reinforcements Schedule 1	Reinforcements Schedule 2	Responses Schedule 1	Responses Schedule 2	Time Schedule 1	Time Schedule 2	Change-overs
P-5	0	259	41	11,369	2,200	11,018	2,382	3,630
	0	202	98	10,076	4,373	9,252	5,575	5,219
	0	279	21	13,337	1,305	11,822	1,465	2,339
	0	169	131	8,978	6,595	8,227	7,120	6,417
	0	29	271	1,000	9,089	1,731	11,228	3,559
	0	75	225	2,832	8,314	4,080	9,313	4,209
	0	100	200	3,638	8,269	5,172	9,514	5,326
	2	260	40	7,845	4,205	8,588	7,088	4,062
	2	201	99	8,349	5,152	8,650	7,821	4,163
	2	274	26	9,782	2,297	10,174	3,936	1,981
	2	165	135	6,944	7,069	8,485	8,509	4,319
	2	225	75	7,312	4,450	8,112	6,480	4,388
	2	168	132	7,565	7,029	8,577	9,294	5,480
	2	255	45	8,781	4,301	9,584	6,551	4,712
	2	200	100	7,633	5,287	8,667	7,786	5,204
	2	270	30	9,890	2,301	9,912	4,240	2,734
	2	29	271	1,589	10,657	2,622	11,243	1,655
	2	75	225	2,916	9,443	4,565	9,871	3,164
	2	100	200	3,290	9,872	6,071	10,323	3,852
	2	270	30	8,791	1,749	10,927	2,957	2,026
	10	260	40	6,221	3,567	8,063	8,869	1,716
	10	203	97	7,729	5,352	8,541	8,569	1,648
	10	278	22	7,743	3,505	7,992	7,635	1,452
	10	168	132	6,734	5,293	8,635	8,664	1,655
	10	285	15	10,151	1,730	10,310	4,740	868
	10	170	130	7,108	4,548	8,821	8,868	1,695
	10	200	100	6,341	4,814	8,563	8,436	1,642
	10	249	51	6,821	4,481	8,499	8,176	1,532
	10	225	75	5,861	4,015	7,799	7,826	1,479
	10	100	200	4,855	6,251	8,476	8,576	1,586
	10	30	270	2,324	9,224	5,459	8,748	1,006
	10	76	224	3,866	4,860	7,662	8,002	1,442
	10	270	30	5,095	2,766	8,325	6,919	1,292
	120	255	45	10,163	3,907	11,367	11,747	194
	120	55	245	7,815	8,951	10,859	10,499	181
	120	150	150	7,507	6,857	9,708	9,711	165
	120	194	106	7,798	5,557	10,157	10,307	174
	120	93	207	7,206	7,479	10,463	10,275	176
P-9	0	259	41	8,469	1,690	12,397	2,298	2,746
	0	259	41	11,459	5,451	10,498	3,688	4,215
	0	40	260	2,654	12,481	2,603	11,263	5,732
	0	145	155	5,930	6,139	5,357	5,914	11,267
	0	270	30	9,411	2,563	7,500	2,559	6,775
	0	30	270	1,962	8,461	1,228	5,385	6,623
	2	259	41	8,511	1,770	13,188	4,406	2,496
	2	224	76	8,234	3,608	7,981	6,679	3,732
	2	162	138	7,212	5,563	8,618	9,115	6,106
	2	251	49	8,504	6,449	8,270	8,209	4,981
	2	200	100	6,688	4,896	9,372	8,307	4,802
	2	270	30	9,400	2,460	8,504	6,060	3,324
	2	30	270	713	9,304	3,491	10,120	1,615
	2	76	224	3,373	7,559	6,479	8,122	2,964
	2	99	201	3,338	6,738	7,390	9,313	4,678
	2	270	30	11,492	2,401	9,771	4,527	3,014
	10	262	38	6,703	2,105	12,694	3,471	646
	10	207	93	5,652	5,589	9,301	8,332	1,580
	10	277	23	7,866	1,156	12,407	3,758	684
	10	169	131	4,910	5,815	8,830	8,796	1,647

APPENDIX 2 (*Continued*)

