# TRANSFER OF TRAINING AS A FUNCTION OF PRIOR AMOUNT OF DISCRIMINATION TRAINING

by 602

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**THIS BOOK CONTAINS NUMEROUS PAGES WITH DIAGRAMS THAT ARE CROOKED COMPARED TO THE REST OF THE INFORMATION ON THE PAGE.**

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In a recent study, Eck, Noel, and Thomas (1969) demonstrated positive transfer of training in successive operant discrimination training with independent discrimination tasks. Pigeons receiving discrimination training between different line orientations in Stage 1 of their experiment performed reliably better on a subsequent color discrimination in Stage 2 than did Ss receiving either nondifferential training with line orientation or single stimulus training with a single line orientation. Stage 1 conditions were then reinstated in Stage 3 and Ss proceeded to learn a brightness discrimination in Stage 4. Birds given discrimination training in Stage 3 again performed better on this task than Ss given nondifferential training.

Keilitz and Frieman (1970) provided further evidence of transfer of training in successive operant discrimination learning. In their experiment pigeons trained with and without "errors" on a color discrimination were compared in their performance on a subsequent line orientation discrimination with single stimulus trained Ss. Both the Error and Errorless groups learned the line orientation discrimination reliably faster than the Single Stimulus Group, but were not reliably different from each other. Therefore, since the Errorless Group experienced no extinction in the first discrimination and yet performed comparably to the Error Group on the line orientation discrimination, error reduction during prior discrimination training does not appear necessary for positive transfer to occur.

The critical question asked in the present study is how much training on a prior discrimination is necessary for positive transfer to occur. Will Ss receiving less than criterion training show any transfer, and if so, how much? Thus, the present experiment was performed to specify the function relating varying levels of training on an initial discrimination

and improved performance on a subsequent discrimination.

Three groups of pigeons received varying amounts of training on a color discrimination while a control group received no training on this task. In the Keilitz and Frieman study (1970) Ss reach a criterion of three successive days of 90 percent response to a positive color stimulus on the first discrimination by the sixth day. Therefore, experimental Ss in the present study received one day, three days, or six days of training. One Day Ss were expected to show very little first discrimination learning, Three Day Ss were expected to show up to criterion learning, and Six Day Ss were expected to meet the criterion set by Keilitz and Frieman.

The present study was designed to determine if performance improves incrementally on the second discrimination with increased level of training on the first discrimination, or whether a sharp break occurs between performance of two of the experimental groups and performance of the third. In other words, does transfer vary continuously with amount of prior training or is a minimum amount of training necessary before transfer will occur?

## METHOD

Subjects. Forty experimentally naive pigeons, 20 Homers and 20 Silver Kings, obtained from two local suppliers and maintained at 75 percent of their free-feeding weight throughout the experiment were used as Ss.

Apparatus. The apparatus consisted of two identical operant conditioning chambers with associated automatic programming equipment. Both chambers had internal dimensions of 32cm X 26cm X 34.5cm. Located on one wall of each chamber was a Grason Stadler response key 17.5cm from the floor. Directly below the key, 5.0cm from the floor, was an opening (5.2cm X 6.4cm) allowing access to a grain hopper. Stimuli were projected onto the response key by an Industrial Electronics display cell equipped with General Electric No. 44 miniature lamps. Chromatic stimuli of peak wavelengths of 555nm and 538nm were produced by Kodak Wratten Filters No. 99 and 74 in the display cells. The display cells also produced a white line .32cm wide X 2.22cm high in either a vertical position ($90^{\circ}$) or $60^{\circ}$ from horizontal which could be superimposed on the chromatic stimuli. Except for the grain hopper light during reinforcement, the response key provided the only source of light in the experimental chambers.

Procedure. Random assignment of Ss was made to each of four groups, differentiated by number of days on the first discrimination: a One Day, a Three Day, a Six Day, and a Single Stimulus (SS) Group, each including 10 Ss (five Silver Kings and five Homers).

Preliminary Training. On Day 1, all Ss received magazine and key-peck training followed by 30 reinforcements of 4-sec access to the grain hopper on a continuous schedule (CRF). The next day Ss received 30 more reinforcements on a continuous schedule. On Day 3 Ss received 30 more reinforcements on a FR 5 schedule, (every fifth response reinforced), and they received 30 reinforcements on an FR 20 schedule on Day 4. This procedure facilitated the subsequent transition to a VI 1-min schedule.

For the next eight days all birds were placed on a variable interval (VI 1-min) reinforcement schedule for 35 min each day. Each daily session consisted of 30 stimulus presentations of 1-min duration separated by 10 sec blackout periods during which the response key was darkened and no responses were reinforced. Throughout this training period the response key was illuminated with a light of 555nm for all groups.

