Effectiveness of social and nonsocial reinforcers in a probability learning task*

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Research in recent years has shown that performance reinforcers become more effective than person reinforcers as a person grows older and that, at least with children, social reinforcement is more effective than nonsocial in motor and probability learning tasks. This study tested the maturity hypothesis, examined social vs nonsocial reinforcement in probability learning, and investigated order of presentation of both social and nonsocial reinforcers. Results were: (1) person reinforcers are equally as effective as performance reinforcers, (2) social reinforcement is more effective than nonsocial in probability learning, and (3) order of presentation in social-nonsocial reinforcement is crucial.

During the last decade there has been a considerable amount of research in two separate but related areas of social reinforcement, namely, the differential effects of classes of verbal reinforcers and the relative effectiveness of social vs nonsocial reinforcement. The most recent studies in the latter area have demonstrated that social reinforcement does indeed affect performance, but the researchers have apparently ignored the findings of experiments involving classes of reinforcers. More specifically, these investigators have tended to treat any positive social reinforcer as the functional equivalent of any other positive social reinforcer, despite evidence to the contrary.

Zigler & Kanzer (1962) and Rosenhan & Greenwald (1965) investigated the effects of two classes of verbal reinforcers across age, sex, and social class. In the first of these experiments, Zigler and Kanzer found that abstract (performance) reinforcers, such as "right" and "correct," were more effective with middle-class children and that more concrete (person) reinforcers, such as "good" and "fine," were more effective with lower-class children, suggesting that the lower-class 7-year-olds are developmentally lower than middle-class 7-year-olds. Zigler and Kanzer put forth the view that the lower-class children had not made the transition from reinforcers signifying correctness to those indicating praise and were consequently lower in the reinforcer hierarchy.

Rosenhan and Greenwald failed to replicate the Zigler and Kanzer results, but did find that older children were

more responsive to performance reinforcers. Use of a marble-dropping task revealed that use of the reinforcer "right" gained better results than reinforcement by the word "good" in older children. The authors concluded that children are sensitive and responsive to the semantic nuances connoted by person and performance reinforcers. They suggested that the process of development is marked by the gradual decrement in responsiveness to the more primitive kinds of reinforcement (concrete, personal) and by a corresponding increment in responsiveness to more mature kinds of reinforcement (abstract, performance). Rosenhan and Greenwald predict that children, as they grow older, become more responsive to performance reinforcers, but not at the expense of person reinforcers. Kintz & Pappas (1965), in a study of different verbal reinforcers, found that college students were sensitive to different verbal forms of praise and evaluation.

A number of studies (Erickson, 1962; Lewis, Wall, & Aronfreed, 1963; Dorwart, Ezerman, Lewis, & Rosenhan, 1965; Parton & Ross, 1965; Lewis & Richman, 1964; Lewis, 1965; Endo, 1968) have investigated the effectiveness of social and nonsocial reinforcement on performance. Lewis, Wall, and Aronfreed conducted a study of the relative values of social and nonsocial reinforcement in relation to developmental change, using first- and sixth-graders in a binary choice motor task. It was found that only the first-graders under social reinforcement tended toward maximizing the more frequently (70:30 ratio) reinforced response, while other groups showed asymptotic proportions of response below the actual probability of being correct. It was suggested that the value of repeated external social approval decreases with age and that the

intrinsic reinforcement of correct prediction is greater in older children. The social reinforcement used was "good" or "fine," both person, or praise, reinforcers.

Dorwart et al used a motor task similar to Lewis's and also used "good" and "fine" as verbal reinforcers. This study showed that only those children who had been socially deprived and then socially reinforced maximized. Results were interpreted in terms of a social drive theory. A further study in social drive was conducted by Lewis and Richman, but the task was shifted to a two-choice probability learning situation, using a deck of 150 cards. Pictures of dogs and cats were distributed randomly in blocks of 25 cards in the ratio of 70% cats and 30% dogs. The Ss were third-grade girls and they were reinforced for correct responses, using "good," "right," "very good," and "fine." The Es concluded that a variety of social encounters can affect the reinforcement value of a subsequent social reward when praise is used as the reinforcer for a correct response. Lewis and Richman considered all four reinforcement words as praise. While it must be acknowledged that random use of the four words in the experiment would not invalidate experimental results, Lewis and Richman did not establish that the probability learning task was equivalent to the motor task of the previous experiments. If the tasks are not equivalent, then there is no rationale for the belief of Lewis and Richman that social reinforcement has differential effect on a probability learning task.

