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LEARNING EFFICIENCY AS A FUNCTION OF DEPICTION, VERBALIZATION, GRADE AND SOCIAL CLASS.

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LEARNING EFFICIENCY AS A FUNCTION OF DEPICTION, VERBALIZATION, GRADE LEVEL, AND SOCIAL CLASS WAS EXPLORED BY ASKING 384 KINDERGARTEN, FIRST-, THIRD-, AND SIXTH-GRADE CHILDREN FROM BOTH MIDDLE-CLASS AND LOWER-CLASS AREAS TO LEARN A LIST OF 24 PAIRED ASSOCIATES. ALL PAIRS WERE PRESENTED PICTORIALLY BY A STUDY-TEST METHOD FOR TWO LEARNING TRIALS. THE FIRST MANIPULATED FACTOR, DEPICTION, HAD TWO LEVELS--"STILL," IN WHICH THE TWO OBJECTS IN EACH PAIR WERE STATIONARY WHEN RECORDED ON MOVIE FILM AND "ACTION," IN WHICH THE TWO OBJECTS IN EACH PAIR WERE MOVING WHEN PHOTOGRAPHED. TO TEST THE SECOND FACTOR, VERBALIZATION, THE EXPERIMENTER EITHER NAMED ALOUD THE TWO OBJECTS IN EACH OF THE PAIRS OR UTTERED A SENTENCE CONTAINING THE NAMES OF THE TWO OBJECTS IN EACH PAIR. AS PREDICTED, BOTH ACTION DEPICTION AND SENTENCE VERBALIZATION PRODUCED INCREASES IN LEARNING EFFICIENCY AND OLDER CHILDREN LEARNED MORE RAPIDLY THAN YOUNGER ONES. QUITE UNEXPECTEDLY, HOWEVER, CHILDREN FROM LOWER-CLASS AREAS LEARNED AS EFFICIENTLY AS THOSE FROM MIDDLE-CLASS AREAS DESPITE THE INFERIOR PERFORMANCE OF THE FORMER ON STANDARDIZED TESTS. THE DIFFERENCES BETWEEN LEARNING CONDITIONS IN THE CLASSROOM AND THOSE IN THE LABORATORY COULD ACCOUNT FOR THE DISCREPANCY BETWEEN TEST AND LEARNING TASK PERFORMANCE. (AUTHOR)

Learning Efficiency as a Function of Depiction, Verbalization, Grade and Social Class[1,2]

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A total of 384 kindergarten, first-, third- and sixth-grade children half of whom were drawn from middle-class areas and half from lower-class areas, were asked to learn a list of 24 paired associates. All pairs were presented pictorially by a study-test method for a total of two learning trials. The first manipulated factor, Depiction, consisted of two levels: Still, in which the two objects in each pair had been stationary when recorded on movie film; and, Action, in which the two objects in each pair had been moving when photographed. The second factor, Verbalization, consisted of the experimenter either naming aloud the two objects in each of the pairs or uttering a Sentence containing the names of the two objects in each pair. The remaining two factors were Grades and Social Class. As predicted, both action depiction and sentence verbalization produced increases in learning efficiency and older children learned more rapidly than younger ones. Quite unexpectedly, however, children from lower-class areas learned as efficiently as those from middle-class areas despite the inferior performance of the former on standardized tests.

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The present experiment was performed in order to evaluate hypotheses suggested by the juxtaposition of two rather disparate topics of current research interest: the improvement of learning efficiency; and, group-related differences in learning efficiency. Concern with the former topic is well-illustrated in recent work on conditions for the facilitation of paired-associate (PA) learning in children. Two kinds of facilitory conditions have been isolated: verbal and pictorial. Jensen and Rohwer (1965) found that the acquisition of a list of paired pictures by second-, fourth-, and sixth-grade children was markedly accelerated by the instruction to form and utter a sentence containing the names of the two objects in each pair. In this and a number of subsequent experiments (Rohwer, in press; Rohwer & Lynch, 1966; Rohwer & Lynch, in press; Rohwer, Shuell & Levin, in press) the facilitory effect of sentence contexts has been clearly demonstrated. On the pictorial side, Davidson (1965) and Reese (1965), working independently, have shown that the learning of paired objects represented by line drawings is determined by the spatial configuration of the two members in a pair. When the two objects in each pair were depicted independently, the amount learned was notably smaller than when the two objects were joined to one another visually (e.g., a picture of a CHAIN and a BOWL, vs. a picture of a CHAIN in a BOWL).