PHASE 1. Following preliminary training, Ss in the One Day, Three Day, and Six Day groups were given discrimination training with 555nm as the positive stimulus (S+) and 538nm as the negative stimulus (S-). In the presence of S+, responses were reinforced on a VI 1-min schedule and in the presence of S- no responses were reinforced. Each session of discrimination training consisted of 30 stimulus periods of 1-min duration each separated by a 10 sec blackout. Positive and negative stimulus periods were presented such that no more than two S+ or S- periods appeared successively and that within each block of 10 stimulus presentations S+ and S- appeared five times each. Discrimination training continued for each S for one, three, or six daily sessions, according to group assignment. Subjects in the SS group were given no training on this discrimination.

PHASE 2. Subjects in the One Day, Three Day and Six Day groups began Phase 2 discrimination training the day after they had completed Phase 1 discrimination training. Subjects in the SS Group proceeded to the Phase 2 discrimination the day after completing preliminary training. All four groups were given identical discrimination training between two different line angles. The positive stimulus was a white vertical ($90^{\circ}$) line and the negative stimulus was a white line tilted $60^{\circ}$ counter-clockwise from horizontal. Both stimuli were superimposed on

the positive stimulus of the first discrimination (555nm). All Ss were given 12 daily training sessions on this discrimination, each consisting of three blocks of 10 stimulus presentations. Procedural details for Phase 2 were otherwise identical to those of Phase 1.

## RESULTS

PHASE 1. Of the 30 Ss undergoing first discrimination training, those 10 comprising the Six Day Group reached a level of 10 S+ responses for each S- response by the third daily session. This level of performance continued during the final three training sessions. Percentages of total response emitted in the presence of the positive stimulus during each day by the Homers and Silver Kings are presented in Figure 1. From this figure it can be seen that by the third training session, Ss generally reached a symptotic performance (90 percent response in the presence of the positive stimulus). It appears that the Six Day Ss of both strains performed better than other Ss and that Silver Kings generally performed better than Homers. These differences were not, however, statistically reliable.

PHASE 2. During this phase all Ss received discrimination training between $90^{o}$ (positive) and $60^{o}$(negative) line angles with 555nm color background present for 12 days. A 2 X 4 X 12 (Strains X Groups X Days) analysis of variance of percentage of total responses emitted in the presence of the positive stimulus is presented in Table 1. The analysis revealed statistically reliable strain, $F(1,32) = 5.380$, $p < .05$, Day X Strain interaction, $F(11,352) = 2.095$, $p < .05$, and Day X Group X Strain interaction, $F(33,352) = 1.875$, $p < .01$, effects but no statistically reliable group, $f(3,32) = .307$, and Group X Strain interaction, $F(3,32) = 1.494$, $p > .2$, effects.

Comparison of the percentage of total responses emitted in the presence of the positive stimulus during each day by the Homers (Figure 2) with that of the Silver Kings (Figure 3) suggests that any group effect may be masked by the uniformly superior performance of the Silver Kings across groups. Performance of all Kings generally compares to that of the Six Day Homers. Data presented in Figures 2 and 3 and the reliable Day X Group X Strain interaction effect suggest that while the Kings in all groups learned at the same rate, not all groups of Homers learned at the same rate. Statistically reliable

