The role of dimension preference in reversal and nonreversal shifts of retardates¹

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The present study replicated the finding of Kendler & Kendler (1959) that the rapid acquisition of a preshift discrimination problem was associated with the rapid acquisition of a reversal of the original problem, but with slow acquisition of a nonreversal shift. The fact that rapid preshift acquisition in the present study was associated with the Ss' dimension preferences leaves open to question the Kendlers' interpretation that this interaction reflects the development of mediation processes.

Kendler & Kendler (1959), finding that kindergartners' performance was approximately the same on a reversal as on a nonreversal shift, reasoned that five-year-olds might be at a transitional stage with regard to the development of mediation processes, half having developed the ability to verbally label classes of stimuli and thereby facilitate discrimination performance, and half not having developed this ability. To support this reasoning they split their Ss on the basis of their pre-shift performance, positing that the fast pre-shift learners (those above the median performance on the pre-shift problem) would be the mediators (finding reversal easier than nonreversal) and the slow would be the non-mediators (finding nonreversal easier). As expected, they found a large Speed-of-Original-Training by Shift-Type interaction.

However, it is possible that these findings resulted, not from differences in mediation abilities, but from a confounded variable, Ss' dimension preferences. Perhaps fast pre-shift learners were those who had been assigned initially to their preferred dimensions. These Ss would perform better on a reversal (again involving their preferred dimension) than on a nonreversal (involving their nonpreferred dimension). The same reasoning leads to a prediction of better performance on nonreversal than reversal for slow pre-shift learners.

Method

Subjects. The Ss were 32 experimentally sophisticated mentally retarded residents of Clover Bottom Hospital and School, whose ages ranged from 12 to 40 and whose Stanford-Binet IQs ranged from 35 to 67. From an initial sample of 52 Ss, 12 were eliminated at random, two were dropped for failure to learn during Stage 1, three for inconsistent dimension preferences in Stage 2, and three for experimental error.

Apparatus. A two-choice discrimination apparatus was fitted with a pair of Industrial Electronics readouts (No. 8014R1495) to project stimuli onto 3 in. x 4 in. panels whose inner edges were positioned 6 in. apart at eye level. The cues were white vs. black backgrounds (light vs. no-light) and three vs. four white dots (dis-

criminable on the white ground). When the S pressed either panel, microswitches closed, terminating the stimulus presentation and producing either a door-chime (reward) or a loud buzzer (nonreward). The sequencing of stimuli and rewards was programmed electronically.

Procedure. Table 1 shows the four stages involved for each of the four basic experimental manipulations. Several days prior to their treatment sessions all 52 Ss from a previous experiment were tested for dimension preference. S was seated before the response unit in a dimly lit experimental chamber and instructed to press the light that rang the "ding-dong" and not the one that rang the buzzer. Session 1 involved a two-stage simultaneous two-choice discrimination problem for which five trials of Stage 2 were choice trials. Choices on these trials indicated whether "white" or "three" of the rewarded compound, "white-three," had dominated his Stage-1 learning. Either response was rewarded on choice trials.

Sixteen Ss who preferred "white" and 16 who preferred "three" in the dimension preference session were randomly selected and assigned to one of the eight treatment combinations with the restriction that there be four in each group. Original or pre-shift training

Table 1. Experimental Design

		Stimulus Reward Contingencies							
Dimension	Stage	+	-	+	-	+	-	+	-
	1	W3	B4	W3	B4	W3	B4	W3	B4
Preference	Stage	+	-	+	-	+	-	+	-
Session	2	W4	B3	W4	B3	W4	B3	W4	B3
Stage 4 Shift Condition		Reversal				Nonreversal			
Stage 4 Relevant Dimension		Bright-ness		Numer-osity		Numer-osity		Bright-ness	
Treatment	Stage	+	-	+	-	+	-	+	-
	3	W3	B4	3W	4B	W3	B4	3W	4B
Original Training	Stage	+	-	+	-	+	-	+	-
	4	W4	B3	3B	4W	W4	B3	3B	4W
Session	Stage	+	-	+	-	+	-	+	-
	4	B4	W4	4B	3B	4B	3B	B4	W4
Shift Training	Stage	+	-	+	-	+	-	+	-
	4	B3	W3	4W	3W	4W	3W	B3	W3

Note: W = White background; B = Black background; 3 = 3 dots; 4 = 4 dots. This design was replicated eight times, four with subjects who preferred "W" in Stage 2 of Session 1, and four with those who preferred "3".

