EFFECTS OF TIMEOUT AND EXTINCTION ON BEHAVIORAL CONTRAST

Thesis for the Degree of M. A.
MICHIGAN STATE UNIVERSITY
HENRY ALLEN VIETH
1970

ABSTRACT

EFFECTS OF TIMEOUT AND EXTINCTION ON BEHAVIORAL CONTRAST

by

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Two theories have emerged to account for behavioral contrast. The relative reinforcement theory states that contrast in S_1 is due to an increase in reinforcement density in S_1 relative to the S_2 stimulus. The response reduction theory states that contrast in S_1 may be a result of emotional factors resulting from unreinforced responding in the presence of S_2.

In order to test these hypotheses, a within subject design was used to compare the amount of contrast resulting from timeout(little or no unreinforced responding) with the amount of contrast resulting from extinction(a measureable amount of unreinforced responding). Relative reinforcement resulting from timeout and extinction was equivalent.

Five pigeons were trained to key peck in the presence of S_1 and S_2. On the eleventh session, extinction in S_2, and timeout were introduced in alternation with S_1.

After correction was made for the greater latencies to first peck after a timeout, the results showed an approximately equivalent amount of sustained contrast for the two conditions. However, transient contrast was greater following extinction than timeout.

Reversal sessions showed a change in the degree of contrast induced by extinction but little change in the degree of contrast induced by timeout. The sustained contrast results tended to support the relative reinforcement hypothesis. The transient contrast results tended to support the response reduction hypothesis.

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Date: Oct 22 '70

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by

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A THESIS

Submitted to

Michigan State University

in partial fulfillment of the requirements

for the degree of

MASTER OF ARTS

Department of Psychology

1970

ACKNOWLEDGEMENTS

I wish to extend my sincere thanks and appreciation to Dr. Mark Rilling for his assistance and support, far above and beyond the call of duty, also to Dr. Glenn Hatton for his helpful criticisms and discussion, and to Dr. Ralph Levine for his helpful suggestions.

I also wish to thank Thomas Kramer for his useful criticisms and advice.

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INTRODUCTION

While studying a classically conditioned salivation response in dogs, Pavlov(1927, p.188) found that when he alternated reinforced trials with unreinforced trials, the amount of saliva secreted during the reinforced trials, increased to an amount greater than that prior to the introduction of the unreinforced trials. Pavlov called the increase in the magnitude of the response "positive induction", and described it as "inhibition leading to increased excitation". In order to allay the "confusion" resulting from the use of the term induction by other theorists in other contexts, Skinner(1938, p.175) substituted the term positive contrast to identify the increase in the response to the reinforced stimulus which occurs when it is alternated with an unreinforced stimulus.

Subsequently, Ferster(1958) studied the effects of timeout from positive reinforcement on an operant response. A timeout is a period during which the experimental chamber is darkened and the opportunity for reinforcement is withdrawn. Unlike extinction, during which many unreinforced responses are characteristically observed, a timeout reduces the probability of a response to nearly zero. Ferster trained chimpanzees to respond for reinforcement by lever pressing on a variable interval schedule. The variable interval(VI) schedule provides reinforcement for responding, at intervals varying around a mean. When Ferster alternated VI periods with timeout periods, he found an increase in the response rate in the presence of a red light presented for the 30 seconds immediately preceeding and signalling the onset of the timeout. The increase in the rate of response(contrast) occurred even though reinforcement was available on the same basis as before during the red light.

Two theories have been developed to explain the contrast effect. The first theory, developed by Reynolds(1961a), assumes that the rate of responding in the presence of a given stimulus is a function of the frequency of reinforcement in the presence of that stimulus relative to the frequency of reinforcement during the presence of the other stimuli controlling that organism's behavior. Hence contrast is a result of an increase in the relative frequency of reinforcement during the presence of the stimulus during which the contrast occurs. Reynolds(1961a, p.60) introduced the term behavioral contrast, which he defined as "an increase in the rate of responding in one component of a multiple schedule when certain changes occur in the other component".

The second theory, developed by Terrace(1963;1966;1968), states that response suppression has an excitatory as well as an inhibitory property. The inhibitory property appears as the reduction in response rate in the unreinforced component. The excitatory property appears as the increase in response rate in the reinforced component. According to the theory, the increase in response rate in the reinforced component, positive behavioral contrast, would occur whenever the response rate in the alternate component was reduced from a baseline level, irrespective of relative reinforcement.

Reynolds(1961a) developed the relative reinforcement theory from a series of experiments in which he compared the contrast effects obtained in multiple schedules. In a multiple schedule, two stimuli, each correlated with a given schedule of reinforcement are presented alternately. This procedure has become the customary method of investigating behavioral contrast.

To begin with, Reynolds(1961a) trained pigeons to respond by key pecking on a multiple schedule until their rates of responding had stabilized. Reynolds found that when he introduced extinction in the second component, the rate of responding during the first component increased (behavioral contrast). When he introduced timeout in place of the second component, he found approximately the same degree of behavioral contrast as was induced by extinction. When the VI schedule was restored to the second component in place of extinction or timeout, the rate of responding in the first component decreased to the baseline level. In order to determine if the response rate in the first component was controlled by relative reinforcement, Reynolds then substituted Dro 50 seconds in the second component. A Dro(Differential reinforcement of other behavior) schedule provides reinforcement if no response has occurred for a given period of time.

Under this procedure, relative reinforcement should have remained about the same during the VI component. As would have been predicted from Reynolds' theory, behavioral contrast did not occur in the VI component.

Further evidence for the relative reinforcement theory was presented in a study(Reynolds, 1961b) in which pigeons were trained to respond on mult variable interval-fixed ratio schedules(mult VI FR). In a fixed ratio schedule, the organism is reinforced for the first response after a fixed number of responses have occurred. By manipulating the value of one schedule, while holding that of the other constant, Reynolds found that the rate of responding during the constant component was an approximate linear function of the relative frequency of reinforcement in that component. A similar study(Reynolds and Catania, 1961) obtained the same results by alternating VI with Fixed interval(FI), In a fixed interval schedule, reinforcement is provided for the first response after a given period of time has elapsed. In the same study, behavioral contrast was obtained when a mult Drl Drl schedule was changed to mult Drl ext. In the Drl(Differential reinforcement of low rates) schedule, the animal is reinforced for each response, but only if a time period, t, has elapsed since the occurrence of the previous response. Even though the introduction of extinction produced a higher rate of responding during the Drl component, and hence, a lower rate of reinforcement, relative reinforcement actually increased during the Drl component. The results therefore, supported the relative reinforcement theory.