The samples of children involved in all of the experiments reviewed thus far were drawn from schools in areas populated by middle- or upper-income groups. This fact is noteworthy in connection with the second topic of pertinence to the present study, namely, group-related differences

in learning proficiency. It has been shown repeatedly that when learning proficiency is measured in terms of performance on standardized tests of school achievement or on commonly used tests of intelligence, children from schools serving middle- and upper-income populations are superior to children from schools serving lower-income populations. It remains to be established whether or not the deficiencies in what and how much children from low-strata schools have learned are related to concomitant deficiencies in the performance of such children on tasks that demand new learning.

One of the purposes of the present experiment was to assess this possibility. A second purpose was to determine whether or not the deficiency in PA learning expected to appear among young children from low-strata schools could be ameliorated by presenting PAs under conditions known to facilitate learning in children drawn from upper-strata schools.

Method

Subjects. The total sample of 384 children was drawn from four grade levels (kindergarten, first, third and sixth) in two kinds of schools distinguished by the characteristic performance of their students on standardized tests of achievement and aptitude. Half the Ss were drawn from schools where test performance was low and the other half from schools where test performance was high. Available information about the eight populations from which the samples were selected is presented in Table 1.

Insert Table 1 about here.

In addition to discrepancies in test performance, the high- and low-strata school populations differed in other ways associated with the distinction

between "advantaged" and "disadvantaged" areas.

From the total population of children within each grade level of the high- and low-strata schools, 48 Ss were selected and assigned randomly to one or another of the 4 experimental conditions such that each cell of the design was comprised of 12 Ss.

Materials and design. In addition to Grades and School Strata, the principal factors in the 4x2x2x2 factorial design were Verbalization (Names vs. Sentences) and Depiction (Still vs. Action). All Ss were asked to learn the same list of 24 pairs of familiar objects presented pictorially by a pairing-test method. The Verbalization conditions differed only with respect to the character of the E's utterances during the pairing trials. As each pair was presented, E, using a prepared script, read either the names of the two objects, (e.g., "DOG....GATE"), or a sentence containing the names of the two objects (e.g., "The DOG closes the GATE."). A complete list of the verbal materials appears in Table 2.

Insert Table 2 about here.

The second experimental factor, Depiction, consisted of two levels that differed with respect to whether the object pairs were presented in a manner consistent with the Name verbalizations in the one case (Still) or in a manner consistent with the Sentence verbalizations in the other case (Action). In the materials for both Depiction conditions, the pairs of objects were photographed against a background of gray cloth and their images were recorded on 16 mm. black-and-white movie film. For the Still condition, the two objects in each pair were simply placed side by side on the set and photographed for 4 secs. For the Action condition, the pairs of objects were photographed while involved in the episodes described by

the corresponding sentence verbalizations. The test-trial materials were the same for both Depiction conditions, that is, they consisted of 24, 4-sec. segments of film bearing the images of the first-named objects in every pair. Two different random orders of pairing-trial and of test-trial materials were formed so that no order was repeated during the course of the two complete trials given to all Ss.

Procedure. The task was administered to Ss individually for a total of two pairing and two test trials.

Results and Discussion

Learning was measured in terms of the total numbers of correct responses made on the two test trials, and the data were analyzed by means of a four-way analysis of variance. The main effects of Grades ($F = 38.89$, $df = 3/352$, $p < .01$), Depiction ($F = 53.75$, $df = 1/352$, $p < .01$), and Verbalization ($F = 27.04$, $df = 1/352$, $p < .01$) were significant but the variance associated with School Strata was not ($F < 1$).

By the decision rule adopted in this study, the interaction of School Strata and Grades was not significant, but, as an examination of Table 3

Insert Table 3 about here.

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suggests, it may be noteworthy that School Strata differences appear to emerge for the Kindergarten samples. To check this possibility, a study is currently underway with pre-Kindergarten age children.

As the information in Table 4 indicates, the interaction of Verbalization

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Insert Table 4 about here.

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and Depiction was significant for Low-Strata children but not for the

High-Strata samples. The form of the three-way interaction, however, was not as predicted, that is, none of the pair-wise contrasts between School Strata conditions was significant, not even the one between the two Name-Still groups.[3] For both Strata, all facilitory conditions produced more efficient learning than the control. Finally, the four-way interaction was not significant.

Perhaps the most striking aspect of the present results is that children from the Low-strata schools learned with impressive proficiency; this in contrast to their classroom performance and their scores on standardized tests.

One interpretation of the discrepancy between test and learning task performance is that it occurs because of pronounced differences between the conditions of learning that are characteristic of the classroom and those that are characteristic of the laboratory.