Fig. 1. Percent correct on Trial 1 and subsequent four-trial blocks for Original Training (Stage 3) and Shift Training (Stage 4).

(Stage 3) for all groups consisted of a discrimination problem in which one of the rewarded (+) cues of the preference session was rewarded (+) and the other cue from the same dimension nonrewarded (-). Irrelevant cues were varied within trials, so that S could systematically select any one of the four cues. Immediately following original training each S, regardless of performance, was given the shift problem to which he had been assigned. For reversal S was required to approach the cue that had been nonrewarded in Stage 3 and avoid the other cue. For nonreversal S was required to approach one of his previously irrelevant cues and avoid the other. In all cases S was required in Stage 4 to select a cue that had never previously been consistently associated with reward. For both reversal and nonreversal, irrelevant cues varied between rather than within trials so that there was no opportunity to develop or sustain cue selection habits to the Stage-4 irrelevant cues. Training on both the original and shift problems was continued to a criterion of nine correct responses on any 10 consecutive trials, or to 100 trials.

Cues were varied from trial to trial in a predetermined counterbalanced sequence. The intertrial interval was a constant 3-1/2 sec. A noncorrection procedure was used throughout. This design and procedure were essentially the same as those used by the Kendlers.

Results and Discussion

The data for Stage 3 (Original Training) and Stage 4 (Shift Training) appear in Fig. 1. Separate 2 by 2 by 2 analyses were performed on each stage, with factors of Original Dimension Assignment (preferred vs. nonpreferred relevant), Shift Type (reversal vs. nonreversal), and Dimensions (brightness vs. numerosity). The data were transformed trials to the last error ($x' = \sqrt{x + .5}$). In original training the only significant effect was asso-

ciated with Dimension Assignment ($F = 14.73$, $df = 1/24$, $p < .001$). Only two of the above-median Ss were those assigned to their nonpreferred dimensions. In Stage 4 there was a significant Dimension Assignment by Shift Type interaction ($F = 4.84$, $df = 1/24$, $p < .05$). This interaction is the same as the Speed of Original Training by Shift Type interaction reported by the Kendlers, since Speed of Original Training and Original Dimension Assignment were essentially the same in the present study. In the same analysis the Shift effect approached significance ($F = 3.95$, $df = 1/24$, $.1 > p > .05$), suggesting that these retardates found reversal easier than nonreversal. The analysis of raw errors led to exactly the same conclusion, as did the analysis from which Stage-3 nonlearners were excluded. No other effect in any Stage-4 analysis reached significance at the .1 level. The mean transformed trials to the shift criterion in Stage 4 were, for those assigned to reversal, 1.63 and 3.76 for those originally assigned to preferred and nonpreferred respectively; and for those assigned to nonreversal, 4.88 and 3.58 respectively. The corresponding raw trials to criterion were 2.51, 19.75, 32.38, and 10.50 respectively. These compare with 6.0, 24.4, 15.5, and 9.0 for the Kendlers.

One point that bears special mention regards the appropriateness of using the same cues for dimension preference and treatments. It is clear that the Stage-3 data could reflect cue preference, not dimension preference. However, such ambiguity does not hold for the Stage-4 data, since all conditions involved a shift to a problem whose rewarded cue (black or four) had never been consistently associated with reward prior to the shift. Thus the Stage-4 results imply that a given S was predisposed to respond to one or another class of stimuli: the problem solution was easier if this class was relevant but more difficult if it was not.

In conclusion, the results of the present study are an impressive replication of the Kendlers' despite the difference in S populations and apparatus. Both studies failed to find a Reversal-Nonreversal main effect and both found a Speed-of-Original-Training by Reversal-Nonreversal interaction. Our interaction was attributed to the Ss' dimension preferences, leaving open to question the conclusion of the Kendlers that their interaction was attributable to the sudden development of mediation processes in kindergartners.

References

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