Dimensional preference and shift option

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Dimensional preference of first grade children was determined by one of four modifications of a matching type preference test. The data suggested that contradictory conclusions regarding the relationship between dimensional preference and shift performance reported in past studies are not due to use of a matching, as opposed to a discrimination type preference test, per se. Further study of the matching type preference test was recommended.

In 1966, Smiley and Weir reported that preference for a particular stimulus dimension was related to performance on an optional-shift problem. The Ss assigned to their preferred stimulus dimension chose to make reversal (R) shifts more often than Ss assigned to their nonpreferred dimension. They also required fewer trials to criterion on Phase 1 of an optional-shift task.

Two more recent studies have indicated that dimensional preference had no effect on shift option. The Ss assigned to their preferred dimension did, however, require fewer trials to criterion than Ss assigned to their nonpreferred dimension (O'Brien, 1966; James, O'Brien, & Brinley, 1969).

The major methodological difference between the Smiley & Weir study (1966) and the two others concerned the preference test used. Specifically, Smiley and Weir used a discrimination type of preference test which required the S to respond to a compound stimulus–red circle, for example. Later the S indicated whether response had been to the color or to the form aspect of the compound. Approximately 20 stimulus exposures were required to determine the dimensional preference of the average S. The preference test stimuli were not used in the optional-shift task which followed.

In contrast, O'Brien (1966) and James et al (1969) used a matching type of preference test. On each of six trials, the S was required to indicate which two of the stimuli in the triad presented "looked most alike." Some of the preference test stimuli were used in the optional-shift task which followed as others were not.

The aim of the present study was to determine whether failure to find a relationship between dimensional preference and shift option would persist if a matching type of preference test were used, but modified. Specifically, would the O'Brien (1966) and the James et al (1969) findings persist if a matching type of test were used but (1) number of stimulus exposures was 6 for some Ss and 18 for others, and (2) stimuli used in the preference test were either all identical or all nonidentical to those used in the optional shift problem which followed?

SUBJECTS

The Ss were 90 first-grade children.[1] Each S was randomly assigned to one of four preference tests and to either his preferred or to his nonpreferred stimulus dimension before beginning an optional shift task.

APPARATUS

The modified Wisconsin General Test Apparatus used consisted of a one-way vision screen which separated the E and the S, and a sliding tray on which moveable stimulus panels were positioned over reward receptacles. The sliding tray could be moved either to the S's or to the E's side of the apparatus through a hinged door positioned immediately below the one-way screen. During intertrial intervals, the tray was on the E's side of the screen to allow for stimulus changes and for placing of token rewards used during the optional-shift task. The stimulus objects, glued to the moveable stimulus panels, were wooden figures varying in color (red, blue, orange, and green) and in form (circle, triangle, cross, and square).

PROCEDURE

Each S was given a preference test 1 day before beginning the optional-shift task. Two of the tests used stimuli identical to those used later in the shift task (red and blue, circle and triangle). The other two consisted of nonidentical stimuli, or stimuli not to be used in the shift task (orange and green, cross and square). Half of the Ss assigned to each preference test were exposed to the stimuli on 6 trials and half were exposed to the stimuli on 18 trials. Thus, each S was assigned to one of the following preference tests: 6 exposures to identical stimuli (6-NI), 6 exposures to nonidentical stimuli (n-NI), 18 exposures to identical stimuli (18-I) or 18 exposures to nonidentical stimuli (18-NI).

On each preference test trial, triads of stimuli showed a selected color and form in two stimulus positions. Positioning of the stimuli across trials guaranteed that a dimensional preference could not be a function of position preference. For example, red circle, red triangle, and blue triangle might be presented in those positions on one trial. On another trial, red triangle, blue triangle and red circle or blue circle, red triangle and red circle might be presented.

During preference testing, each S was told to slide back the two stimuli in the triad which "looked most alike." Any S matching on the basis of color or on the basis of form on five of the first six preference test trials was considered to show a consistent dimensional preference. No reinforcement was given during preference testing.

When each S came to the experimental room to begin the optional-shift task on Day 2, he was told to slide back the "correct thing." He was also told to take the penny that would always be in the reward receptacle under the "correct thing." These pennies he could trade for a candy bar at the end of the game. A correction procedure was used in Phases 1 and 2 of the task which forced the S to slide back the correct stimulus following every incorrect choice. No S was allowed to take the hidden penny if he had made an error on his first choice.

The optional-shift task used was described in detail in Kendler, Kendler, & Learnard (1962). Briefly, the task consisted of three phases. In Phase 1, two pairs of stimuli were presented from trial to trial (red cross and blue triangle; blue cross and red triangle). Position of the stimuli was counterbalanced so that consistent responses to a cue were not confounded with position preferences. During this phase, the S was consistently reinforced for responding to single cue either on his preferred or on his nonpreferred dimension. When the S reached a criterion of 9 of 10 correct responses, he was shifted to Phase 2 of the task in which only one stimulus pair was used. In Phase 2, the S was never reinforced for response to the stimulus bearing the cue that had been positive in Phase 1. Upon reaching a criterion of 9 of 10 correct responses in Phase 2, the S began Phase 3. Phase 3 consisted of 10 Phase 2 trials interspersed among 10 test trials. The former trials were aimed at keeping the S responding as he had responded in Phase 2. The latter trials used the stimulus pair not used in Phase 2. They were aimed at determining whether the S had chosen to reverse or to nonreverse during Phase 2. All Ss who made eight responses to a single cue during the 10 test trials were labeled either reversers or nonreversers, depending on the cue to which they had responded. Other Ss were called inconsistent.