Further support came from the results of a study by Catania(1961). Pigeons were trained to respond on a concurrent mult VI VI schedule. In the concurrent mult VI VI schedule, the birds were presented with two keys, lit at all times. Reinforcement was available on a VI3 basis for responding on either key. One key, the mult VI VI key, alternated between green and yellow. The second key, the conc VI key, was always red. After training the birds to respond, Catania introduced extinction during the presence of the yellow key. Behavioral contrast was obtained during the presence of the green light on the first key and also in number of responses to the red key. Next, Catania doubled the number of reinforcements available on the red(conc) key at the same time that he introduced extinction during the presence of the yellow key. This time, behavioral contrast did not occur during the presence of the green key, presumably since relative reinforcement during the green key had not been increased.

Reynolds(1961c) suggested that extinction has both an inhibitory and an excitatory property. The inhibitory property is manifested by the reduced rate of responding during the presence of the stimulus correlated with extinction(S-). And the excitatory property is manifested by the occurrence of behavioral contrast in the presence of the stimulus correlated with reinforcement(S+). Terrace(1963;1966) found that he could eliminate both the inhibitory and the excitatory aspects of extinction by means of a procedure he called errorless discrimination learning. Terrace used a procedure in which the S- stimulus was presented as a dark key for a brief period of time and then gradually increased both in intensity and in duration. Terrace concluded that a necessary condition for behavioral contrast seemed to be unreinforced responding to S-. As Dunham(1968) points out in a review of the literature, this analysis fails to account for the results obtained by Reynolds(1961a). Reynolds obtained contrast by alternating S+ with timeout, a condition during which few, if any, responses will occur.

Terrace(1968) attempted to distinguish between the two possible explanations for behavioral contrast: 1.) Relative reinforcement; and 2.) Response reduction. After training pigeons to respond on a mult VI VI schedule, Terrace introduced electric shock contingent on responding during S_2. This produced an increase in response rate during S_1 although there was no change in relative reinforcment. Similarly, a change from mult VI VI to mult VI Drl produced the same results, although for only half the subjects tested. These results led Terrace to conclude that a reduction in response rate in S_2 is a sufficient condition for the occurrence of behavioral contrast in S_1. Reynolds and Limpo(1968) performed a similar experiment in which pigeons were trained on a mult Drl Drl schedule. After the birds' response rates had stabilized, a time cue was introduced during S_2 which served as a signal that the Drl interval had elapsed. This decreased the response rate during S_2 but increased the number of reinforcements. The decrease in response rate in S_2 was accompanied by an increase in response rate during S_1 even though relative reinforcement in S_1 had decreased. These results were directly opposite to what would have been predicted from Reynolds' theory. Weisman (1970) in a study similar to Reynolds(1961a) trained birds on a mult VI VI and then changed the schedule to a mult VI Dro. Weisman found that if reinforcement density was held nearly equal in the two components by manipulating the rate of reinforcement in the Dro component, behavioral contrast occurred in the VI component. These data, and those obtained by Reynolds and Limpo(1968) were in agreement with the results obtained by Terrace(1963;1966;1968) and with his conclusions. Response reduction in S_2 would seem to be a sufficient condition for the occurrence of behavioral contrast in S_1.

Evidence has been presented for two theoretical explanations for behavioral contrast. The first theory states that behavioral contrast is a result of an increase in relative reinforcement in the component during which it occurs. This position was taken by Catania(1961), Reynolds(1961a;1961b;1961c;1963) and Reynolds and Catania(1961).

The second theory stems from the work on errorless learning by Terrace(1963;1966) who suggested that behavioral contrast may be an emotional byproduct of unreinforced responding during extinction. Terrace(1968) has suggested that reduction in response rate in the presence of one stimulus is a sufficient condition for the occurrence of behavioral contrast in the other. This explanation was supported by results obtained by Reynolds and Limpo(1968) and Weisman(1970).

The purpose of the present study was to compare, as determinants of behavioral contrast, timeout and extinction. Two possible sets of results were expected based on the theoretical explanations listed above. (a) If behavioral contrast were a function of relative reinforcement, then both conditions would produce an equivalent increase in the rate of responding in the presence of the stimulus correlated with reinfircement, (b) If behavioral contrast were a result of unreinforced responding in the presence of the stimulus correlated with extinction, then contrast would occur in multiple schedule components preceeded by extinction but not in components preceeded by timeout, since responses during a timeout are quite rare.

Nevin and Shettleworth(1966) found that the rate of responding during the presence of a stimulus correlated with reinforcement was highest in the period immediately following the offset of extinction. Nevin and Shettleworth differentiated the change in response rate within the schedule component from the overall change in response rate across schedule components. They called the change in gross response rates averaged over successive components of the experimental session, sustained contrast. This procedure seemed to permit a more sensitive analysis of the effects of the independent variable. In the present study, the comparison of timeout and extinction as determinants of behavioral contrast utilized an analysis of both sustained and transient contrast.

METHOD

<u>Subjects</u>:

Five locally obtained, female, White Carneaux pigeons, four to ten years of age, were maintained at 80% ±5% of their free feeding weights for the duration of the experiment. The birds were experimentally naive at the beginning of the study.

<u>Apparatus</u>:

All subjects were run in the same standard, Lehigh Valley model 1519 test chamber, equipped with three model 1348 pecking keys. Only the center was key was used or illuminated at any time. The chamber was equipped with a blower which was used for ventilation and the masking of extraneous sounds. Standard electro-mechanical equipment located in an adjacent room was used to program the experiment and to record the data.

<u>Procedure</u>:

<u>Discrimination sessions</u>; After having stabilized for at least three days at 80% of their free feeding weights, the birds were placed into the test chamber and allowed to habituate to it. They were presented during this time with continued access to the raised magazine. Once the birds had become accustomed to eating from the magazine, they were shaped to peck a key illuminated from behind by a white light. The first session was terminated after the bird had received a total of 100 reinforcements. Each reinforcement

consisted of 3.5 seconds access to the raised magazine. On ten succeeding 67 minute daily sessions, each bird was trained to respond on a mult VI one minute VI one minute schedule during both S_1 and S_2. During both the training and the discrimination sessions, S_1 was correlated with a green key light and S_2 with a red key light. The S_1 period was of three minutes duration and the S_2 period of one minute duration. The three minute S_1 periods were selected to permit an analysis of transient contrast. The one minute length for the S_2 component was selected because it permitted a shorter session length. Each training session consisted of 17 S_1 presentations and 16 S_2 presentations. Each session began with an S_1 period in order to allow for stabilization of responding. After the initial S_1 period, S_1 and S_2 were presented alternately. Data from the first S_1 period of the session was not used in the analysis of the results of the experiment.