In brief, three kinds of such differences may be distinguished. First, greater control of the focus of the child's attention is achieved in the laboratory than in the classroom by (a) administering the learning materials individually rather than to groups, and, in the special case of the present study, by (b) presenting the elements to be learned in a form that elicits the attention of the child. Second, the requirements of the child's task are explicitly detailed to a much greater extent in the laboratory than in the classroom. Third, in the laboratory case, the information necessary for the child to make a judgment about the adequacy of his performance is inherent in the learning materials themselves whereas in the classroom, such information is typically made available only in the teachers reaction

to the child's behavior and not within the boundaries of the task itself. Whether or not these differences between the conditions of learning in the classroom and in the laboratory are responsible for the discrepancy between the performance of Low-strata children on standardized tests and their performance on learning tasks, it should be noted that the higher incidence of success in the laboratory than in the classroom, at least in the present study, may itself reinforce the behaviors that lead to efficient learning.

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Footnotes

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[2]We wish to thank the participating administrators, teachers and children for their cooperation in the conduct of this study.

[3]Unless otherwise indicated in the text, all *post hoc* comparisons were made by means of the Scheffé method at $p = .05$.

Table 1

Mean Chronological Ages and Stanford Achievement Test Grade-Equivalent Quartiles for K, 1, 3, and 6 of the Two School-Strata Populations

Grade	School Strata	Mean CA (Years)	Stanford Achievement Test					
			Intermediate II, Form W					
			Word Meaning			Paragraph Meaning		
			Q_1	Q_2	Q_3	Q_1	Q_2	Q_3
6	High	11.60	5.7	6.9	8.4	6.6	7.3	8.1
	Low	12.06	3.8	4.4	5.1	3.2	4.2	4.8
			Primary II, Form W					
			Word Meaning			Paragraph Meaning		
			Q_1	Q_2	Q_3	Q_1	Q_2	Q_3
3	High	8.57	No data available					
	Low	8.97	1.7	2.0	2.7	1.6	1.9	2.5
			Primary I, Form W					
			Reading					
			Q_1	Q_2	Q_3			
1	High	6.60	1.6	1.9	2.4			
	Low	6.93	1.4	1.5	1.6			
K	High	5.32	No data available					
	Low	5.31	No data available					

Table 2

Pairing-Trial Materials

1.	Fork Cake	The fork cuts the cake.
2.	Towel Plate	The towel wipes the plate.
3.	Cat Log	The cat jumps the log.
4.	Man Pole	The man bends the pole.
5.	Bat Cup	The bat strikes the cup.
6.	Shoe Chair	The shoe taps the chair.
7.	Boat Ball	The boat rolls the ball.
8.	Hand Hat	The hand throws the hat.
9.	Rock Bottle	The rock breaks the bottle.
10.	Car Wagon	The car upsets the wagon.
11.	Rope Eye	The rope rubs the eye.
12.	Needle Balloon	The needle pops the balloon.
13.	Dog Gate	The dog closes the gate.
14.	Spoon Egg	The spoon rolls the egg.
15.	Fire Bed	The fire burns the bed.
16.	Ax Wood	The ax hits the wood.
17.	Knife Flower	The knife cuts the flower.
18.	Blanket Tree	The blanket covers the tree.
19.	Milk Bowl	The milk fills the bowl.
20.	Teeth Apple	The teeth bite the apple.
21.	Hammer Bell	The hammer pulls the bell.
22.	Pencil Paper	The pencil tears the paper.
23.	Doll Book	The doll opens the book.
24.	Foot House	The foot kicks the house.

Table 3

Mean Numbers of Correct Responses as a Function of Grades and School Strata

School Strata	6	3	1	K	Total
High	33.54	33.25	30.12	27.08	31.00
Low	34.22	34.27	29.77	23.64	30.47
Total	33.88	33.76	29.95	25.36	

MSE (352) 39.95

G x SS: $F = 2.48$, $df = 3/352$, $.05 < p < .10$.

Table 4

Mean Numbers of Correct Responses as a Function of School Strata, Verbalization and Depiction

School Strata	Depiction			
	Still		Action	
	Name	Sentence	Name	Sentence
High	26.21	31.75	31.45	34.58
Low	24.35	31.19	34.23	32.15
Total	25.28	31.47	32.84	33.36

MSE (352) 39.95

V x D: $F = 19.29$, $df = 1/352$, $p < .01$.

SS x V x D: $F = 6.34$, $df = 1/352$, $p < .05$.