In Lewis's 1965 study, he used the same apparatus and reinforcer words as in the Lewis and Richman experiment, but conducted only 30 trials. There is no indication that Lewis considered possible differences between reinforcer words or that they were used randomly. A more recent study by Endo used essentially the same apparatus as Lewis except that the former's card deck had the numbers 4 and 7 stamped on them in the ratio of 70:30. The social reinforcement was "good," "fine," and "you're doing swell."

Results of the foregoing studies indicate that performance reinforcers become more important as an individual grows older, while person reinforcers are more important in young children. In all of the studies but that of Kintz and Pappas, which investigated sensitivity to various words in a college population, the Ss were children. The implication is that performance reinforcers may be clearly better than person reinforcers

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by the time that an individual is of college age.

In the studies on social vs nonsocial reinforcement, the effect of the former on performance was demonstrated, but no evidence was offered that the differential value of verbal reinforcers was taken into consideration. In addition, the studies that used probability learning (Lewis & Richman, 1964; Lewis, 1965; Endo, 1968) did not establish that social reinforcement had more effect on performance than nonsocial reinforcement in that type of task. This relationship is assumed by the Es to exist, but no data is presented to support this assumption.

In an effort to reconcile some of these differences, this study was performed to answer the following questions: (1) In a college age population, are performance reinforcers more effective than person reinforcers in a probability learning task? (2) Does social reinforcement have a differential effect over nonsocial reinforcement in a probability learning task? (3) Does the presentation of both social and nonsocial reinforcement enhance performance on a probability learning task and, if so, does the order of presentation of the social and nonsocial reinforcement make a difference?

SUBJECTS

Fifty male undergraduate students from the introductory psychology S pool at Syracuse University were used. They were divided randomly into five experimental groups: verbal performance reinforcer (PERF), verbal person reinforcer (PERS), nonsocial reinforcement (NS), nonsocial reinforcement followed by verbal person reinforcer (NS/PERS), and verbal person reinforcer followed by nonsocial reinforcement (PERS/NS).

PROCEDURE

The learning task was a two-choice probability learning problem. The materials consisted of a deck of 180 cards. Blue stars and silver stars were pictured on the backs of the cards in the ratio of 70% blue and 30% silver. The master deck was divided into subdecks of 10 cards, each of which had a random distribution of seven blue and three silver stars. A restriction was placed on the randomness so that not more than six blue stars could occur consecutively. This limitation was imposed to agree with Endo's experimental design.

The Ss were tested individually by a male E who sat across a desk from the S. The Ss were told that the purpose of the experiment was to determine the effectiveness of extrasensory perception in a two-choice learning situation. The following instructions

were then given: "On the desk you will see a stack of cards turned face down. On the back of each of these cards is either a silver star or a blue star. These cards are sorted in a prearranged order known to me. Your task is to guess which color star will appear on the next card." Several cards were then guessed by the S in order to familiarize him with the procedure. He was then asked if there were any questions and then given the following instructions: "Now we are ready to continue to the experimental deck of cards. Please guess which color star (silver or blue) will appear next and continue on through the deck until you have guessed the last card. Your guesses will be tape-recorded so that they may later be checked for accuracy." The tape recorder, used to provide a minimum of distraction to the S during the task, was then turned on, and S was told, "Please begin."

The S then guessed silver or blue on 180 cards, the reinforcement contingent upon the experimental condition. In the PERF group, the S was reinforced for each correct response with the word "right," but was not shown the card, so that he had no independent knowledge of results and, consequently, no nonsocial reinforcement. In the PERS group, the same procedure as above was used, but the word "good" was substituted for "right." In this condition, the card was also not shown. In the NS group, no verbal reinforcement was given, but the S was shown the card after each of his guesses. The card was removed from sight prior to his next guess. In the NS/PERS group, the S was shown the card immediately after each guess, followed by the verbal reinforcement "good" each time his guess was correct. The card was removed from sight prior to the next guess. In the PERS/NS group, the verbal reinforcement "good" was given for each correct response, followed by turning the card for the S to see. If the S guessed incorrectly, he was merely shown the card, with no verbal reinforcement. The card was removed from sight prior to the next guess.

Following the final card, a postexperimental questionnaire was administered to determine if the S had previous knowledge of the experiment, if he guessed the purpose of the study, and what strategy, if any, he used in guessing the cards. All Ss were then thoroughly shown the purpose of the experiment, the deception was explained, and the S was asked not to reveal the purpose of the study to any other person for 2 weeks.