On the eleventh session, each bird was introduced to both extinction during S_2 and to the timeout condition. These conditions were counterbalanced in an ABBA design, i.e., presented in the following order; one S_1 component (for response rate stabilization), four S_1 components preceeded by S_2, eight S_1 components preceeded by timeout, four S_1 components preceeded by S_2. This manner of presentation of the experimental conditions was designed to control for order and fatigue effects. These conditions were presented during the eleventh through the twentieth sessions.

In addition, one session was selected at random between the 13th and the 19th sessions for each bird. During this randomly selected session, latency to the first peck after the reappearance of the S_1 condition was recorded with a stopwatch. These latencies were recorded at the beginning of each S_1 component following both S_2 and timeout. This was done in order to evaluate the possible effects of differential latencies to first peck after the offset of timeout as compared to extinction.

Reversal sessions; The same subjects and apparatus were used as in the discrimination sessions. At the beginning of the reversal sessions, the positions of S_1 and S_2 in the order of presentation were exchanged. During the reversal series, reinforcement was available only during S_2. During the reversal series, S_2 was preceeded by either S_1 or timeout. The same ABBA design was used that was used during the discrimination sessions. All S_1 components and timeout components were one minute in length and S_2 components were three minutes in length.

Any reinforcement made available but not collected during any component was cancelled at the end of that component. During all components associated with extinction or timeout the variable interval tape was stopped.

RESULTS

Figure 1 shows the mean rate of responding for each session during both S_1 and S_2. Discrimination sessions began in session 11. The baseline consists of an average of the last five days of training sessions prior to the introduction of discrimination training. The increase in the rate of responding during S_1(behavioral contrast) which accompanied the introduction of discrimination training was not large, but was evident in four of the five birds tested. Bird #174 showed a decrease in the rate of responding during S_1(induction) upon the introduction of discrimination training. Responses during the timeout were rare. Figure 1 shows that the average rate of responding across the three minutes of the S_1 component was not differentially influenced by the preceeding stimulus.

An analysis of transient contrast is presented in Figure 2. The rate of responding within each 30 second segment of the S_1 component was averaged across the 10 sessions of discrimination training. The higher response rate shown during the first 30 seconds of the S_1 component following the termination of S_2 as compared to that following the termination of timeout, reflects a consistent transient contrast for all subjects except #174. The slight difference shown for #174 is a result of a much higher response rate following timeout during only the first session of discrimination training. For all subjects, the rates during the second through sixth segments of the S_1 component were not differentially affected by the experimental conditions.

Differential response rates during the first 30 seconds of the S_1 component could have been a result of differential latencies to the first peck. In order to determine the extent of the effects of this variable, latencies to the first peck after the reappearance of S_1 were recorded after both timeout and S_2 for each bird during one randomly selected discrimination session. Means and standard deviations of these latency times are shown in Table 1. The latency to first peck following timeout was found to be reliably longer than the latency following S_2. This difference was found to be statistically significant($p <.05$) when subjected to an analysis of variance.

The latency data was used to recompute the response rates for the initial 30 seconds of the S_1 components in those sessions during which latency times were recorded. As shown in Figure 3, the consistently lower response rate during the first 30 seconds after timeout remained even after the rates had been corrected for the differential response latencies. An analysis of variance for repeated measures showed this difference to be statistically significant($p <.001$).

Reversal sessions; On the twentyfirst session the reinforcement contingencies were reversed so that S_1(green) was correlated with extinction and S_2(red) was correlated with VI one minute. A comparison was then made of the response rates during the presence of the stimulus correlated with reinforcement on the last day of discrimination training(S_1) with the response rates during the presence of the stimulus correlated with reinforcement on the first day of reversal(S_2). These data, shown in Figure 4, revealed no reliable change in the rate of response during the components preceeded by timeout between the last discrimination session and the first reversal session. All the birds showed a decline in response rates during those components preceeded by extinction from the last discrimination session to the first reversal session. Even those birds that showed a decline in post-timeout rates showed a greater decline in post-extinction rates, as seen in Figure 4. Referring to Figure 5, this effect is seen in broader perspective. Behavioral contrast resulting from timeout remained relatively constant overall. The rate of reponding in those reinforced components preceeded by extinction declined upon reversal and then increased to prereversal levels.

Figure 6 shows the mean transients during the first reversal sessions for the S_2 components. A consistently higher response rate was found in those components preceeded by timeout as opposed to those preceeded by extinction. Furthermore, the general shape of the post-timeout transients remained about the same as the prereversal transients, but the post-extinction transients adopted a configuration comparable to the prereversal shape of the post-timeout transients.

A differential latency to first peck was found during the discrimination sessions. In view of this, the comparison of response rates during periods following timeout and extinction in the reversal sessions was made ommitting the first 30 seconds of responding during the reinforced component. These data are shown in Figure 7. The response rate following timeout was found to be higher than that following extinction during the first reversal session. An analysis of variance for repeated measures showed this difference to be statistically significant($p < .025$).

Figure 1. Mean rates of responding for all subjects under all conditions during training and discrimination sessions.

