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NEWELL, MARY E. The Effect of Pairing Self-Evaluation with Reinforcement on a Transfer Task Requiring Self-Evaluation. (1975) Directed by: Dr. Rosemary O. Nelson. Pp. 69.

The purpose of this study was to investigate on a transfer task the effect of pairing on an initial task self-evaluative statements with reinforcement. If self-evaluative statements become conditioned reinforcers when they are paired with reinforcement on a training task, these statements should maintain performance on other tasks requiring self-evaluation.

Thirty-six children, aged 4 through 6, who scored 38 or above on the Lee-Clark Reading Readiness Test, were matched on the basis of age, sex, race, and score, and divided into four groups. The study was divided into two stages. During the training stage, subjects in Group 1 (external reinforcement) received feedback from the experimenter concerning the accuracy of their responses, and reinforcement contingent on correct responses. Subjects in Group 2 (self-reinforcement) learned to evaluate the accuracy of their own responses, and received contingent reinforcement. Subjects in Group 3 (external evaluation) received feedback from the experimenter and non-contingent reinforcement. Subjects in Group 4 (self-evaluation) learned to evaluate the accuracy of their own responses, and received non-contingent reinforcement. During the second stage, on the transfer task, subjects in all groups were taught to evaluate the accuracy of their responses, and received non-contingent reinforcement. Subjects continued to work on the training task concurrently with the transfer task during the second stage.

It was predicted that a) during training, groups receiving contingent reinforcement would give more correct responses than groups receiving

non-contingent reinforcement; b) during training, the accuracy of self-evaluations for the two self-evaluation groups would increase over sessions; c) Group 2 (self-reinforcement) whose self-evaluative statements were paired with reinforcement during training would give more correct responses than other groups on the transfer task; and d) self-evaluation groups (2 and 4) would give more accurate self-evaluations than external evaluation groups (1 and 3) on the transfer task.

Three dependent measures were recorded: per cent correct responses, number of responses, and per cent of responses with a correct self-evaluation, for those subjects engaging in self-evaluation. As predicted, during the training stage, subjects who received contingent reinforcement gave a higher per cent of correct responses than subjects who received non-contingent reinforcement. Contrary to prediction, the accuracy of self-evaluation did not change significantly over training sessions. The central prediction of the study, that Group 2 (self-reinforcement) would give more correct responses than other groups on the transfer task, was not confirmed. There were no significant differences among groups on the accuracy of self-evaluation on the transfer task. Thus, the prediction that self-evaluation groups (2 and 4) would give more accurate self-evaluations than external evaluation groups (1 and 3) was not confirmed. These and other results are discussed and suggestions for further research are given.

THE EFFECT OF PAIRING SELF-EVALUATION WITH REINFORCEMENT
ON A TRANSFER TASK REQUIRING SELF-EVALUATION

by

Mary E. Newell
"

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Approved by

Rosemary O. Nelson
Thesis Adviser

APPROVAL PAGE

This thesis has been approved by the following committee of the Faculty of the Graduate School at The University of North Carolina at Greensboro.

Thesis Adviser Rosemary O. Nelson

Committee Members P. Scott Lawrence

Jacquelyn Maclellan

October 27 1975
Date of Acceptance by Committee

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CHAPTER I
INTRODUCTION

The initial work in behavior modification involved demonstrations that a wide variety of behavior problems could be controlled through manipulations of environmental variables by external agents. Certain problems regarding generalization of treatment effects arose, however, when people left the setting in which treatment was conducted. This problem was solved, to some extent, when modification occurred in the client's home environment and when significant persons in the client's environment carried out the treatment program. However, it is not possible to program externally control of all the important variables in a client's environment. In addition, new variables are often introduced which were not considered in the original treatment program. For these reasons, there has been increasing concern with self-management techniques in behavior modification.

Skinner (1953) defines self-control as a set of self-generated behaviors which alters the probability that other self-generated behaviors will occur. Viewed in this way, self-control is a set of behaviors which can be taught in the same way that other behaviors are taught. If an individual can learn to manipulate variables in his environment to control his own behavior, there is no problem of generalization from therapy to the natural environment. In addition, the individual has learned a set of skills which he can apply to new behavior problems, should they arise.

When behavior modification techniques are used with children, objections are often raised that children become dependent on external control. Extrinsic reinforcement is considered to be bribery for good behavior. When children are taught self-management techniques, these problems are avoided.

There has been a recent trend in behavior modification to investigate teaching self-management techniques to children. The results of numerous investigations indicate that even very young children can be taught to control their own behavior.

