Incentive effects and social class in children's probability and discrimination learning

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Middle- and lower-class preschool children were presented a three-choice problem in which the responses were reinforced on either a 100-0-0 or a 75-25-0 schedule with incentives that differed in value. Higher levels of performance occurred for middle- than for lower-class Ss and for Ss receiving continuous reinforcement. Incentive effects were found only when the two levels of incentive were present within a single problem for lower-class Ss. The role of incentive contrast is discussed.

The performance of children in probability learning tasks has often been found to differ significantly as a function of level of incentive (e.g., Stevenson & Hoving, 1964; Weir & Gruen, 1965). In discrimination learning, however, level of incentive has not resulted in consistent differences in rate of learning (e.g., Friedman & Tieber, 1965; Miller & Estes, 1961). The discrepancy between these sets of findings is difficult to understand, especially since probability learning typically involves learning a discrimination with maximal reinforcement of less than 100%. Since somewhat different procedures have been used in studies of the two types of problems, it would be of interest to know whether differences in the effects of incentives would occur when the two problems are presented in the same context with a difference only in the percentage of reinforcement.

The present study was undertaken to explore the effects of level of incentive, percentage of reinforcement, and social class on children's probability and discrimination learning. Middle- and lower-class preschool children were presented a three-choice task in which the responses were reinforced on either a 100-0-0 or 75-25-0 schedule with incentives of either high or low value. Lower-class children were included since level of incentive typically has had a significant effect on children's discrimination learning only when a deprivation condition (removal of incentives) preceded the introduction of the experimental task (Brackbill & Jack, 1958; Stevenson, Weir, & Zigler, 1959), or when the Ss were lower-class children, who are commonly deprived of many material objects (e.g., Terrell, Durkin, & Wesley, 1959). The effects of using incentives of different value within a single task were also investigated. This condition was introduced to assess the validity of the hypothesis that the value of an incentive is influenced by a comparison with alternatives, such that the value of a given incentive is increased by a contrast with one of lower value. In this condition one choice was reinforced more often with an incentive of high value than with one of low value, a second choice had these conditions reversed, while the third choice was never reinforced.

Method

Subjects. The Ss were 35 boys and 30 girls from nursery schools enrolling middle-class children and 31 boys and 34 girls from lower-class families in a summer Head Start program. The mean CAs were 4.7 years and 5.1 years, respectively (SDs = .4 years). Within each social class 13 Ss were randomly assigned to each of five conditions.

Apparatus. Colors were rear-projected on three 4-in. frosted glass windows located in a horizontal array across the middle of a large gray panel. The Ss responded by pushing one of the windows on each trial. Reward were delivered manually into a chute which terminated in the front of the apparatus. The rewards fell into a plastic box that permitted them to be seen but not handled. The E was concealed from S during the course of the trials.

Procedure. The S was seated in front of the apparatus and told he could win some prizes. He was shown the colors that would appear and was told that he could win a prize if he pushed the correct one and could keep all the prizes he won. During the first few trials S was told, "Now push the one you think will give a prize." Two sets of colors were used (red-blue-yellow and green-purple-orange) with an equal number of Ss being presented each set. The presentation of the colors was randomized so that each color within a set appeared twice in each position within each block of six trials. The color or colors to be reinforced were distributed equally in each condition across the three colors. A total of 48 trials was presented.

Level and percentage of reinforcement differed across five conditions. Two conditions included discrimination learning tasks with high (DL-H) or low incentive (DL-L). An additional two conditions included 75-25-0 noncontingent probability learning tasks, again with either high (PL-H) or low (PL-L) incentives. The fifth condition involved an incentive contrast (IC). One of the colors was reinforced with high incentives 75% of the time and low incentives 25% (IC-H), a second color was reinforced with low incentives 75% of the time and high incentives 25% (IC-L), while a third choice was never reinforced. The two reinforcement schedules for IC were randomized by trials independently, and the same two randomizations were used with equal frequency in determining the reinforcement schedules for PL-H and PL-L.

The high incentives were plastic trinkets (e.g., football, bottle, animals, coins) and the low incentives were dried beans. Middle-class preschoolers clearly pre-

Fig. 1. Mean number of correct responses per block of six trials.

ferred the trinkets, for in a paired-comparison test with 10 middle-class preschoolers 93% of the choices were of the trinkets.

Results

The average number of correct responses are presented in Fig. 1 in blocks of six trials for each subgroup. The frequency of choice of IC-H and IC-L are presented separately. The data for all but Condition IC were subjected to a 2 (level of incentive) by 2 (task) by 2 (social class) by 8 (trial block) analysis of variance. The results indicated a significant task effect ($F=9.54$, $df=1/96$, $p<.01$), with a higher level of performance in the discrimination learning task. The middle-class children performed at a higher level than the lower-class children ($F=6.45$, $df=1/96$, $p<.05$). There was a significant increase in the mean number of correct responses across blocks of trials ($F=3.52$, $df=7/672$, $p<.01$). None of the interactions was significant.

Two analyses of variance including Condition IC were performed. When the IC-H data were compared to the results for Conditions DL-H and PL-H, there were significant task ($F=3.56$, $df=2/72$, $p<.05$) and trials effects ($F=2.04$, $df=7/504$, $p<.05$), and a significant interaction between trials by task by social class ($F=2.23$, $df=14/504$, $p<.01$). The overall means for IC-H (18.3) and PL-H (17.0) were similar, but both were below that for DL-H (23.1). The significant interaction reflects the fact that the average level of performance was ordered in a different manner for the two social classes, with IC-H resulting in the highest frequency of correct response with lower-class children and the lowest level with the middle-class children (see Fig. 1). An analysis of variance of the comparable results for the low incentive data indicated a significant task ($F=4.21$, $df=2/72$, $p<.05$) and social class effect ($F=6.79$, $df=1/72$, $p<.05$). Again, the means for PL-L and IC-L were similar (17.0 and 15.8, respectively), but both were lower than that of DL-L (21.8). The middle-class children responded at a higher level than the lower-class children. None of the interactions was significant.

A related measures *t* test was performed on the dif-

ferences in the terminal level of response to IC-H and IC-L in the two social classes. The difference was not significant for the middle-class Ss ($t<1.00$), but the lower-class Ss chose the IC-H stimulus significantly more frequently than the IC-L stimulus ($t=2.88$, $df=12$, $p<.02$).

Discussion

The differences found in the study due to percentage of reinforcement and social class have been found in many studies. In addition, the failure to find significant incentive effects in the discrimination learning task adds further evidence of the difficulty of influencing performance in discrimination learning tasks by varying incentive level. It is surprising, however, that differences were not obtained in the probability learning task. Consistent differences, opposite in direction for the two social classes, were found during the last three blocks of trials for Conditions PL-H and PL-L, and with more trials significant effects may have emerged.

The finding of greatest interest was the performance of Ss in Condition IC. The combination of presumed deprivation and a contrast between the high and low levels of incentive resulted in a clear preference by the lower-class Ss for the stimulus yielding the higher percentage of incentives of high value. Such a contrast effect may also have occurred in the recent study by Bissett & Rieber (1966), where a higher level of response was found for lower-class children in a discrimination learning task in a high incentive condition after the Ss had been pretested with incentives of both high and low value. A critical determinant of the effect of level of incentive on learning may be knowledge of the alternative possibilities for reinforcement.

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Note

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