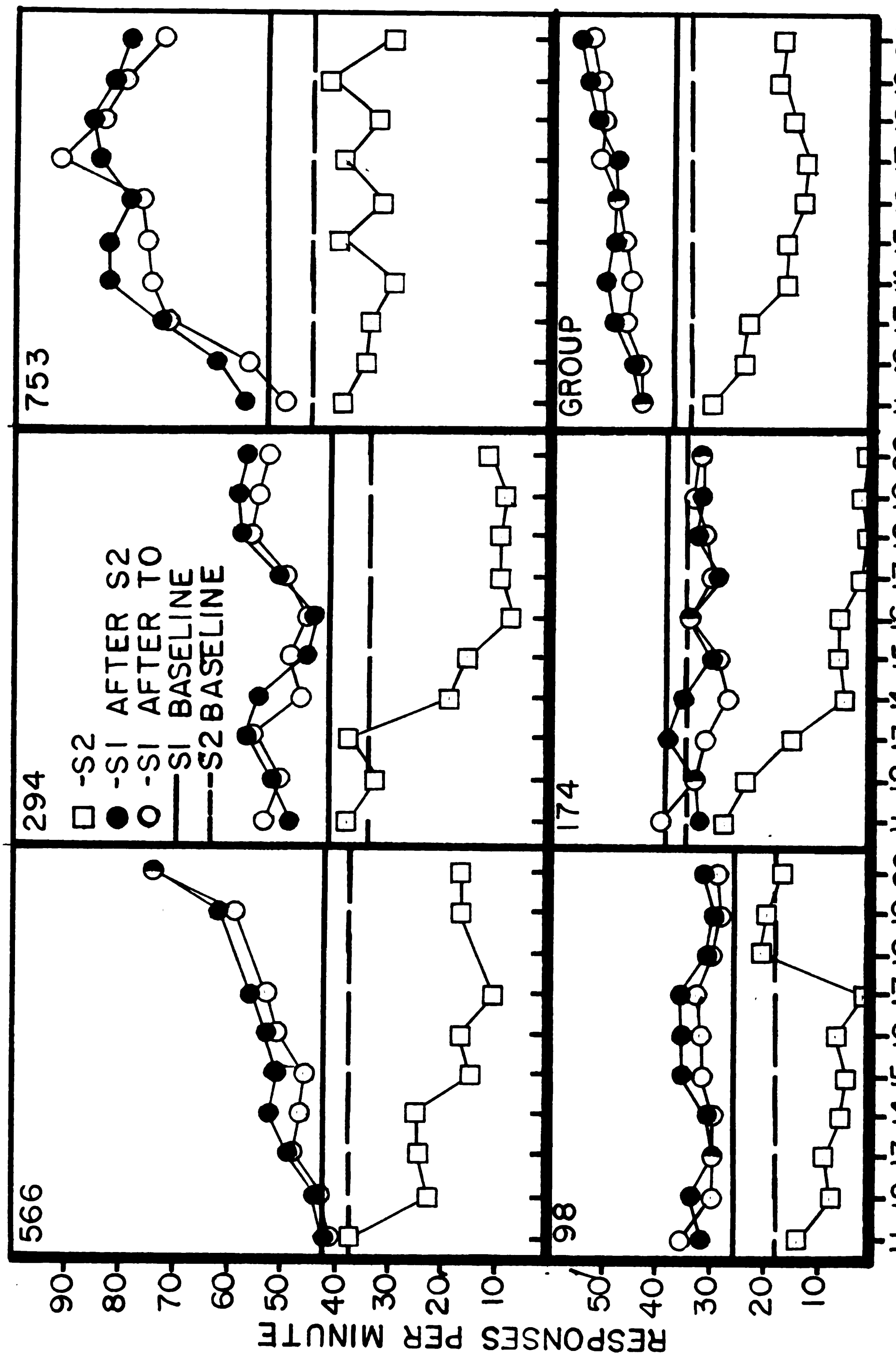

566
294
753
98
174
GROUP
□ -S2
● -SI AFTER S2
○ -SI AFTER TO
SI BASELINE
S2 BASELINE
RESPONSES PER MINUTE
90
80
70
60
50
40
30
20
10
50
40
30
20
10
SESSION
11 12 13 14 15 16 17 18 19 20
11 12 13 14 15 16 17 18 19 20
11 12 13 14 15 16 17 18 19 20

Figure 2. Mean transients across all test sessions for all subjects during discrimination sessions.

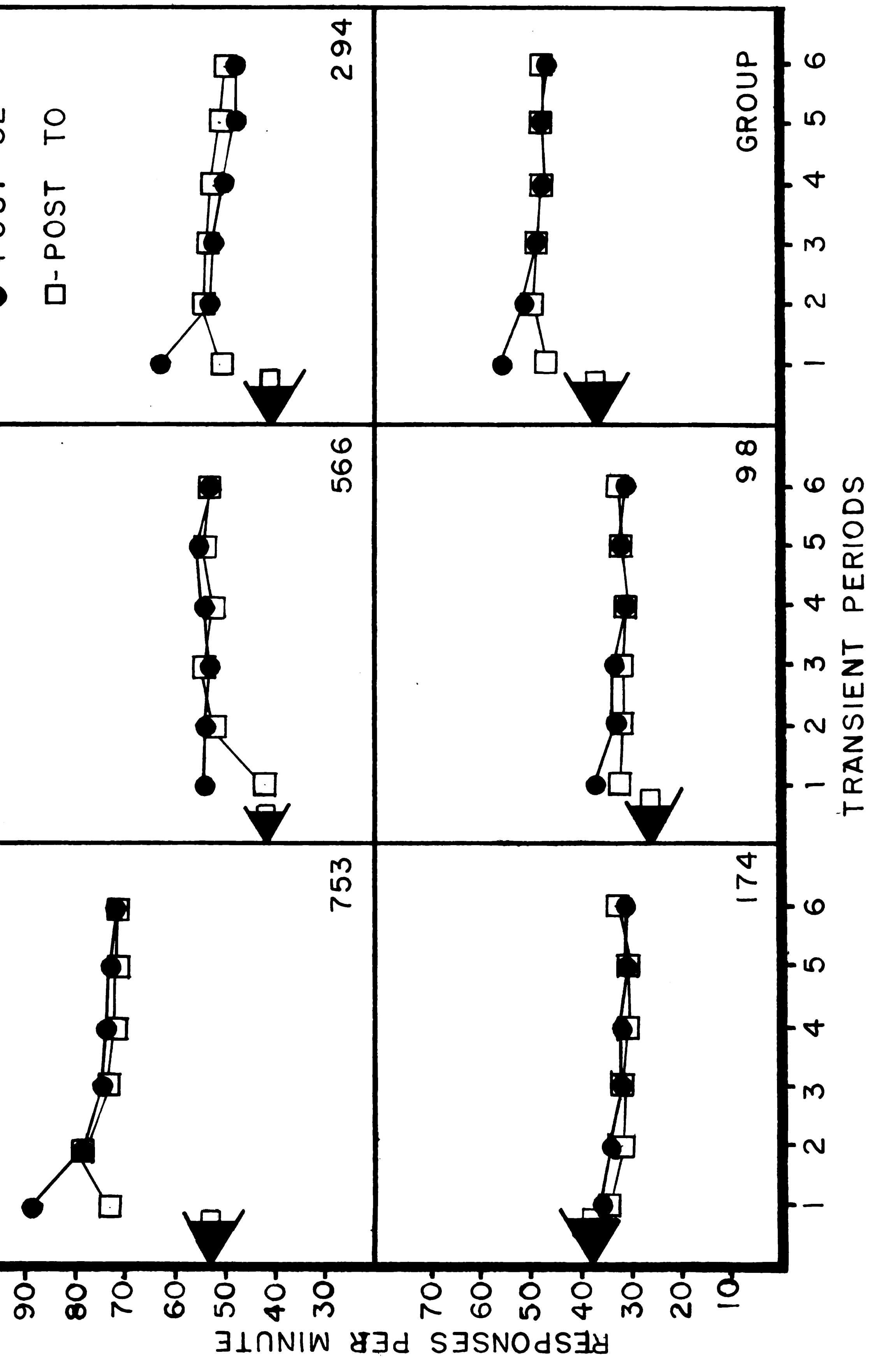

●-POST S2
□-POST TO
753
566
294
174
98
GROUP
RESPONSES PER MINUTE
90
80
70
60
50
40
30
70
60
50
40
30
20
10
TRANSIENT PERIODS
1
2
3
4
5
6

TABLE 1

Average latencies, in seconds to first response following S_2 or timeout.