Meichenbaum and Goodman (1969, 1971) have successfully trained impulsive children to control their behavior by talking to themselves. Children are taught to use self-verbalizations which have been shown to generate behaviors incompatible with impulsive behaviors. Palkes, Stewart, and Kahana (1968) similarly taught hyperactive children to use self-directed verbal commands to modify their impulsive behavior on the Porteus Maze Test. Performance on this test was significantly improved with the use of self commands. Bem (1967) taught three- and four-year-old children a complex task by establishing self-instruction techniques. Blackwood (1970) reduced disruptive behavior in a classroom by teaching children to verbalize the consequences of their behavior and found this method to be more effective than traditional operant conditioning procedures. Kanfer and Zich (1974) taught children to use recorded verbal presentation of positive long-term consequences of non-transgression as a controlling response to increase resistance to temptation. Self-control training was more effective when the experimenter was absent

during training. Drabman, Spitalnik, and O'Leary (1973) taught children to evaluate their academic and social behavior. The students were exposed initially to a token program managed by the teacher and were later taught to match the teacher's evaluations. While teacher evaluation was gradually withdrawn, students were able to maintain high rates of academic behavior, and low rates of disruptive behavior. In addition, behavior changes generalized to periods of the day during which the token program was not in effect.

One type of self-management that has received considerable attention is self-reinforcement. It has often been observed that both children and adults set standards of performance and evaluate their own behavior. Many investigators have explored the development of self-evaluative behavior in children, and the variables controlling its occurrence. The term self-reinforcement encompasses several concepts. The most widely investigated aspects of self-reinforcement are self-recording of behavior, self-evaluation of behavior (right or wrong; good or bad), self-determination of criteria for reinforcement, and self-administration of reinforcement. Some studies have explored all of these components of self-reinforcement, while others have been limited to one or two of the components.

Marston (1964) points out that there have been three areas of investigation in self-reinforcement research: variables influencing the occurrence of self-reinforcement, the direct external reinforcement of self-reinforcement behaviors, and the reinforcing effect of self-reinforcement. The literature covering these three areas will be

reviewed below, with particular emphasis on the reinforcing effect of self-reinforcement.

Studies Investigating Variables Influencing the Occurrence of Self-Reinforcement

There have been many studies which have investigated variables which influence patterns of self-reward. Naturalistic observation reveals that persons differ in the standards they set for their own performance, in their evaluation of their performance, and in self-administration of rewards and punishments, both verbal and extrinsic. Bandura and his associates have investigated the effects of modeling on children's patterns of self-evaluation and self-reward. Bandura and Kupers (1964) exposed children to models who demonstrated either a high criterion for self-reinforcement, or a low criterion for self-reinforcement. A control group was not exposed to any models. Children's patterns of self-administration of candy for performance in a bowling game closely matched those of the model to whom they were exposed. In addition, 27% of the experimental children reproduced the models' exact self-evaluative verbalizations. Bandura, Grusec, and Menlove (1967) found that social reinforcement of a model's high self-imposed criteria for reinforcement resulted in stricter self-imposed criteria among children observing the model. Bandura and Whalen (1966) found that prior success or failure on a task interacts with the effect of modeling of self-reward patterns in a complex relationship.

Kanfer (1966) investigated the frequency of self-reinforcement following incorrect performance. Results of this study indicate that

inappropriate self-reinforcement decreases with age. In addition, children ranked in the top half of their class take fewer undeserved rewards than those ranked in the lower half of their class.

In summary, children's patterns of self-reward closely match those of models to whom they are exposed, particularly when the model receives reinforcement. The tendency of children to self-administer undeserved rewards decreases with age, and is inversely related to school performance.

Studies Investigating the Direct External Reinforcement of Self-Reinforcement

The studies previously described indicate that patterns of self-reinforcement can be acquired through observation of models. The studies described below involve direct reinforcement of patterns of self-reinforcement. Studies in this area have involved adults, rather than children.

Kanfer and Marston (1963a) reinforced self-evaluative judgments, independent of task performance, with social approval. Subjects who received social reinforcement for positive self-evaluations gave more self-reinforcing responses than subjects who received social disapproval. Those effects generalized to a new task in which the person administering reinforcement was absent. Kanfer and Marston (1963b) found that subjects given instructions establishing lenient criteria for self-reinforcement gave more frequent, but inappropriate self-reinforcement.

It appears that patterns of self-reward can be established through modeling or through direct reinforcement of self-reinforcing responses.

It is likely that both of these procedures are operative in the natural environment.

Studies Investigating the Reinforcing Effect of Self-Reinforcement

Several studies have investigated the question of whether self-evaluation and self-administered reinforcement maintain behavior as effectively as externally administered reinforcement. Most of these studies have been concerned with children in classroom settings.

Broden, Hall, and Mitts (1971) found that self-recording of study behavior during class increased studying, while self-recording of talking out behavior decreased talking out. For these students, merely recording the occurrence of their own behavior modified that behavior in a socially acceptable direction, perhaps because the self-recording prompted self-evaluation and subsequent behavior changes (Kanfer, 1970).