Subject	MICT (s)	Reinforcements Schedule 1	Reinforcements Schedule 2	Responses Schedule 1	Responses Schedule 2	Time Schedule 1	Time Schedule 2	Change-overs
	10	254	46	12,532	1,984	10,070	6,420	1,203
	10	224	76	8,344	4,407	7,619	7,708	1,449
	10	100	200	3,008	7,161	9,011	9,139	1,640
	10	25	275	1,794	10,079	7,371	8,385	1,342
	10	75	225	2,736	7,591	8,175	8,570	1,527
	10	270	30	11,152	2,309	9,397	5,545	1,008
	120	256	44	10,945	2,942	11,386	11,732	195
	120	55	245	4,723	6,431	11,709	11,332	195
	120	148	152	5,686	4,725	10,054	10,052	170
	120	194	106	8,760	4,911	10,234	10,405	175
	120	94	206	5,875	10,855	10,384	10,161	175
P-10	0	255	45	14,043	1,724	12,138	2,177	2,475
	0	198	102	13,780	4,385	9,114	5,446	5,821
	0	280	20	16,875	1,097	11,839	1,377	2,762
	0	20	280	956	14,328	965	12,464	1,430
	0	145	155	4,270	5,873	6,171	6,235	3,137
	0	39	261	1,789	12,786	2,245	12,659	2,370
	2	258	42	9,899	2,264	10,493	5,771	2,939
	2	200	100	12,571	4,287	8,426	8,256	4,497
	2	279	21	15,895	1,475	10,988	3,895	2,068
	2	224	76	12,288	2,936	9,388	5,044	3,450
	2	172	128	10,583	4,520	8,675	7,925	4,695
	2	255	45	15,738	2,587	11,131	4,762	3,003
	2	200	100	8,582	3,744	8,866	7,708	4,182
	2	270	30	13,378	1,857	10,034	4,250	2,494
	2	29	271	2,568	14,840	2,897	11,016	1,537
	2	73	227	3,105	9,762	4,890	9,565	2,371
	2	99	201	3,389	7,696	7,390	9,142	3,400
	10	258	42	13,286	2,659	9,088	7,847	1,465
	10	201	99	11,411	5,202	8,187	8,422	1,545
	10	279	21	13,111	1,557	9,682	5,438	1,011
	10	166	134	10,367	5,532	8,970	8,730	1,646
	10	284	16	15,375	907	11,459	3,319	623
	10	198	102	9,216	3,711	8,884	8,025	1,503
	10	251	49	10,947	2,822	8,864	8,001	1,516
	10	225	75	9,896	3,388	8,118	7,538	1,450
	10	100	200	4,182	8,039	8,420	8,700	1,545
	10	29	271	915	9,492	5,683	9,176	1,039
	10	75	225	2,539	8,612	7,391	8,132	1,386
	10	270	30	10,262	1,860	9,074	5,850	1,075
	120	256	44	9,256	1,969	11,869	11,898	197
	120	55	245	3,915	7,855	11,886	11,752	197
	120	151	149	6,635	6,839	9,700	9,646	164
	120	198	102	10,745	5,014	10,063	10,161	171
	120	89	211	7,402	9,074	10,632	10,340	177
P-11	0	262	38	14,685	1,505	13,366	1,503	3,040
	0	202	98	10,358	4,896	7,788	7,139	6,890
	0	280	20	16,461	1,362	11,880	1,505	2,144
	0	223	77	11,899	2,633	8,929	4,289	4,129
	0	179	121	9,563	5,169	6,796	8,833	7,868
	0	254	46	13,179	3,040	9,898	5,047	3,975
	0	75	225	3,212	13,016	3,505	9,655	4,228
	0	28	272	1,275	13,933	823	11,876	2,255
	0	100	200	5,285	10,930	5,801	9,028	5,153
	0	271	29	11,877	1,037	12,019	1,041	1,899
	2	258	42	11,887	2,691	10,819	5,670	3,062
	2	202	98	9,582	5,089	8,087	8,809	4,645
	2	100	200	5,815	9,759	6,860	9,515	5,064
	2	275	25	11,987	901	12,446	1,345	891

APPENDIX 2 (*Continued*)

