

Journal of Experimental Psychology
1968, Vol. 76, No. 2, 323-324

REVERSAL AND NONREVERSAL SHIFTS AMONG LIBERIAN TRIBAL PEOPLE¹

MICHAEL COLE

University of California, Irvine

JOHN GAY

Cuttington College, Liberia

AND JOSEPH GLICK

Yale University

A 2-category reversal shift problem used previously with American college students was conducted using 3 groups of Ss from a West African tribal group. The results replicate the earlier finding of superiority of the reversal over a nonreversal shift for all 3 tribal groups.

Kendler and Mayzner (1956) studied the relative rates of learning reversal and nonreversal shifts among American college students. They found that a reversal shift was learned far more quickly than a nonreversal shift when a two-category problem was used.

In the present experiment the Kendler-Mayzner two-category problem was studied using groups of Liberian tribal people. The groups of Liberian Ss differed in age and degree of "Westernization."

Method.—The Ss were 79 members of the Kpelle Tribe of North-Central Liberia. Seven Ss were discarded owing to *E* error or failure to learn the initial task. Of the remaining 72 Ss, 24 were classified as illiterate adults (spoke little or no English, little Western contact, average estimated age, 31.3 yr., Range 17-55 yr.), 24 were classified as illiterate children (same criteria as adults but average estimated age, 11.0 yr., Range 9-15 yr.) and 24 were classified as school children (these Ss attended local government sponsored schools, spoke the local English dialect and could read some English; average estimated age, 11.4 yr., Range 8-16 yr.). The ages had to be estimated because almost no Kpelle knows his exact age.

Copies of the concept cards developed by Kendler and Mayzner (1956) were used (see Kendler & Mayzner, 1956, p. 245 for a diagram of the stimulus and response cards). Following the Kendler and Mayzner two-category problem, the authors used the

concepts Horizontal-Vertical (HV) and Straight-Oblique (SO). The HV concept required response cards with "circle hands" at either the 12 or 6 o'clock positions to be sorted under the stimulus card with the vertical arrow and the circles with "hands" at either the 3 or 9 o'clock position to be sorted under the stimulus card with the horizontal arrow. In a like manner, the SO concept required *S* to match the obliquely lined boxes on the response cards with the stimulus card containing an oblique lower line and the response cards with horizontal or vertically striped boxes under the stimulus card with the horizontal lower line.

Half of the Ss in each subgroup initially learned the HV concept and half the SO concept. Then half of each of these subgroups learned HV or SO in a second discrimination. For those continuing with the initial training dimension, the assignment of correct alternatives was reversed (e.g., if the initial problem was to match horizontal with horizontal and vertical with vertical, the new problem was to match horizontal with vertical and vertical with horizontal). This is termed a reversal shift (RS) by Kendler and Mayzner. For the other half of the Ss, the stimulus dimension relevant in training becomes irrelevant during the second discrimination; thus, if HV is the basis for solution in initial training, SO becomes the basis of solution. This is termed a nonreversal shift (NRS). When provision is made for counterbalancing of the various types of shifts and dimensions a $2 \times 2 \times 3 \times 2$ factorial design results (Shift Condition \times Relevant Dimension \times Groups \times Learning Phase).

The stimulus cards were placed on a table in front of *S*. Then *S* was read the

¹Support for this research was provided as part of a larger study on the relation between indigenous mathematics and school mathematics learning sponsored by Educational Services, Incorporated, Cambridge, Massachusetts. Later work in preparing this manuscript was provided by Grant No. MH 1186-01 from the National Institute of Mental Health to Joseph Glick.

TABLE 1
MEAN TRIALS TO CRITERION FOR THE REVERSAL AND
NONREVERSAL Ss ON THE INITIAL AND
SHIFT PHASES

Stage of Learning	Group	Shift Condition	
		Reversal	Non-reversal
Initial	Illiterate Adults	43.3	32.0
	Illiterate Children	40.1	23.5
	School Children	37.7	10.6
Shift	Illiterate Adults	14.3	49.5
	Illiterate Children	40.9	68.7
	School Children	22.6	61.6

following instructions (in Kpelle or English, depending on which language he chose):

You will be shown a series of pictures one at a time. Some of these pictures will belong with this (point to the first stimulus card) card, and others with this one (point to the second card). You must decide for each of the cards that I will show you with which of the two cards (point to the two stimulus cards) it belongs. Tell me your choice by pointing to the card that the picture goes with. If your choice is correct, I will say "yes." If your choice is wrong, I will say "no." You must make as many correct choices as possible. Do you have any questions?

The E was a Kpelle college student specially trained to conduct the experiment.

The criterion of learning for both phases of the experiment was 15 consecutive correct responses. After the initial learning criterion was reached, E switched to the new concept without informing S or pausing. Any S who failed to learn within 160 trials was discarded. The Ss who failed to learn the second concept were assigned scores of 160.

Results and discussion.—A summary of the results for the initial and shift phases

of the experiment in terms of the trials to criterion is contained in Table 1. For purposes of statistical analysis, a $\sqrt{x+1}$ transform was applied to the data. The overall analysis of variance of the data in Table 1 yielded only one significant effect, an interaction between original learning and shift learning, $F(1, 60) = 14.3, p < .01$. Separate analyses of the learning and shift phases represented in Table 1 indicate: (a) The difference between the RS and NRS subgroups during the initial phase approaches significance, $F(1, 35) = 2.91, p < .10$; this is presumably a chance fluctuation since there is no differential treatment of the groups during this phase of the experiment: (b) In the shift phase, the RS is learned significantly faster than the NRS, $F(1, 35) = 12.4, p < .01$; (c) No other differences were significant.

The relative ratio of learning the RS and NRS for this experiment is the same as reported by Kendler and Mayzner (1956) for New York college students. However, the magnitude of the discrepancy is larger for the Americans (mean trials to criterion were 5 and 109 for the RS and NRS, respectively). Although it is possible to speculate on the implications of this difference between Kpelle and American Ss, the lack of a difference between the three Kpelle groups during the shift phase should make one cautious about equating reversal behavior and "degree of cultural development."

At present we must restrict ourselves to the observation that whatever processes are involved in the superiority of the RS in the present task, they are shared by a very large range of Ss over the age of 10.

REFERENCE

- KENDLER, H. H., & MAYZNER, M. S., JR. Reversal and nonreversal shifts in card-sorting tests with two and four sorting categories. *J. exp. Psychol.*, 1956, 51, 244-248.

(Received January 5, 1967)