TABLE 1

Average latencies, in seconds.

Session	Bird No.	Latency Time			
		Post TO		Post S_2	
		$\bar{X}$	S.D.	$\bar{X}$	S.D.
17	294	3.9	.19	1.5	.27
15	566	5.0	.33	1.4	.51
13	174	3.7	.22	2.2	.45
19	98	3.3	.14	1.9	.63
18	753	3.0	.13	0.4	.18

Figure 3. Mean rates of responding during the first 30 seconds of S_1 during discrimination training, corrected for differential latency to first response after offset of timeout and S_2. Shaded portion is post-timeout and open portion is post-extinction(S_2).

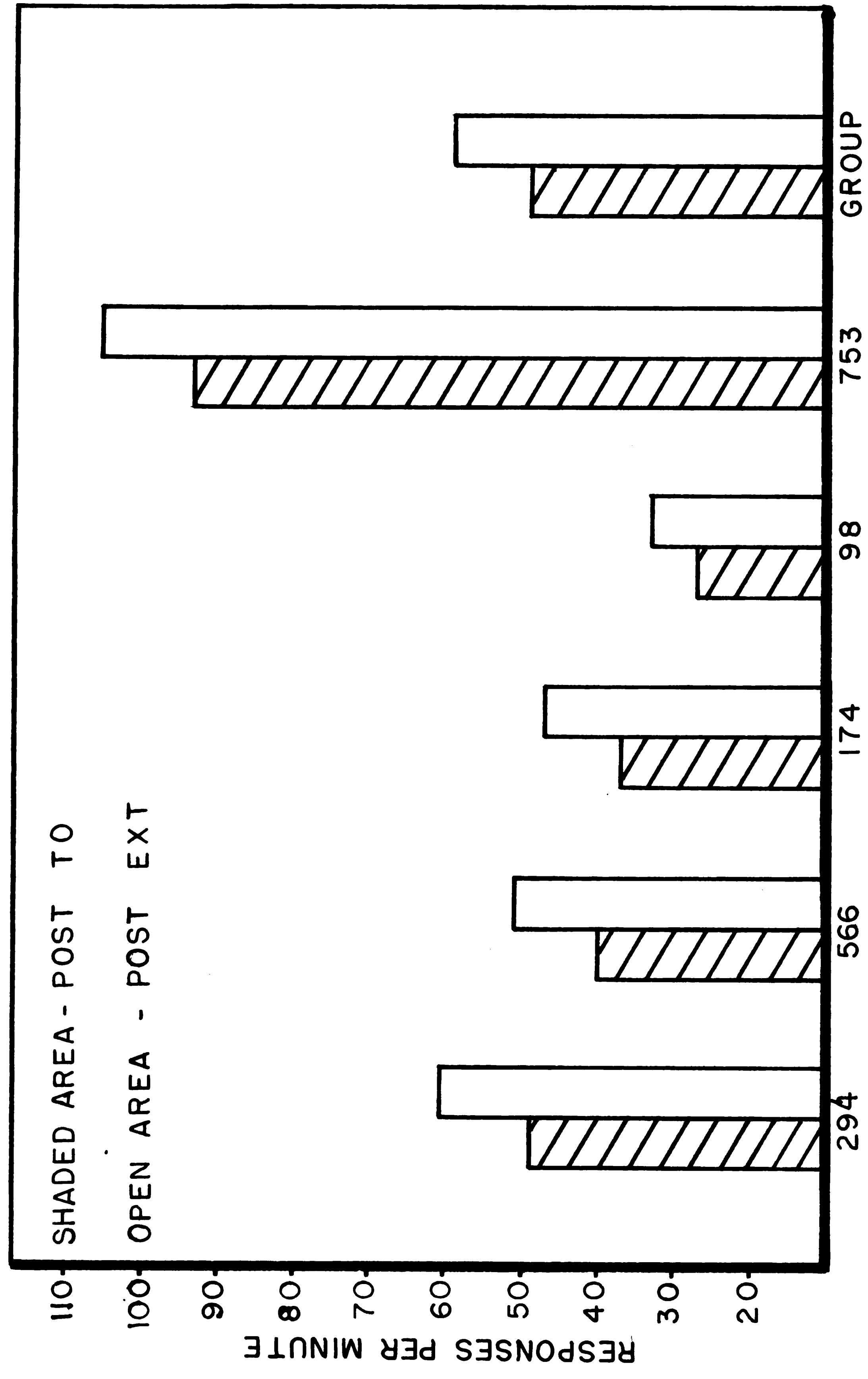

SHADED AREA - POST TO
OPEN AREA - POST EXT
RESPONSES PER MINUTE
110
100
90
80
70
60
50
40
30
20
294
566
174
98
753
GROUP

Figure 4. Change in rate of responding, post-timeout and post-extinction, between last discrimination session and first reversal session.