Subject	MICT (s)	Reinforcements		Responses		Time		Change-overs
		Schedule 1	Schedule 2	Schedule 1	Schedule 2	Schedule 1	Schedule 2	
	2	145	155	5,790	3,834	7,852	7,887	5,340
	2	41	259	3,031	8,367	7,385	9,634	4,660
	10	255	45	10,192	4,040	8,347	8,668	1,648
	10	198	102	11,088	4,856	8,241	8,370	1,615
	10	225	75	8,217	2,560	7,660	7,703	1,485
	10	165	135	7,639	4,796	8,990	9,078	1,754
	10	247	53	11,479	4,520	8,441	8,618	1,600
	10	200	100	11,372	4,873	8,542	8,608	1,645
	10	269	31	9,618	3,689	7,760	7,752	1,444
	10	30	270	2,081	9,582	8,496	8,612	1,619
	10	75	225	4,033	8,027	8,589	8,451	1,642
	10	100	200	6,870	8,941	8,483	8,527	1,646
	120	265	35	10,444	568	11,447	11,929	198
	120	48	252	3,346	8,359	11,156	10,732	186
	120	149	151	5,770	6,161	9,869	9,776	167
	120	192	108	7,677	5,576	10,352	10,529	178
	120	92	208	5,825	7,798	10,704	10,516	181
P-12	0	284	16	12,215	794	13,030	649	1,161
	0	272	28	11,816	1,017	11,804	1,206	1,784
	0	178	122	7,600	5,176	7,385	6,439	6,900
	0	255	45	9,992	2,448	11,982	2,620	4,954
	0	200	100	6,998	3,700	9,269	5,345	5,887
	0	224	76	7,025	3,023	9,308	3,950	5,823
	0	29	271	1,498	9,755	1,583	11,458	2,955
	0	100	200	5,017	8,972	6,672	8,212	5,260
	2	100	200	4,822	7,783	7,752	8,693	4,676
	2	75	225	3,118	10,377	8,295	14,707	4,928
	2	225	75	4,497	4,645	9,098	7,348	5,111
	2	33	267	2,134	8,664	5,288	8,776	3,270
	2	272	28	8,800	1,253	9,445	3,150	1,947
	10	225	75	5,559	2,195	7,657	7,744	1,486
	10	162	138	2,974	3,783	9,305	9,237	1,765
	10	249	51	5,626	4,248	8,555	8,120	1,518
	10	200	100	5,464	3,879	8,567	8,532	1,590
	10	270	30	5,308	1,696	7,837	7,614	1,411
	10	30	270	1,348	5,397	7,465	7,918	1,384
	10	75	225	2,704	4,527	7,918	7,780	1,499
	10	100	200	5,020	6,216	8,618	8,308	1,625
	120	256	44	6,835	1,981	11,413	11,782	196
	120	55	245	3,619	7,870	11,914	11,543	199
	120	150	150	4,088	4,398	10,286	10,226	174
	120	194	106	5,292	3,444	10,258	10,440	176
	120	90	210	3,767	6,190	10,481	10,241	177
P-13	0	260	40	9,571	1,885	10,336	4,001	5,721
	0	220	80	10,897	3,986	7,535	5,253	4,963
	0	202	98	10,535	4,149	8,084	6,660	5,893
	0	280	20	15,478	1,156	10,042	2,888	4,936
	0	170	130	7,309	6,062	6,758	8,498	6,488
	0	285	15	14,680	1,343	11,493	1,772	3,047
	0	254	46	12,201	2,994	9,400	4,933	6,832
	0	27	273	1,185	16,475	1,824	10,981	3,271
	0	75	225	3,720	13,454	3,702	9,379	3,372
	0	270	30	13,074	1,647	10,605	2,137	3,791
	0	225	75	8,726	2,298	7,875	3,528	4,281
	2	260	40	10,847	2,706	11,432	4,845	2,385
	2	217	83	9,149	7,141	7,232	7,192	3,257
	2	100	200	5,536	11,426	7,274	9,176	5,394
	2	75	225	4,322	11,842	6,588	8,554	5,199
	2	30	270	1,831	15,683	3,652	10,653	2,797

APPENDIX 2 (*Continued*)

Subject	MICT (s)	Reinforcements		Responses		Time		Change-overs
		Schedule 1	Schedule 2	Schedule 1	Schedule 2	Schedule 1	Schedule 2	
	10	258	42	10,956	1,817	9,613	7,109	1,316
	10	256	44	13,568	8,111	8,315	8,669	1,573
	10	218	82	7,549	7,338	7,355	7,461	1,407
	10	225	75	7,933	4,444	7,852	7,865	1,465
	10	171	129	10,779	5,712	8,504	8,659	1,618
	10	249	51	11,893	7,885	8,291	8,540	1,595
	10	200	100	12,114	11,790	8,208	8,536	1,568
	10	272	28	11,215	10,465	8,137	7,653	1,396
	10	30	270	4,526	10,965	7,467	10,481	1,358
	10	75	225	7,662	8,436	8,160	8,147	1,506
	10	100	200	8,433	10,778	8,718	9,060	1,636
	120	255	45	11,132	3,859	11,323	11,676	194
	120	55	245	5,747	10,354	10,702	10,324	178
	120	150	150	6,434	7,406	9,737	9,768	166
	120	190	110	5,006	3,912	10,311	10,430	176
	120	93	207	7,611	6,952	10,402	10,241	175