RESULTS

Regardless of the type of preference test used, all 90 Ss showed a preference for form over color. The Ss were not, however, so consistent in their Phase 1 performance. During Phase 1, 27 Ss failed to reach criterion in spite of the correction procedure used. Twenty-four of these had been assigned to their nonpreferred dimension (NP Ss) and only three to their preferred dimension (P Ss). All three P Ss who failed

Table 1
Shift Choices of P and NP Ss Assigned to the Four Preference Tests

	Preferred						Nonpreferred					
Preference Test	N	R	%	N	NR	%	N	R	%	N	NR	%
6-1	8		100	0		0	3		50	3		50
6-N1	7		86	1		14	4		57	3		43
18-1	7		100	0		0	1		14	6		86
18-N1	8		100	0		0	6		75	2		25
Overall	30		97	1		3	14		50	14		50

to reach criterion were in Preference Test 18-I. The failing NP Ss were in all four preference tests (6-I = 4; 6-NI = 6; 18-I = 6; and 18-NI = 8). These 27 Ss, along with four Phase 3 inconsistent Ss, were dropped from the data to be discussed.

In order to determine the effect of dimensional preference on shift option, the overall data and the data for each preference test shown in Table 1 were analyzed. The chi square test of the overall data indicated a significant effect of preference on shift option ($\chi^2 = 14.60$, df = 1, $p < .001$). The P Ss elected to make the R shift almost exclusively (97%), whereas only 50% of the NP Ss elected to make the R shift. Consideration of the data for each preference test, however, suggests that this is an oversimplification. One hundred per cent of 18-I P Ss elected to make the R shift as 86% of NP Ss in this preference test elected the NR shift (Fisher's exact $p = .010$). Although none of the other Fisher tests reached significance at the .05 leve., the 18-NI data suggest that the R shift was preferred by both P and NP Ss (100% and 75%, respectively). The 6-I and 6-NI data suggest that most P Ss (100% and 86%, respectively) elected the R shift as about 50% of NP Ss elected this shift.

Mann-Whitney U tests were used to compare the performance of P and NP Ss during Phase 1 learning. The data indicated that P Ss required fewer trials to criterion (median = 13.0) than NP Ss (median = 24.5, $z = 3.31$, $p < .0005$). These P Ss, reversers with one exception, were faster learners than the combinations of reversers and nonreversers which made up the NP group. A U test comparing trials to criterion of NP reversers and NP nonreversers, however, indicated that reversers were not significantly faster learners than nonreversers (R median = 24.5, NR median = 28.0; $z = .95$, $p < .171$). The U test comparison of trials to criterion for P Ss who reversed and for NP Ss who reversed indicated that P reversers required fewer trials to criterion than NP reversers (P median = 12.0, NP median = 24.5; $z = 3.17$, $p < .0008$).

Type of preference test appeared to have no effect on trials to criterion in Phase 1 learning. All of the U tests which compared trials to criterion required by P Ss who had worked on the various preference tests failed to reach significance at the .05 level. The same finding held when comparisons were made among NP Ss who had worked on the four types of preference test.

The analyses of the Phase 2 overall data indicated no significant difference in the trials to Phase 2 criterion required by P and by NP Ss. Also, NP reversers and NP nonreversers did not differ in trials to Phase 2 criterion. When U tests compared trials to criterion required for Phase 2 learning by Ss who had worked under each of the four preference tests, only the 18-I vs the 18-NI difference for NP Ss was significant ($U = 6$; $p < .010$). The 18-NI Ss, predominantly reversers, required fewer trials to criterion (median = 10) than the 18-I Ss who were predominantly nonreversers (median = 16).

DISCUSSION

The data reported here suggest that failure to find a relationship between dimensional preference and shift option is not a universal finding when preference is assessed by a matching type of test. In fact, the 18-I data indicated a significant effect that one might expect from the Heal, Bransky, and Mankinen data which showed that in a forced-shift problem an R shift was easier than an NR shift for P Ss, as the converse was true for NP Ss (1966).

Although the small Ns used in this study indicated trends rather than significant findings for three of the four preference tests used, the data suggest that the matching type of preference test will yield different types of data under different test conditions. Data like that of Smiley and Weir (the 6-I and 6-NI data), like that of O'Brien and James et al (the 18-NI data), and like the Heal et al data (the 18-I data) all seem plausible. But, whether all of these trends are reliable or not must be determined by future research which uses larger Ns.

Even though our data clearly indicate the need for further study using the matching type of preference test, they indicate one finding consistent across the test modifications studied. Regardless of the test modification used to assess preference, an R shift was the predominant choice of P Ss. Similar confidence in ability to predict shift choice of NP Ss is not warranted on the basis of our data.

The data reported agree, in general, with data reported in other studies in suggesting that dimensional preference may be a critical determinant of speed of Phase 1 learning. Not only did NP reversers require more trials to Phase 1 criterion than P reversers but NP reversers and NP nonreversers required about the same number of trials to criterion. The P reversers did, however, require fewer trials to Phase 1 criterion than NP reversers. The only evidence that could be construed as evidence that reversers are faster learners than nonreversers came from the comparison of the Phase 2 scores contributed by the 15 NP Ss. The dimensional preference of these Ss was assessed by the 18-I and 18–NI tests.

In summary, the data reported here suggest that differences in the relationship between dimensional preference and shift option reported in past studies is not due to use of a matching type, or a discrimination type, of preference test per se. They also suggest that, regardless of the matching modification used, R shifts are the choice of most P Ss. The shift choice of NP Ss, however, seems to vary with the preference test modification used to assess dimensional preference. Since the matching type of preference test is more quickly and easily administered than the discrimination type of test, further study of the matching preference test seems warranted.

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NOTE

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