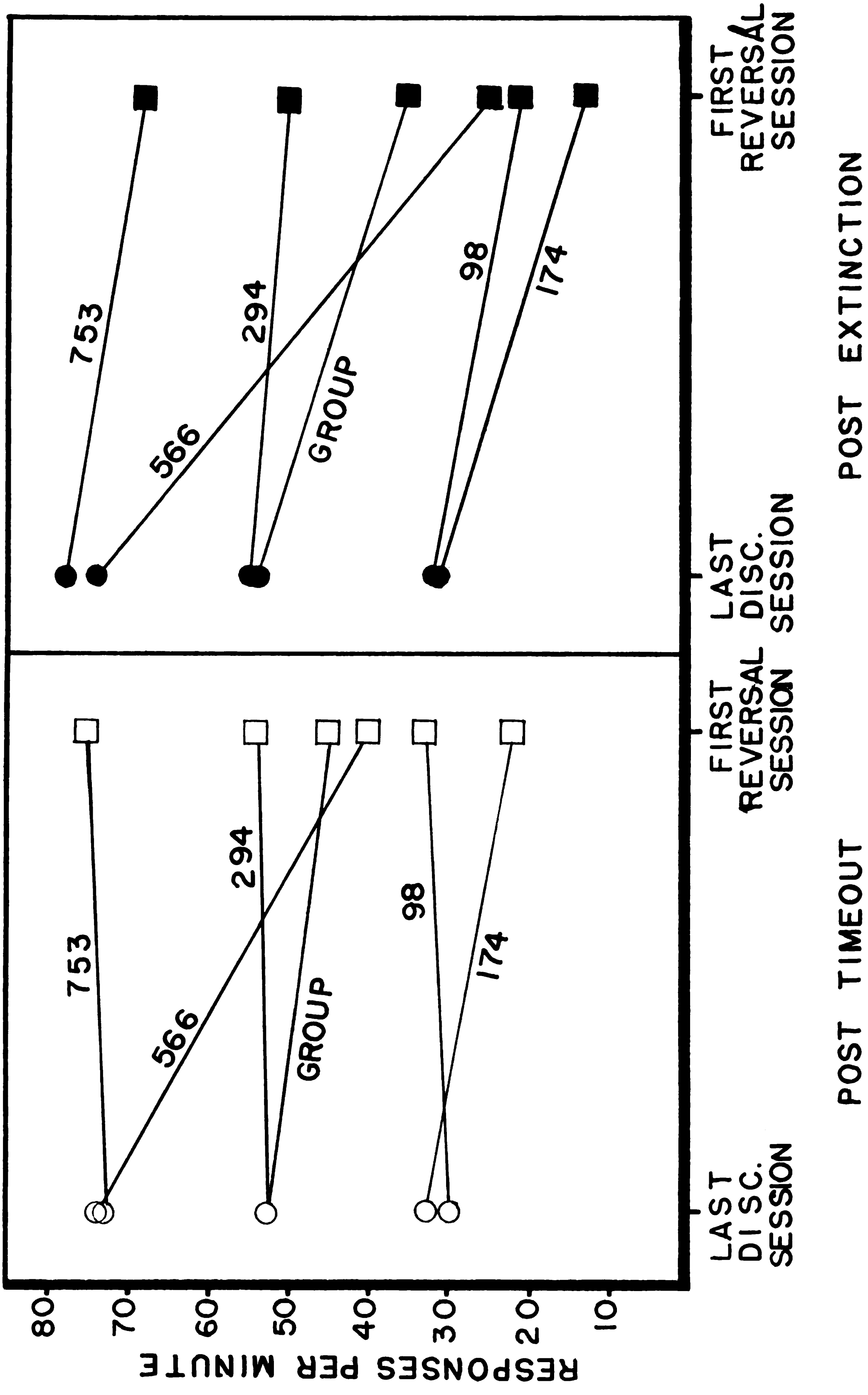
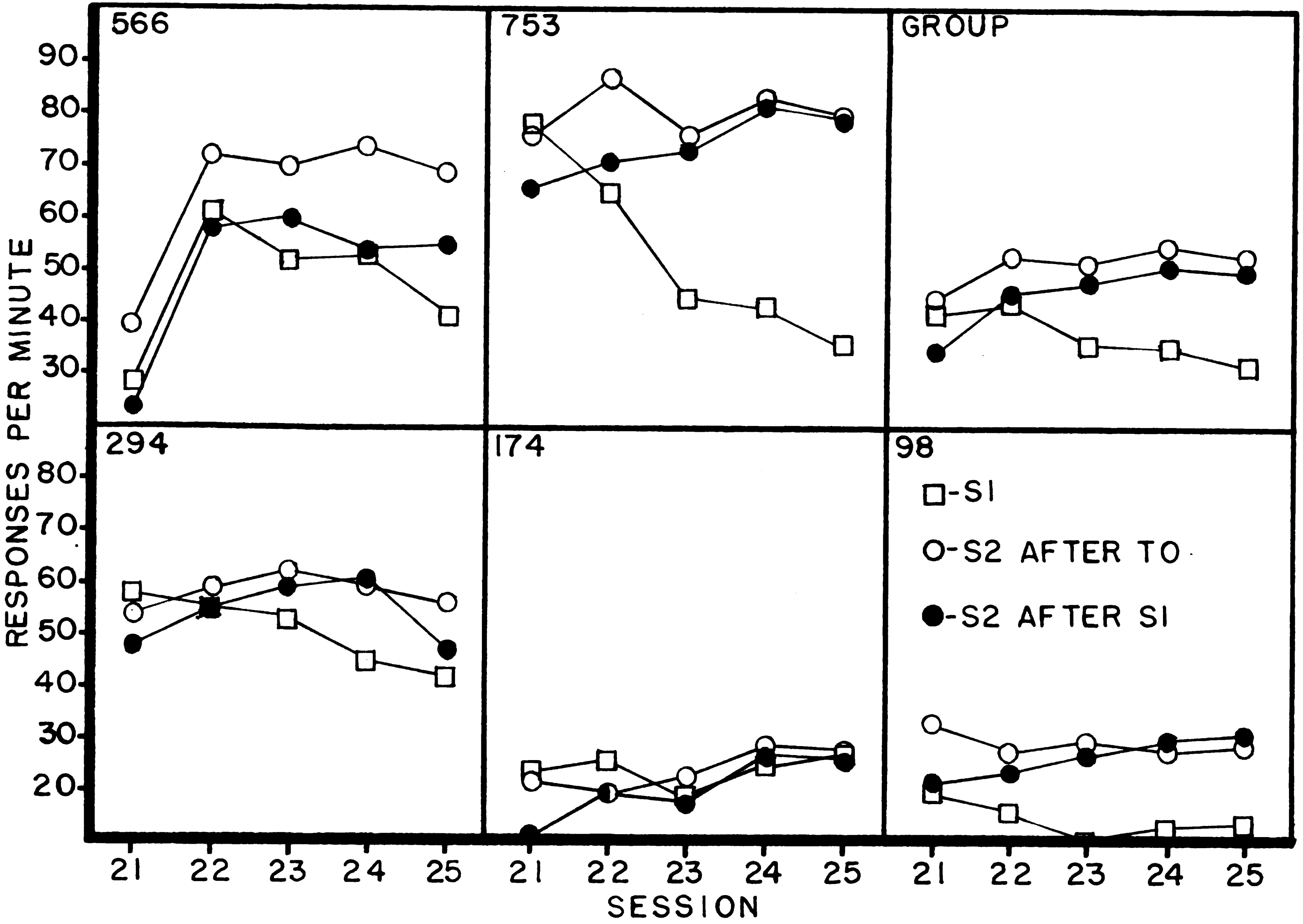

RESPONSES PER MINUTE
80
70
60
50
40
30
20
10
LAST DISC. SESSION
FIRST REVERSAL SESSION
POST TIMEOUT
LAST DISC. SESSION
FIRST REVERSAL SESSION
POST EXTINCTION
753
566
294
GROUP
98
174
753
566
294
GROUP
98
174

Figure 5. Mean rates of responding for all subjects under all conditions during reversal sessions.


