The effects of concept training on preschool children's oddity performance*

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Following the suggestion of Lipsitt & Serunian (1963) that reading-readiness training may accelerate the child's acquisition of the oddity solution, the oddity performance of one group (Group T) of preschoolers who were initially given such training was compared to that for a second group (Group NT) who had not received such training. The training employed facilitated oddity performance in that Group T made significantly more correct responses than Group NT and significantly more children in Group T than in Group NT reached a performance criterion.

Oddity problems as used with child Ss typically involve the presentation of three stimuli, two of which are identical and one of which differs from these two. Usually all of the stimuli are odd (rewarded) an equal number of times, and the spatial location of the odd stimulus is counterbalanced across trials. Previous studies employing oddity problems have often been concerned with changes in children's performance that occur with increasing chronological or mental age. The results of such studies have indicated that a majority of preschool-aged children cannot solve this type of problem. For example, Ellis & Sloan (1959) and Penn, Sindberg, & Wohlhueter (1969) found that fewer than 20% of mental retardates having MAs of 4 years and under could solve an oddity problem. The results of the former study indicated that the majority of normal children and retardates having MAs of 6, 7.7, and 9.7 years could solve the problem, with performance being directly related to MA.

Lipsitt & Serunian (1963) found that the oddity problem was extremely easy for first- and third-graders, while only one of six preschoolers reached criterion. Also included in this experiment were two groups of kindergarten-aged children differing in age and amount of prior school experience. An older group (5½-6 years) had completed one semester of school, while a younger group (5-5½ years) had just entered school. A marked difference in the oddity performance of these two groups was found as the mean number of correct responses in 54 trials was 40 for the older group and 28 for the younger group. Lipsitt & Serunian suggested that this finding indicated the occurrence of an experience within this age period that is of importance in the acquisition of the oddity solution. They further speculated that the

crucial factor was the reading-readiness tasks administered to kindergarteners. Typically, such tasks involve instructing the child to select one figure on a page or line that is different from the others. Presumably, training of this type might conceivably accelerate a child's acquisition of the oddity solution.

The purpose of the present study was to determine whether the oddity performance of preschool-aged children could be accelerated by a type of training similar to that involved in reading-readiness tasks. Hence, two groups of preschoolers spent an initial 10 min interacting with E before the presentation of an oddity problem; one group (Group T) of Ss received such training, while the second group (Group NT) did not.

METHOD

The Ss were 44 children enrolled in a private preschool located on the University campus. Twenty-six children from a younger group ranged in age from 31 to 54 months, while the remaining 18 children ranged in age from 55 to 78 months. Half the Ss in each age group were assigned randomly to Group T, while the remaining one-half were assigned to Group NT.

The test apparatus was a modified Wisconsin General Test Apparatus. The stimuli were three pairs of wooden cubes painted red, pink, and green, respectively. The stimuli were presented in wells lined with foam cushions in order to minimize giving auditory cues to the Ss. Small chocolate candy pieces were used as rewards.

Each S was seen individually in the preschool office-storage room. Each child was seated at a table, given a sheet of paper and crayons, and asked to color while E prepared the "game." Printed on the paper were three sets of objects (1) one large five-pointed and two small six-pointed stars, (2) one large and two small triangles, and (3) one large and two small circles. While Ss in Group T colored, E asked questions of the following nature: "Are

these alike?" and "Why?" or "Why not?" If S spontaneously verbalized the size and/or form differences, his verbalizations were reinforced by E. Those Ss not verbalizing size or form differences were asked more specific questions, e.g., "Is this one as big as this one?" Approximately 10 min was spent with each S in Group T in this manner. At the end of this time, each S was shown a set of three rubber balls, two large orange ones and a smaller purple one. All Ss in Group T were able, when asked, to indicate that the smaller ball differed from the other two in both size and color.

The Ss in Group NT also spent 10 min coloring; however, E's conversations with these Ss were of a general nature regarding their coloring, their activities at school, etc. Questions regarding differences or similarities among the three sets of objects were not asked, nor was the set of three balls presented. The Ss in both groups were asked to name the crayon colors in order to determine whether they could recognize and name colors.

Following the coloring phase, all Ss were presented an oddity problem. When the stimuli were counterbalanced so that each color was odd an equal number of times, and the odd stimulus was in each position an equal number of times, there were 18 possible stimulus settings. A set of 18 trials was randomly constructed, and this set was then repeated three times for a total of 54 trials. All Ss performed until they had either reached a criterion of six successive correct responses or for a maximum of 54 trials. In addition to the candy reward, social reinforcement (e.g., "That's right," "Wrong that time") was employed. The noncorrection procedure was used throughout.

RESULTS AND DISCUSSION

The number of correct responses in each of three blocks of 18 trials was determined for each S (see Table 1), and a Lindquist (1953) Type III analysis of variance was applied using these scores. The between-Ss factors were training and age groups, while the within-Ss factor was trial blocks. This analysis indicated two significant effects:

Table 1
Mean Number of Correct Responses Across Trials in Blocks of 18

Training-Age Group	Trial Blocks			Overall
	One	Two	Three	
T-Young (n = 13)	8.5	11.7	14.9	35.1
T-Old (n = 9)	10.1	12.0	13.3	35.4
NT-Young (n = 13)	7.7	8.8	8.9	25.4
NT-Old (n = 9)	10.8	11.9	11.7	34.4

*The data are from the junior author's MA thesis which was directed by the senior author.