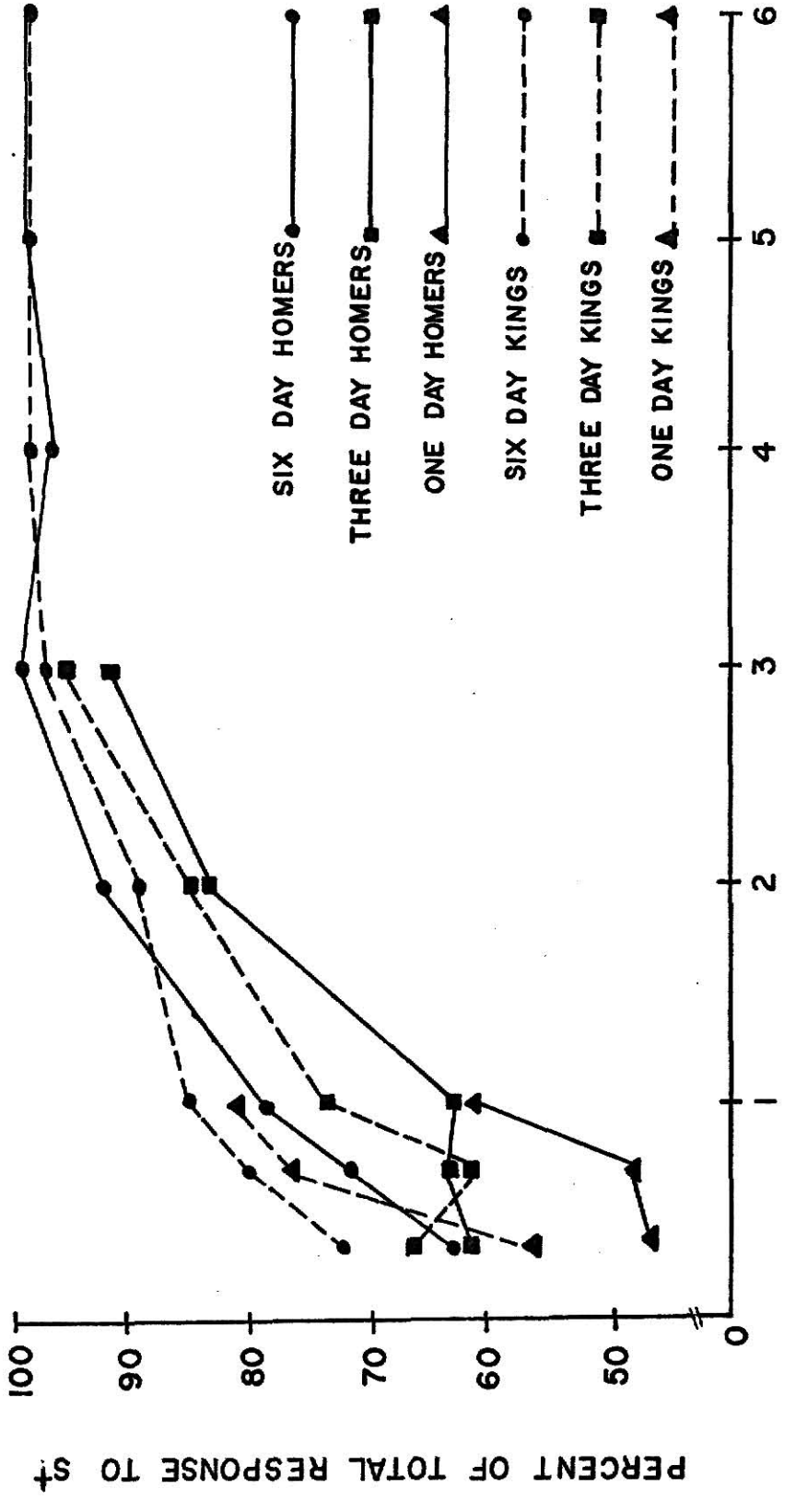


FIGURE 1 - AVERAGE PERCENTAGE OF TOTAL RESPONSES TO 555nm ($S^+$) DURING PHASE I FOR THREE DISCRIMINATION GROUPS.