RESULTS

The dependent measure was the total number of responses made to the more frequently occurring event

(blue), regardless of whether or not reinforcement was given. Table 1 presents the mean percentage of response to blue in blocks of 10 trials, as well as the grand mean for each experimental condition. A repeated measures analysis of variance was performed on the data to determine if learning occurred and to detect any significant differences between the various groups.

Significant differences were found between the groups ($F = 4.25$, $p < .01$). Analysis of group data revealed that there were significant differences between PERS when compared to both NS and NS/PERS. Similar differences were found in comparing PERS/NS with both NS and NS/PERS. No other comparisons revealed significant differences, although a PERF-PERS test showed $p < .10$.

In order to test the groups in which both social and nonsocial reinforcement was used, an analysis of variance was performed on the data of the NS/PERS and PERS/NS conditions, yielding significant results ($p < .05$). However, comparison of NS/PERS with NS, as well as PERS/NS with PERS, revealed no significant differences.

DISCUSSION

The results of this study do not confirm the contention of Rosenhan and Greenwald that as an individual grows older he becomes more responsive to performance reinforcers. The data show that person reinforcers, such as "good," are effective in enhancing performance in a probability learning task. While the difference between the "good" and "right" reinforcement conditions is not significant ($p > .10$), the results do show that use of both words is, at worst, of equal effectiveness. This is in accord with the Kintz and Pappas findings in a college population that arrived at identical scaling evaluation for both words. As a consequence, it would appear that the studies of Lewis and Richman, Lewis, and Endo were not adversely affected by the random use of both verbal reinforcers.

This experiment also confirms the implicit allegation of Lewis and Richman, Lewis, and Endo that social reinforcement does have a differential effect over nonsocial reinforcement in a probability learning task. Both groups which experienced person reinforcers showed significantly better performance than the group which had merely nonsocial reinforcement. They also showed significantly better performance than the group which had nonsocial followed by social reinforcement. In the case of performance reinforcement, performance was not significantly

Table 1
Mean Percentages of Responses to Blue for Each Group in Blocks of 10 Trials

Group	Blocks of 10 Trials																		Grand Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
PERF	49	48	55	54	53	59	63	65	62	66	70	68	60	65	62	72	67	75	61.8
PERS	51	57	62	71	66	62	67	66	69	64	65	74	64	68	70	75	66	79	62.2
NS	41	51	49	49	60	52	55	60	53	61	55	60	61	58	53	53	54	56	54.5
NS/PERS	46	45	55	56	54	53	60	54	62	57	65	67	61	52	54	64	61	58	56.8
PERS/NS	51	48	52	58	60	67	66	71	75	75	68	74	74	76	60	72	74	67	62.0

better than nonsocial reinforcement.

Results of this experiment do not show that presentation of both social and nonsocial reinforcement either enhances or detracts from performance. Rather, there appears to be a primary effect in that the first reinforcement that the S receives, whether social or nonsocial, seems to overshadow the second reinforcement. From the lack of significant differences between the NS and NS/PERS, as well as the PERS and PERS/NS, it would appear that the second reinforcement to be presented is superfluous. Order of presentation would, therefore, appear to be crucial, with the initial reinforcement carrying the weight of effectiveness.

It could be argued that the PERS condition carries two separate and possibly additive aspects. That is, the verbal reinforcer "good" gives the S information, much the same as the PERF ("right") condition, but it also provides surplus components in the form of praise. Consequently, it would stand to reason that a reinforcer that provides praise in addition to information would be more effective than one that carries only the latter. If the primacy effect is accepted, then the nonsocial reinforcement groups could be expected to perform less well than those that received social reinforcement with its surplus value.

The PERF condition is less easy to handle because it does not vary

differences between person and performance reinforcers' effectiveness in a probability learning task, that social reinforcement has a greater effect than nonsocial reinforcement in a probability learning task, and that when both social and nonsocial reinforcements are presented, a primacy effect takes place and the second reinforcement to be presented becomes superfluous.

significantly from PERS and PERS/NS. In addition, it does not vary significantly from NS and NS/PERS, which compounds the problem. All that can be reasonably inferred is that the use of "right" does have an information value and, being delivered by a human being, it also must be considered a social reinforcer. Statistical results do not allow inferences to be drawn about where the PERF condition "might" be if the number of Ss were larger, or if a different task were used, but it seems safe to say that the PERF condition should be the subject of more study to resolve the dilemma of its relative effectiveness on the reinforcer hierarchy.

In conclusion, this experiment has shown that there are no significant

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