The effect of two training sets on transposition in adults

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Abstract

Transposition in the intermediate size problem as a function of training on two sets with the same relationally defined element reinforced was explored with 96 adults. The data indicated that the relationship between the dual training sets was critical in determining whether or not relational transfer occurred in test.

Problem

While young children transpose with test sets one step removed from the training set and show first absolute and then random response as the test increases in distance from the training set (Zeiler, 1963) and somewhat older children display relational transfer at all distances (Kuenne, 1946), a recent study with adults (Zeiler, 1964) revealed quite different effects. In a five stimulus intermediate size problem, adults showed significant absolute transfer when the training and test sets differed by one step and transposed only when the training and test sets were such that the previously positive training stimulus was not contained in the test set. Because of this discontinuity, other aspects of transposition studies need to be explored to determine developmental differences or similarities. Several investigators (Gonzalez & Ross, 1958; Johnson & Zara, 1960) reported that children always showed relational transfer following training on two sets in which the same relationally defined stimulus was reinforced. The effect of such training situations on adults was investigated in the current study.

Method

Ninety-six female undergraduates were assigned randomly to six groups of 16 Ss each and were trained to respond to the intermediate-sized member of either one or two sets of three stimuli. The three stimuli used on each training or test trial were selected from nine unpainted 1/4 in Masonite squares designated in order of size with numbers 1-9. Block 1 had a surface area of 2.86 sq in and each successive square in the series increased in area by a factor of 1.4.

All Ss were informed that they would be presented with three blocks and were to find the goal object, a red plastic chip. The spatial position of the three blocks on each trial was predetermined randomly. On each training trial, S was permitted a single response.

Groups 1 and 2 were trained on a single set: Group 1 received stimuli 1-3-5 and Group 2 was trained with 2-4-6. The training criterion was six successive correct responses. Groups 3 and 4 (concurrent groups) received two training sets presented in random sequence with the limitation that each set appear three times in

any given block of six trials. Criterion was six successive correct responses. Group 3 received sets 1-3-5 and 3-5-7, while Group 4 was given sets 2-4-6 and 3-5-7. Groups 5 and 6 (successive groups) were given the second training set after they reached the criterion of six successive correct responses on the first set. Training on the second set was to the same criterion. Group 5 received sets 1-3-5 and 3-5-7, while Group 6 received sets 2-4-6 and 3-5-7. After attainment of criterion in training, all six groups were given a single test trial with a set composed of stimuli 5-7-9.

Results and Discussion

There was no significant difference in the number of trials to criterion in training for the six groups whether the F test was based on the first training set for Groups 5 and 6 or whether it was based on the total training trials for those groups. Mean total trials to criterion for all groups is given in Table 1; the mean trials to criterion on the second training set for Groups 5 and 6 were 6.8 and 6.3 respectively.

The frequency of response to each stimulus in test is indicated in Table 1. Response was approximately equal to the small and intermediate stimuli in all groups except Groups 3 and 5 where there was significant preference for the intermediate over the small stimulus: in Group 3, $\chi^2(1) = 12.2$, $p < .001$; in Group 5, $\chi^2(1) = 9.0$, $p < .01$. The nature of the first training set within either the successive or concurrent groups made a considerable difference in response in test: response in Group 3 was significantly different from that in Group 4 [$\chi^2(1) = 6.0$, $p < .02$] and response in Group 5 was significantly different from that in Group 6 [$\chi^2(1) = 6.8$, $p < .01$]. Since all of these groups received the same second training set (3-5-7), that set alone could not have been responsible for the difference in test response. Groups 1 and 2 indicated that neither set 1-3-5 nor

Table 1
Training and Test Results

Group	Training sets	Trials to training criterion		Frequency of response in test		
		Mean	S.D.	Test stimulus		
				5	7	9
1	1-3-5	19.4	11.4	8	7	1
2	2-4-6	19.2	13.6	7	9	0
3	1-3-5, 3-5-7	16.9	10.7	1	15	0
4	2-4-6, 3-5-7	17.2	10.0	7	9	0
5	1-3-5, 3-5-7	20.2	7.3	2	14	0
6	2-4-6, 3-5-7	20.8	9.0	9	7	0

2-4-6 was responsible for the difference in the multiple set groups since those sets produced virtually identical response in test. Therefore, the differences must have been a function of the nature of both training sets. That is, a combination of 1-3-5 and 3-5-7 produced significantly more transposition in test than did the combination of 2-4-6 and 3-5-7.

These results showed that adults both did and did not manifest the same pattern of response after two training sets as did children. Further consideration of the data provided an explanation for the different test response when the first set was either 1-3-5 or 2-4-6. Evaluation of the first training trial with the second training set in Groups 5 and 6 indicated the nature of response were either 1-3-5 or 2-4-6 used as a training set and 3-5-7 used as the test set. These data showed that after training with 1-3-5 (Group 5), there was significant preference for stimulus 3 (the absolute stimulus) over stimulus 5 [$\chi^2 (1) = 4.0, p < .05$]. However, after training with 2-4-6 (Group 6), there was significant preference for stimulus 5 (transposition) over stimulus 3 [$\chi^2 (1) = 11.2, p < .001$]. When the training sets were such that the first produced transposition in the second (Groups 4 and 6), the response in the final test (5-7-9) was not relationally determined

but was identical to that occurring when either 1-3-5 or 2-4-6 was used as a single training set (Groups 1 and 2). However, when the training sets were such that the first did not produce transposition in the second (Groups 3 and 5), response in the final test (5-7-9) was on the basis of identical training-test relationships. Research is currently in progress to determine if this same between-training set relationship is also necessary for the establishment of relational transfer in young children.

References

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