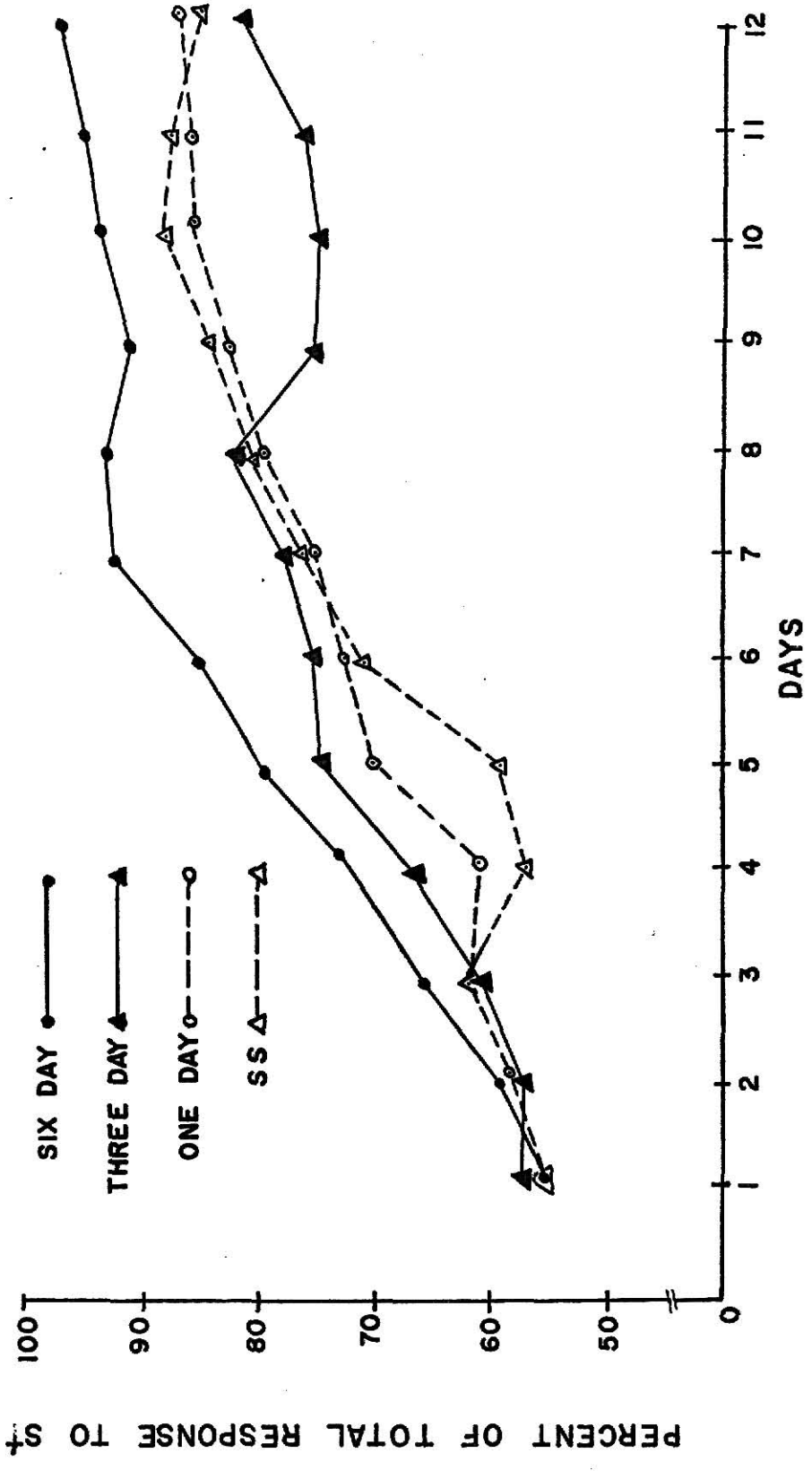


FIGURE-2- AVERAGE PERCENTAGE OF TOTAL RESPONSES TO 90° LINE (ST) DURING PHASE 2 FOR HOMERS.

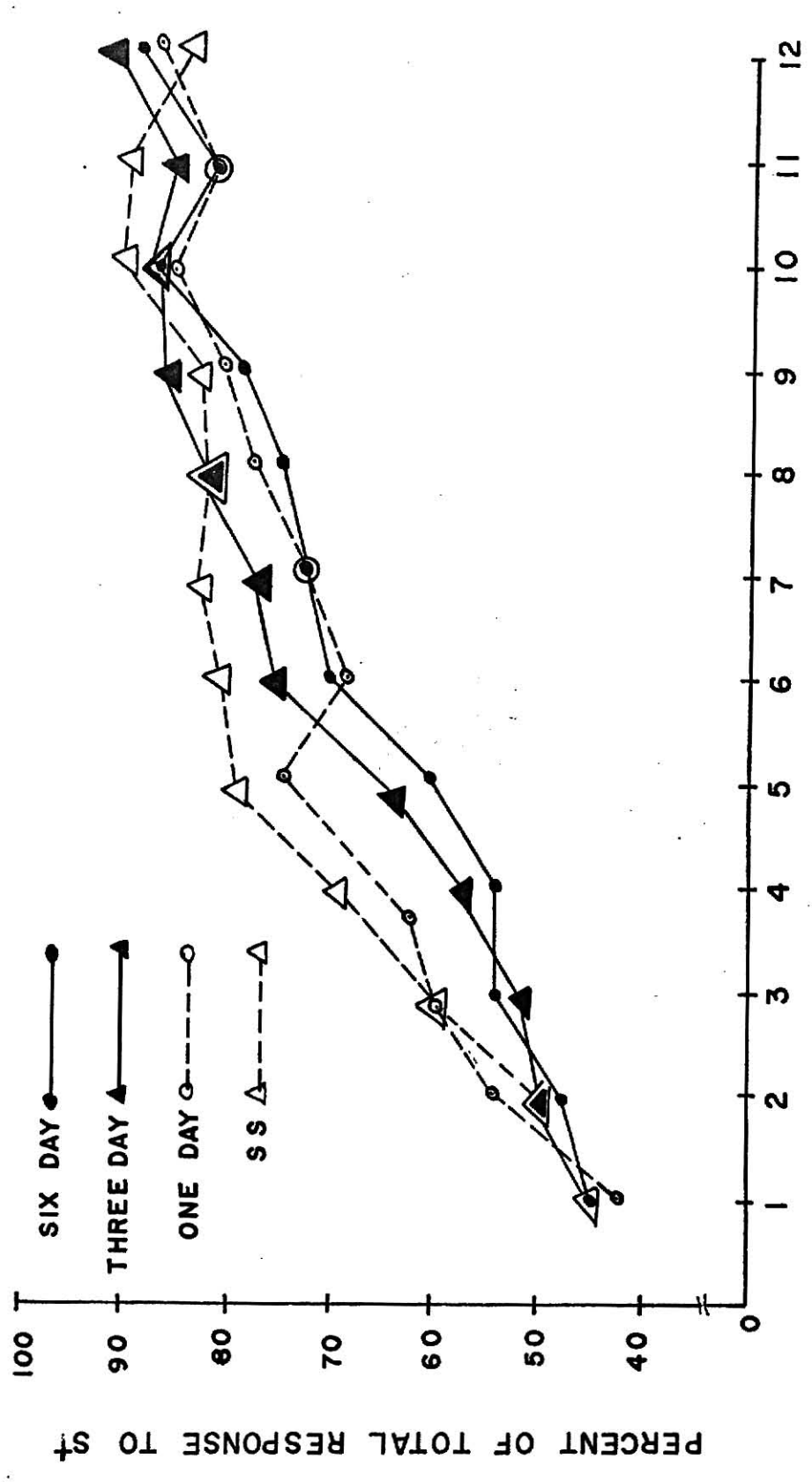


FIGURE 3- AVERAGE PERCENTAGE OF TOTAL RESPONSES TO 90° LINE (S†) DURING PHASE 2 FOR SILVER KINGS.