566
753
GROUP
294
174
98
□-SI
○-S2 AFTER TO
●-S2 AFTER SI
RESPONSES PER MINUTE
90
80
70
60
50
40
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80
70
60
50
40
30
20
21
22
23
24
25
21
22
23
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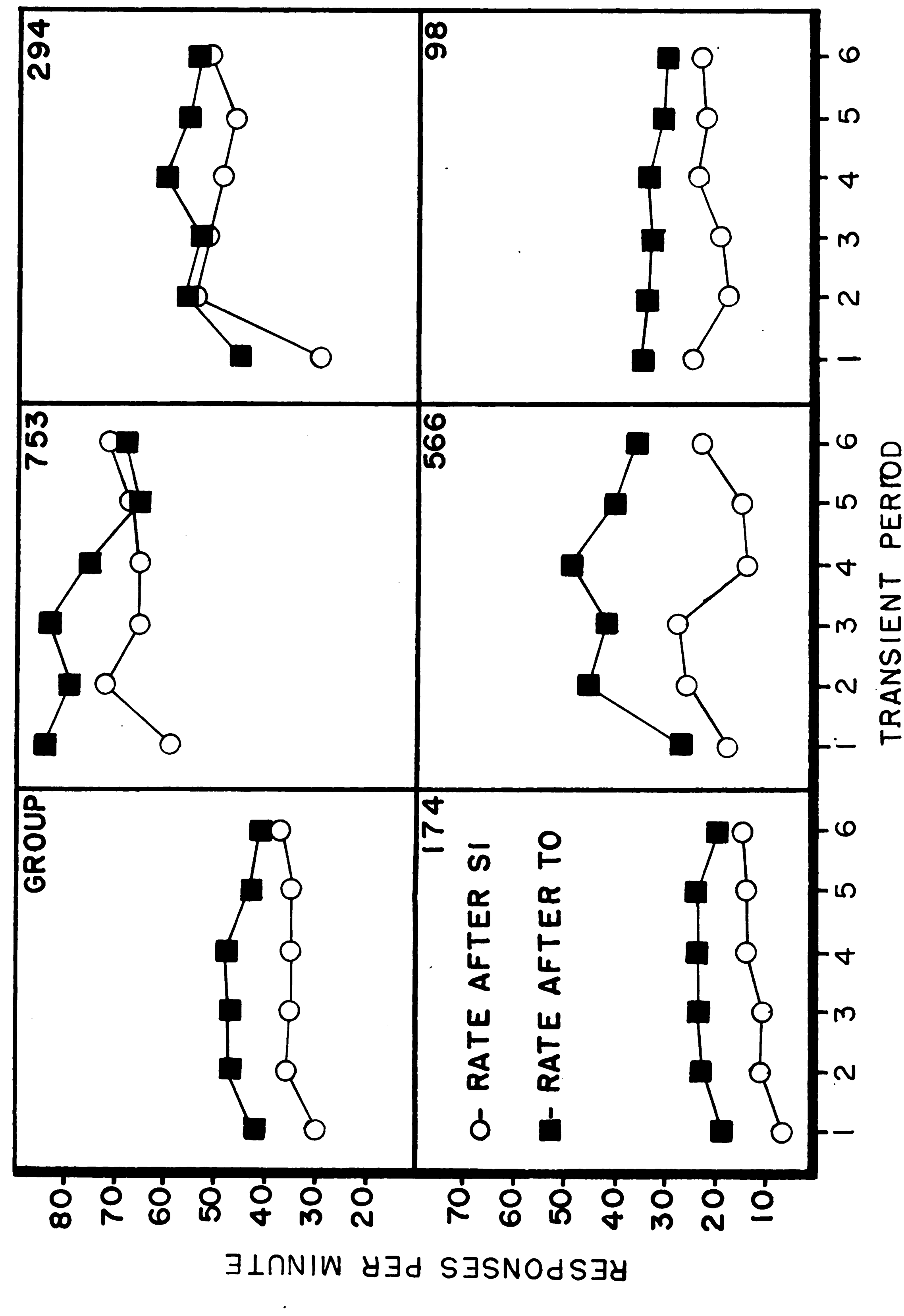
25
21
22
23
24
25
SESSION

Figure 6. Mean transients for all subjects during the first reversal session.


GROUP
753
294
174
566
98
○- RATE AFTER SI
■- RATE AFTER TO
RESPONSES PER MINUTE
80
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60
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40
30
20
70
60
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20
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TRANSIENT PERIOD
1
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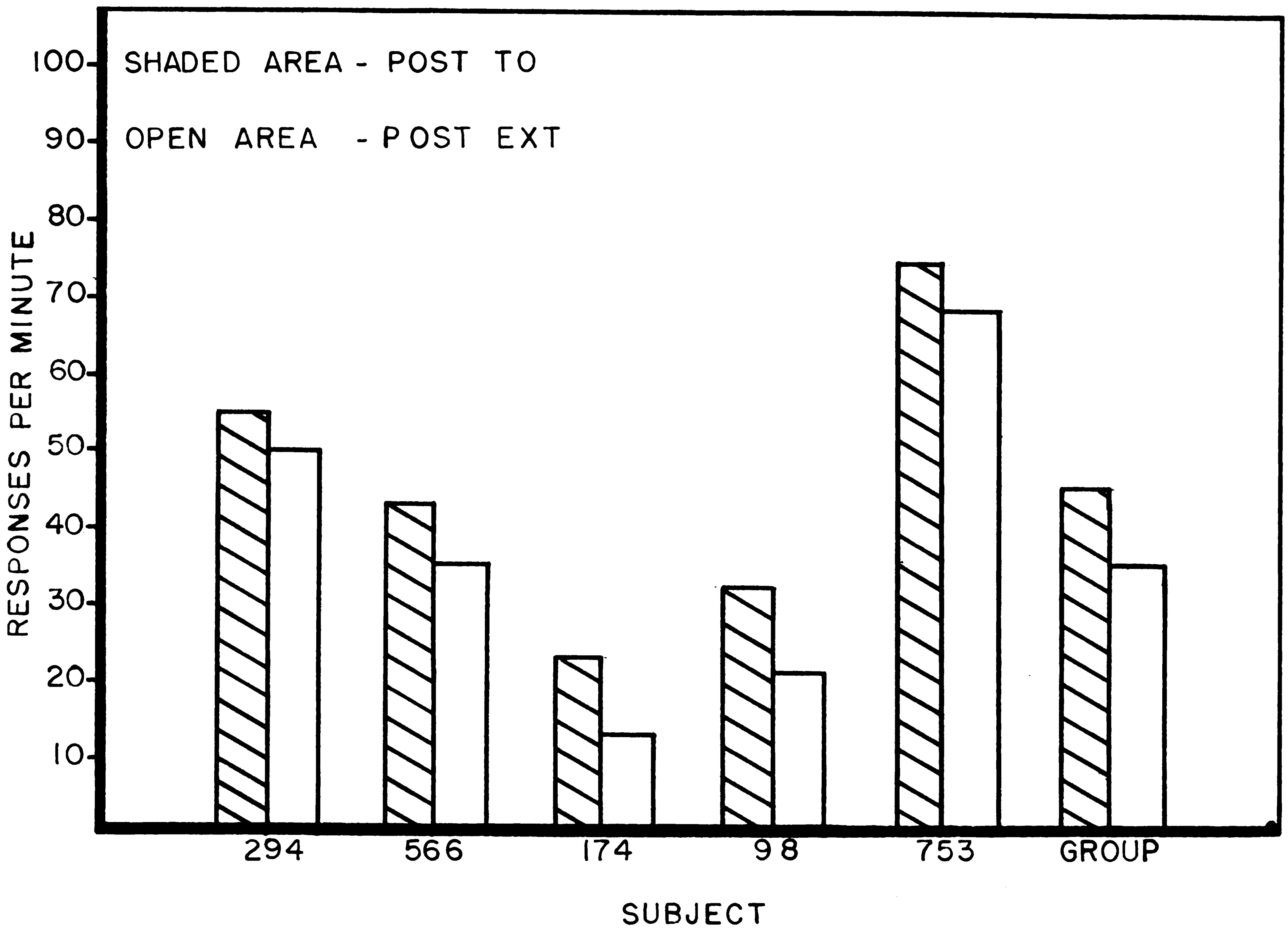
Figure 7. Mean rates of responding, post-timeout and post-extinction, during the first reversal session. The first 30 seconds following the offset of timeout and extinction was omitted. Shaded area is post- timeout and open area is post-extinction.