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(1) the main effect for trial blocks ($F = 15.35$, $df = 2/80$, $p < .01$), which was due to the increase in performance across trials, and (2) the Trial Blocks by Training Groups interaction ($F = 6.48$, $df = 2/80$, $p < .01$). Follow-up tests indicated that the difference between the two groups for the first block of trials was nonsignificant ($t = .53$, $df = 42$, $p > .20$), while Group T made significantly more correct responses than Group NT for both the second and third trial blocks ($t = 3.71$ and 9.35 , respectively, $df = 42$ and $p < .01$ in each case). While inspection of Table 1 reveals an apparent interactive effect of training and age, this interaction was not statistically significant ($F = 1.45$, $df = 1/40$, $p > .20$).

Fifteen Ss in Group T, but only six Ss in Group NT, reached criterion. A chi-square analysis indicated this difference to be significant ($\chi^2 = 7.38$, $df = 1$, $p < .01$). Somewhat surprising, however, was the finding that only 6 of the 15 children in Group T reaching criterion were able to verbalize the solution of the oddity problem. Thus, most of these children were able to note stimulus similarities and differences during the training phase and were, in addition, able to do this in the test phase in that they attained the performance criterion but, nonetheless, they were unable to overtly verbalize the

principle involved in the problem solution. Of the six Ss in Group NT reaching criterion, four were able to verbalize the problem solution. The youngest child in this group to reach criterion was 51 months of age.

The results of this study provide some evidence supporting the hypothesis of Lipsitt & Serunian (1963) that reading-readiness training may accelerate a child's acquisition of the oddity solution. In this regard it should be noted that the duration of the training phase was only 10 min, the training was quite informal, and that the primary emphasis during this phase was upon instructing the child to attend to dimensional similarities and differences (size and form) not involved in the oddity problem.

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anticipatory fear, may develop within Ss during the temporal interval between a warning signal and the probable occurrence of a noxious stimulus. Franzini (in press) has applied the magnitude-estimation technique to assess directly the averseness of that period during which there is a high probability of the male college student S's receiving a noxious electric shock. He found the degree of perceived averseness to be a function of the interaction of the level of shock anticipated and the length of the interval spent awaiting the shock. Magnitude estimations of the averseness of the interval were linearly related to the size of the interval prior to shock delivery at all levels of anticipated shock.

Thus, Franzini's data indicate that the period awaiting possible shock is aversive. Any fear or anxiety that might develop in the interval following a signal that shock may follow could be conceived of as an additional drive source. Increased drive level would be expected to augment one's perception of the intensity of a noxious stimulus. This study is designed to assess the hypothesis that as the interval between warning signal and anticipated shock delivery increases, magnitude estimations of shock intensity increase.

METHOD

Thirty male Ss were recruited from undergraduate psychology classes. Shock was delivered through electrodes strapped to Ss' nonpreferred forearm. The circuit was designed to function as a constant-current system. A 336,000-ohm resistor was placed in series with the shock output so that interindividual differences in skin resistance would not significantly alter the actual delivered current, which ranged from 0.10 to 6.1 mA. Shock intensity was regulated by a Variac. Shock duration was constant at 0.75 sec in all conditions.

The independent variables were three levels of shock intensity, individually calibrated for each S according to his range of tolerance, and four levels of intratrial interval (5, 10, 30, and 75 sec). These levels were chosen to conform with the paradigm of Franzini (in press) in which different Ss judged the averseness of the interval preceding shock. It was assumed that the action of higher-order symbolic processes in human Ss would serve to maintain or even augment any emotional response that might build following CS onset. Each S made 24 judgments, having been presented randomly each of the 12 conditions twice. A trial consisted of a light of 1-sec duration (CS), the prescribed time interval, and the termination which would be a shock (UCS) of the prescribed intensity or a single click. Trials ending with a click were nondata trials and

variables might influence Ss' estimates of shock intensity, but little attention has been given in previous studies to the effect of possible emotional variables upon the dependent variables of primary interest, such as the psychophysical judgments. An exception is an early study by Hill, Kornetsky, Flanary, & Wikler (1952) who reported that under "anxiety arousal" their Ss perceived more intense pain from electric shock stimuli than they perceived under nonanxious conditions.

The experimental animal literature (e.g., Brown, Kalish, & Farber, 1951; Sidman & Boren, 1957) supports the hypothesis that a conditionable emotional reaction, i.e.,

Anticipatory fear and judgments of shock intensity

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Three levels of shock intensity, individually calibrated for each of 30 male Ss, and four interstimulus intervals (5, 10, 30, and 75 sec) were presented randomly in all combinations four times. Half the trials were data trials, i.e., terminated with a shock. Ss' judgments of shock intensity remained unaffected by increases in the interval or by the development of a hypothetical emotional response within S while he awaited possible shock.

It seems reasonable that affective