TABLE 1

Analysis of Variance of Percentage of Total Responses to the Positive Stimulus in Phase 2.

| Source of Variance | Degrees of Freedom | Mean Square | F |
|---|---|---|---|
| Between Subjects | 39 | | |
| Group | 3 | 330.333 | 0.307 |
| Strain | 1 | 5782.000 | 5.380* |
| Group X Strain | 3 | 1606.000 | 1.494 |
| Error | 32 | 1074.781 | |
| Within Subjects | 440 | | |
| Days | 11 | 6928.363 | 113.633*** |
| Day X Group | 33 | 48.697 | 0.799 |
| Day X Strain | 11 | 127.727 | 2.095* |
| Day X Group X Strain | 33 | 114.303 | 1.875** |
| Error | 352 | 60.972 | |
| Total | 479 | | |

*p < .05
**p < .01
***p < .001

strain and Day X Strain interaction effects indicate that averaged over groups, performance of the Kings improves more quickly than that of the Homers.

The critical portion of this experiment then rests on the learning of only 20 Homers spread over four groups. A 4 X 12 (Groups X Days) analysis of variance of percentage of total responses emitted by the Homers alone in the presence of the positive stimulus is presented in Table 2. While no statistically reliable group effect was found, $F(3,16) = 1,267$, $p > .31$, there was a reliable Day X Group interaction effect, $F(33,176) = 1.508$, $p < .05$, indicating that rates of discrimination learning did differ for the groups. In Figure 2, it appears that performance of the Six Day Group improves more quickly than that of the other groups. Possibly a greater number of Ss would have resulted in a statistically reliable group effect.

TABLE 2

Analysis of Variance of Percentage of Total Responses to the Positive Stimulus in Phase 2 for Homers Only

| Source of Variance | Degrees of Freedom | Mean Square | F |
|---|---|---|---|
| Between Subjects | 19 | | |
| Group | 3 | 1368.104 | 1.267 |
| Error | 16 | 1080.074 | |
| Within Subjects | 220 | | |
| Days | 11 | 2809.608 | 45.369** |
| Day X Group | 33 | 93.371 | 1.508* |
| Error | 176 | 61.928 | |
| Total | 239 | | |

* $p < .05$
** $p < .001$

## DISCUSSION

Second discrimination results need to be interpreted cautiously because Six Day Ss of both strains apparently performed better on the first discrimination than other Ss. While this difference is not statistically reliable, neither is the difference between the Six Day and the other Ss on the Second discrimination.

The most clearcut finding discovered in the experiment is the strain related difference in discrimination learning. Averaged over groups, performance of the Kings on the second discrimination improves more quickly than that of the Homers. It should be noted, however, that this strain related difference may be due not only to genetics but also to differences in geographic source of Ss and past history, the latter of which is, of course, unknown. The strain related difference is also present in first discrimination performance but is not statistically reliable.

Although the difference between the Six Day and the other groups of Homers was not statistically reliable, it appears that overtraining on the first discrimination maximizes positive transfer. The final three training sessions received by the Six Day Homers on the first discrimination comprise overtraining because nearly all Ss mastered this task by the third training session. That the Six Day Group of Homers apparently performed better than the Single Stimulus, One, and Three Day Groups, which performed comparably, suggests that some overtraining on the first discrimination may be necessary for positive transfer to occur.

The suggested effect of overtraining in the present experiment is consistent with results obtained by Komaki (1961) and Mandler (1968). Komaki studied the effect of overlearning on transfer in reversal and independent discrimination tasks, using a trials procedure with white rats. All Ss first learned

to discriminate between smooth and rough plates presented as the alley floors in a Y-maze. Reversal Ss then proceeded to learn a discrimination with the formerly negative stimulus as the positive stimulus and the formerly positive stimulus as the negative stimulus. Subjects in the nonreversal condition received training to discriminate between black and white cards hung over the entrances to the goal boxes. Komaki found that overtraining on the prior discrimination facilitated positive transfer in both paradigms and concluded that overlearning enabled the S to better learn that reinforcement occurs with response to one of the discriminanda. Similarly Mandler discovered that overtraining on a Y-maze black-white discrimination produces faster learning of a subsequent position discrimination than mastery training.

The most difficult finding to explain in the present study is the performance of the Three Day Ss. While these Ss achieved criterion on the first discrimination, they demonstrated no transfer on the second discrimination. Whatever facilitated transfer then apparently occurred only during overtraining. Any explanation of transfer learning must include some factor to account for such facilitation.

In a future study it would be instructive to include a group receiving more than three days of overtraining in order to assess further the effects of overtraining on transfer of training. Whether positive transfer increases directly with increased overtraining or whether there is an optimal amount of training remains to be determined.