SHADED AREA - POST TO
OPEN AREA - POST EXT
RESPONSES PER MINUTE
100
90
80
70
60
50
40
30
20
10
294
566
174
98
753
GROUP
SUBJECT

DISCUSSION

The results of the discrimination sessions demonstrated that a timeout produced less behavioral contrast than extinction. Reynolds' theory predicts that, since relative reinforcement was the same following both timeout and extinction, the same degree of contrast would be expected as a result of either stimulus. This hypothesis fails to explain the transient contrast shown in Figures 2 and 3. The response rates during the 30 second period immediately following timeout were much lower than they were during the same period of time preceeded by extinction. However, the overall response rates shown in Figure 1 support Reynolds' interpretation. No difference was found in the amount of sustained contrast induced by extinction as opposed to that induced by timeout.

If one considers only the second through sixth 30 second periods of the S_1 component, or the overall average response rates(sustained contrast), the results do not support Terrace's(1966;1968) theory. As stated before, the amount of sustained contrast was approximately equivalent for the four birds which showed contrast, bird #174 showed no sustained contrast. The results shown in Figures 2 and 3 do support Terrace's theory that behavioral contrast is a result of unreinforced responding in the presence of another stimulus. A lower rate of response followed the timeout components, components during which almost no unreinforced responding ever occurred, but only for the first 30 seconds after the termination of the timeout.

An accurate analysis and interpretation of the effects of timeout and extinction on behavioral contrast would not have been possible without an analysis of transient contrast. The results of this study, as seen in Figure 2, showed that during discrimination training, response rates in reinforced componnents preceeded by extinction were highest during the first 30 seconds following the offset of extinction. This was the same result obtained by Nevin and Shettleworth(1966). In view of the fact that the differential response rates bore the same relationship to each other even after the correction for differential latencies to first peck, it is quite probable that the differential latencies as well as behavioral contrast were a manifestation of the properties of the preceeding stimulus.

The data support Nevin and Shettleworth's(1966) contention that there are two forms of behavioral contrast. In the present study, the transient contrast could be accounted for by the response reduction hypothesis. A considerable degree of transient contrast followed the stimulus correlated with extinction, whereas no transient contrast ever followed the timeout components, during either the discrimination or the reversal sessions. A completely different effect was found with regard to the sustained contrast. Both timeout and extinction seemed to result in an equivalent degree of sustained contrast, in accordance with results predicted by the relative reinforcement hypothesis.

Figure 4 shows that the equivalent amounts of sustained contrast were not a generalized effect of the presence of extinction in the experimental session. When the reinforcement contingencies were reversed, the contrast effect in components preceeded by remained, for four of the five birds, at about the same level as that prevailing during the pre-reversal sessions. But the response rate in the post-extinction component declined. Even the decline in the post-timeout rate for #566 was not as great as the decline in the post-extinction rate for the same bird. The experimental effects of extinction and timeout may, therefore, be assumed to have been seperable in this study.

Another application of this data may be possible. Terrace(1966) concluded that an S- may become an aversive stimulus as a result of unreinforced responding in the presence of that stimulus. In order to study the possible aversive properties of extinction, Rilling, Askew, Ahlskog and Kramer(1969) trained pigeons to respond on a mult VI VI schedule. A second key was presented which, if pecked, produced a 30 second timeout. In the present study, timeouts were presented as a part of the schedule contingencies. But Rilling, et al, permitted the birds to make a response resulting in a timeout. Rilling, et al, found that when they changed the schedule to mult VI ext, the birds made many more responses for timeouts during the extinction components than they did during the VI components. There may be a connection between the birds' preference for timeout over extinction in the study by Rilling, et al, and the results of the present study in which more transient contrast occurred following extinction than occurred following timeout.

Additionally, Rilling, et al, after 60 discrimination sessions, reversed the reinforcement contingencies associated with the key lights. They found that, after an initial suppression, timeout responses rose to the level obtaining prior to stimulus reversal. Again a parallel was found in the present study. During the early sessions after reversal, contrast resulting from extinction was less than that resulting from timeout. Although the results of this study did not demonstrate the aversiveness of extinction, they were predictable from the Terrace(1966;1968) hypothesis and from the data compiled by Rilling, et al(1969).

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APPENDIX

Source	SS	df	ms	F	p

Summary of analysis of variance for difference in post-extinction and post-timeout responding during the first 30 seconds of S_1, during discrimination sessions.

Total	5903.1	9			
Subjects	5635.6	4			
Treatments	260.1	1	260.1	142.13	< .001
Error	7.3	4	1.83		

Summary of analysis of variance for difference between post-timeout and post-extinction latencies to first peck.

Total	17.54	9			
Subjects	2.54	4			
Treatments	13.46	1	4.49	11.66	< .05
Error	1.548	4	.385		

Summary of analysis of variance for difference between post-timeout and post-extinction responding in the first reversal session.

Total	98023	9			
Subjects	90547	4			
Treatments	6200	1	6200	19	< .025
Error	1276	4	319		