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# APPENDIX A

## PERCENTAGE OF TOTAL RESPONSES TO POSITIVE STIMULUS FOR 0 DAY HOMERS

### PHASE 2 DISCRIMINATION

| DAY | SUBJ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1 | | 42.746 | 41.892 | 52.347 | 37.990 | 48.326 |
| 2 | | 49.471 | 53.297 | 46.042 | 40.530 | 52.028 |
| 3 | | 43.915 | 81.881 | 37.945 | 46.352 | 48.773 |
| 4 | | 53.859 | 45.753 | 46.644 | 43.337 | 48.764 |
| 5 | | 52.868 | 54.131 | 39.644 | 42.897 | 57.584 |
| 6 | | 59.194 | 90.655 | 45.460 | 52.603 | 56.308 |
| 7 | | 58.867 | 94.986 | 56.021 | 58.821 | 63.201 |
| 8 | | 68.805 | 94.647 | 55.174 | 68.825 | 73.718 |
| 9 | | 80.385 | 97.829 | 55.291 | 58.996 | 76.810 |
| 10 | | 87.272 | 96.069 | 61.817 | 61.623 | 83.413 |
| 11 | | 85.830 | 98.327 | 60.014 | 63.941 | 77.396 |
| 12 | | 82.849 | 97.696 | 49.166 | 67.462 | 82.111 |

PERCENTAGE OF TOTAL RESPONSES TO POSITIVE

STIMULUS FOR 1 DAY HOMERS

PHASE 1 DISCRIMINATION

| DAY | SUBJ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1 | | 70.202 | 61.481 | 62.560 | 59.115 | 66.655 |

PHASE 2 DISCRIMINATION

| DAY | SUBJ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1 | | 46.604 | 42.960 | 42.313 | 43.959 | 48.153 |
| 2 | | 55.597 | 43.035 | 50.471 | 43.759 | 46.174 |
| 3 | | 60.295 | 45.208 | 55.523 | 47.589 | 47.480 |
| 4 | | 50.361 | 42.151 | 57.834 | 49.935 | 51.741 |
| 5 | | 59.101 | 44.260 | 84.114 | 54.398 | 56.751 |
| 6 | | 54.693 | 50.249 | 88.607 | 52.308 | 66.239 |
| 7 | | 58.037 | 47.851 | 83.561 | 58.981 | 75.408 |
| 8 | | 67.725 | 47.898 | 85.669 | 68.511 | 79.696 |
| 9 | | 68.387 | 45.213 | 90.521 | 77.529 | 80.125 |
| 10 | | 77.358 | 46.850 | 87.984 | 79.262 | 85.911 |
| 11 | | 78.157 | 49.192 | 95.908 | 78.398 | 79.387 |
| 12 | | 84.231 | 56.153 | 96.298 | 66.825 | 82.050 |

PERCENTAGE OF TOTAL RESPONSES TO POSITIVE

STIMULUS FOR 3 DAY HOMERS

PHASE 1 DISCRIMINATION

| DAY | SUBJ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1 | | 97.496 | 60.197 | 53.823 | 61.212 | 82.731 |
| 2 | | 99.797 | 93.671 | 65.983 | 86.324 | 93.459 |
| 3 | | 99.860 | 98.997 | 75.745 | 98.064 | 98.709 |

PHASE 2 DISCRIMINATION

| DAY | SUBJ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1 | | 51.250 | 49.219 | 41.829 | 47.541 | 48.034 |
| 2 | | 41.035 | 45.797 | 44.548 | 51.235 | 51.196 |
| 3 | | 39.879 | 46.867 | 49.973 | 75.414 | 43.612 |
| 4 | | 42.309 | 52.241 | 50.771 | 70.136 | 66.619 |
| 5 | | 45.612 | 58.173 | 51.120 | 85.873 | 80.556 |
| 6 | | 49.531 | 59.233 | 52.809 | 94.006 | 70.080 |
| 7 | | 52.786 | 61.425 | 56.630 | 91.279 | 75.767 |
| 8 | | 57.590 | 70.965 | 55.480 | 93.060 | 86.475 |
| 9 | | 63.787 | 67.200 | 53.467 | 81.377 | 58.005 |
| 10 | | 64.512 | 73.613 | 52.217 | 65.502 | 65.918 |
| 11 | | 70.192 | 67.947 | 51.578 | 83.416 | 57.859 |
| 12 | | 65.239 | 80.501 | 57.387 | 81.905 | 72.469 |

PERCENTAGE OF TOTAL RESPONSES TO POSITIVE

STIMULUS FOR 6 DAY HOMERS

PHASE 1 DISCRIMINATION

| DAY | SUBJ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1 | | 56.280 | 91.158 | 79.817 | 69.563 | 96.368 |
| 2 | | 89.393 | 100.000 | 98.000 | 82.572 | 99.431 |
| 3 | | 98.065 | 100.000 | 99.830 | 99.455 | 99.619 |
| 4 | | 99.876 | 99.931 | 99.469 | 98.375 | 90.360 |
| 5 | | 99.881 | 97.429 | 99.379 | 99.533 | 97.683 |
| 6 | | 99.968 | 99.879 | 96.366 | 100.000 | 99.025 |

PHASE 2 DISCRIMINATION

| DAY | SUBJ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1 | | 38.481 | 41.813 | 42.668 | 45.383 | 55.974 |
| 2 | | 56.241 | 48.126 | 47.913 | 44.688 | 47.351 |
| 3 | | 47.962 | 56.419 | 56.458 | 57.905 | 61.471 |
| 4 | | 60.204 | 61.722 | 63.063 | 60.622 | 64.772 |
| 5 | | 66.553 | 78.764 | 70.328 | 69.338 | 63.469 |
| 6 | | 74.137 | 88.736 | 70.618 | 77.373 | 64.150 |
| 7 | | 76.574 | 95.365 | 78.530 | 84.146 | 76.636 |
| 8 | | 74.092 | 91.883 | 86.911 | 81.276 | 80.892 |
| 9 | | 76.077 | 79.974 | 88.867 | 75.437 | 85.155 |
| 10 | | 77.319 | 91.149 | 82.230 | 77.672 | 88.617 |
| 11 | | 67.773 | 98.727 | 77.608 | 92.091 | 89.056 |
| 12 | | 78.153 | 98.487 | 75.065 | 93.153 | 93.526 |

APPENDIX B

PERCENTAGE OF TOTAL RESPONSES TO POSITIVE STIMULUS FOR 0 DAY SILVER KINGS

PHASE 2 DISCRIMINATION

| DAY | SUBJ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1 | | 46.419 | 45.597 | 40.786 | 35.345 | 52.436 |
| 2 | | 47.246 | 50.623 | 51.737 | 55.990 | 51.846 |
| 3 | | 48.904 | 75.320 | 51.630 | 69.030 | 55.896 |
| 4 | | 53.961 | 89.025 | 57.445 | 92.126 | 65.820 |
| 5 | | 59.511 | 92.944 | 72.269 | 99.076 | 78.234 |
| 6 | | 55.453 | 90.041 | 88.005 | 98.289 | 79.182 |
| 7 | | 54.816 | 88.682 | 91.786 | 99.662 | 80.753 |
| 8 | | 58.588 | 81.360 | 93.577 | 89.230 | 89.014 |
| 9 | | 63.728 | 89.412 | 94.602 | 97.992 | 68.088 |
| 10 | | 59.694 | 95.264 | 94.707 | 98.403 | 97.275 |
| 11 | | 65.690 | 98.103 | 90.911 | 99.660 | 94.968 |
| 12 | | 60.448 | 98.896 | 86.420 | 99.746 | 92.712 |

PERCENTAGE OF TOTAL RESPONSES TO POSITIVE STIMULUS FOR 1 DAY SILVER KINGS

PHASE 1 DISCRIMINATION

| DAY | SUBJ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1 | | 85.874 | 66.910 | 64.293 | 86.605 | 93.010 |

PHASE 2 DISCRIMINATION

| DAY | SUBJ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1 | | 42.188 | 40.692 | 43.170 | 45.028 | 43.847 |
| 2 | | 71.028 | 48.658 | 44.843 | 53.494 | 52.539 |
| 3 | | 78.741 | 55.763 | 50.263 | 49.188 | 66.817 |
| 4 | | 86.845 | 73.997 | 50.131 | 51.625 | 74.108 |
| 5 | | 94.407 | 75.665 | 60.220 | 59.152 | 85.052 |
| 6 | | 74.367 | 67.478 | 56.659 | 49.506 | 95.348 |
| 7 | | 88.683 | 71.137 | 58.110 | 54.048 | 86.736 |
| 8 | | 92.834 | 75.686 | 67.816 | 55.074 | 97.169 |
| 9 | | 91.635 | 87.795 | 76.765 | 58.115 | 88.079 |
| 10 | | 93.288 | 79.585 | 76.941 | 76.628 | 91.184 |
| 11 | | 94.782 | 72.861 | 74.172 | 71.192 | 95.320 |
| 12 | | 94.673 | 80.202 | 80.100 | 84.863 | 98.509 |

PERCENTAGE OF TOTAL RESPONSES TO POSITIVE

STIMULUS FOR 3 DAY SILVER KINGS

PHASE 1 DISCRIMINATION

| DAY | SUBJ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1 | | 58.004 | 95.141 | 68.779 | 77.101 | 81.081 |
| 2 | | 81.295 | 98.465 | 89.517 | 93.743 | 83.820 |
| 3 | | 96.733 | 100.000 | 97.910 | 97.382 | 92.888 |

PHASE 2 DISCRIMINATION

| DAY | SUBJ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1 | | 41.461 | 41.097 | 47.012 | 45.454 | 46.560 |
| 2 | | 42.957 | 50.786 | 53.802 | 50.345 | 50.951 |
| 3 | | 42.826 | 62.072 | 54.361 | 52.655 | 54.092 |
| 4 | | 49.941 | 49.448 | 77.059 | 56.218 | 62.492 |
| 5 | | 44.821 | 75.870 | 74.274 | 78.292 | 64.510 |
| 6 | | 53.256 | 91.949 | 84.682 | 83.656 | 71.197 |
| 7 | | 55.115 | 80.699 | 89.934 | 84.804 | 79.499 |
| 8 | | 65.529 | 89.448 | 88.487 | 85.681 | 81.051 |
| 9 | | 71.903 | 84.222 | 91.162 | 83.488 | 89.311 |
| 10 | | 78.997 | 90.228 | 92.431 | 80.191 | 84.439 |
| 11 | | 73.481 | 95.974 | 79.930 | 88.293 | 88.890 |
| 12 | | 82.829 | 97.692 | 88.498 | 91.306 | 93.524 |

PERCENTAGE OF TOTAL RESPONSES TO POSITIVE

STIMULUS FOR 6 DAY SILVER KINGS

PHASE 1 DISCRIMINATION

| DAY | SUBJ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1 | | 84.201 | 68.954 | 97.925 | 78.844 | 96.730 |
| 2 | | 89.612 | 81.488 | 99.951 | 92.104 | 99.691 |
| 3 | | 94.530 | 95.511 | 99.730 | 99.195 | 98.036 |
| 4 | | 96.716 | 99.238 | 99.752 | 98.158 | 99.480 |
| 5 | | 95.606 | 99.618 | 99.882 | 99.322 | 99.711 |
| 6 | | 97.130 | 99.951 | 99.463 | 97.585 | 99.411 |

PHASE 2 DISCRIMINATION

| DAY | SUBJ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1 | | 46.403 | 49.479 | 36.907 | 44.629 | 40.694 |
| 2 | | 46.051 | 57.841 | 46.144 | 51.448 | 43.775 |
| 3 | | 45.358 | 47.976 | 63.433 | 71.159 | 42.891 |
| 4 | | 50.334 | 48.197 | 51.717 | 72.085 | 48.884 |
| 5 | | 52.731 | 50.118 | 71.809 | 78.396 | 48.011 |
| 6 | | 62.051 | 62.410 | 92.954 | 81.057 | 57.886 |
| 7 | | 72.167 | 67.614 | 81.965 | 84.042 | 53.390 |
| 8 | | 76.867 | 63.335 | 84.693 | 87.259 | 59.264 |
| 9 | | 90.119 | 69.946 | 91.147 | 79.058 | 66.289 |
| 10 | | 90.521 | 75.175 | 85.093 | 83.274 | 89.109 |
| 11 | | 92.370 | 82.528 | 77.648 | 83.237 | 75.589 |
| 12 | | 92.894 | 88.461 | 93.018 | 83.854 | 87.196 |

# TRANSFER OF TRAINING AS A FUNCTION OF PRIOR AMOUNT OF DISCRIMINATION TRAINING

by

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ABSTRACT

An experiment was performed to specify the function relating varying amounts of training on one discrimination to performance on a subsequent discrimination. The question asked was whether transfer would vary continuously with amount of prior training or whether a minimum amount of training was necessary before transfer would occur.

Random assignment of Ss was made to each of four groups, differentiated by number of days on the first discrimination: a One Day, a Three Day, a Six Day, or a Single Stimulus (SS) Group, each including 10 Ss (five Silver King and five Homing pigeons). During Phase 1, Ss in the One Day, Three Day, and Six Day groups were given discrimination training with 555nm as the positive stimulus and 538nm as the negative stimulus. Subjects in the SS Group were given preliminary training with 555nm only. Subjects in the One Day, Three Day, and Six Day groups began Phase 2 discrimination training the day after they had completed Phase 1 discrimination training. Subjects in the SS Group proceeded to the Phase 2 discrimination the day after completing preliminary training. All four groups were given identical discrimination training for 12 days between a white vertical ($90^{o}$) line (S+) and a white line tilted $60^{o}$ counterclockwise from horizontal (S-). Both stimuli were superimposed on the positive stimulus of the first discrimination (555nm).

The Phase 1 discrimination was mastered by nearly all Ss by the third training session. Six Day Ss were somewhat overtrained because their performance continued at criterion during the final three training sessions.

Averaged over groups the Kings were found to acquire the second discrimination reliably faster than the Homers. Furthermore, while there were no differences in Phase 2 for four

groups of Silver Kings, there appeared to be differences among the groups of Homers. Performance of the Six Day Homers was apparently (but not reliably) better on the second discrimination than the SS, One, and Three Day groups, which performed comparably.

Since the Six Day Homers received additional training on the initial task after achieving criterion it appears that overtraining may be necessary for positive transfer to occur. Greater overtraining would perhaps have further increased positive transfer.