Bandura and Perloff (1967) found self-monitored and externally imposed reinforcement to be equally effective in maintaining children's responding on a task which involved turning a wheel on a mechanical device. In general, children chose high performance standards for self-reinforcement, rather than maximizing reinforcement. Self-imposition of a standard of performance, without self-reinforcement for achieving the standard, had no response maintenance value. Glynn (1970) found that self-determined reinforcement was as effective as experimenter-determined reinforcement in maintaining performance with history and geography material in a ninth-grade classroom. Felixbrod and O'Leary (1973) obtained the same results with second-grade children using

arithmetic materials. Glynn, Thomas and Shee (1973) taught self-control procedures, consisting of self-assessment of on-task classroom behavior, self-recording of this behavior, self-determination of reinforcement, and self-administration of reinforcement, to elementary school children. Self-control procedures maintained on-task behavior at the same level that had previously been established with externally-administered reinforcement. Bolstad and Johnson (1972) found no difference between externally administered reinforcement and self-administered reinforcement in the reduction of disruptive classroom behavior.

Contrary to previous results which established the comparability of external reinforcement and self-reinforcement, Santogrossi, O'Leary, Romanczyk, and Kaufman (1973) found that self-evaluation of behavior without tokens was not effective in reducing disruptive behavior. In addition, they found that a self-administered token program was not effective in maintaining reductions in disruptive behavior previously established with a token program administered by the teacher. Conversely, Lovitt and Curtiss (1969) found self-imposed contingencies to be more effective than teacher-imposed contingencies in maintaining academic behavior with a twelve-year-old student.

Several studies have demonstrated that self-reinforcement during acquisition maintains responding during a subsequent extinction period more than external reinforcement. Kanfer and Duerfeldt (1967) found that a group of subjects given control over delivery of reinforcement performed better during extinction than subjects to whom reinforcement was administered by the experimenter. Johnson (1970) compared the

effects of external and self-regulated token reinforcement programs on attentive behavior in second-grade boys. Both external and self-reinforcement maintained high response rates on a match-to-sample task. During the initial part of extinction, the self-reinforcement group performed better than the external reinforcement group. Johnson and Martin (1972) compared three groups of children on performance of visual discrimination. One group of children were reinforced on an externally-managed token system. A second group was taught to evaluate the correctness of their response, and to administer their own reinforcement. A third group was taught to evaluate the correctness of their response, but was given non-contingent reinforcement. Both contingent reinforcement procedures yielded higher response rates than non-contingent reinforcement throughout acquisition and extinction. During the first session of extinction, the self-reinforcement group responded at a higher rate than the external reinforcement group. The authors suggest that the greater resistance to extinction of the self-reinforcement group was due to the establishment of self-evaluation as a conditioned reinforcer. For the self-reinforcement group, self-evaluation ("I was right") was paired with reinforcement. During extinction, it is likely that subjects continued to evaluate their responses. For the self-reinforcement group, these self-evaluations had become conditioned reinforcers. Therefore, their behavior was more resistant to extinction. This effect disappeared during the second session of extinction.

Rachlin (1974) suggests that self-reinforcement maintains behavior through its discriminative stimulus properties, rather than through its

reinforcing properties. Self-reinforcing responses provide immediate feedback which makes the long-term consequences of behavior more salient. According to Rachlin, self-reinforcement is a form of secondary reinforcement. Secondary reinforcement is effective through its discriminative stimulus properites. It does not, however, have reinforcing properties, since it cannot maintain behavior in the absence of external reinforcement.

Statement of the Problem

The literature reviewed above suggests that self-reinforcement is effective in maintaining a high level of performance on a variety of tasks. Both Johnson and Martin (1972) and Rachlin (1974) have offered the hypothesis that self-reinforcement becomes a conditioned reinforcer through its association with extrinsic reinforcement. Several studies have offered support for this hypothesis, demonstrating that self-reinforcement groups show greater resistance to extinction than external reinforcement groups. Johnson and Martin (1972) propose that self-reinforcement serves a reinforcing function, rather than the stimulus function proposed by Rachlin. Both theories, however, consider self-reinforcement to be a form of secondary reinforcement.

The purpose of the present study was to test the conditioned reinforcement hypothesis using performance on a transfer task, rather than resistance to extinction, as the dependent variable. If specific self-evaluative statements, such as "I was right" become conditioned reinforcers when they are paired with extrinsic reinforcement, these statements should not only increase resistance to extinction, but they should

also maintain performance on other tasks which require self-evaluation. Thus, this study introduced an alternative paradigm to test the conditioned reinforcement model of self-evaluation. The present study also assessed the effect of feedback concerning the accuracy of self-evaluative statements on the accuracy of self-evaluation.

The study involved four-, five- and six-year-old children. Subjects were selected from day care centers. Each subject received a total of three hours of instruction in reading readiness skills during the two stages of the experiment. There were six instruction sessions during each stage of the experiment. During the first stage, children received individual instruction with the Peabody Rebus Reading Program. Subjects were assigned to one of four groups. The experimental design was $2 \times 2 \times 6$, with two between-subjects factors (contingent vs. non-contingent reinforcement; external vs. self-evaluation) and one factor with repeated measures (instruction sessions). One group of subjects received feedback from the experimenter concerning the accuracy of their responses, and reinforcement contingent on correct responses. A second group evaluated the accuracy of their own responses using color-coded feedback in the workbook, and self-administered reinforcement contingent on correct responses. A third group received feedback from the experimenter concerning the accuracy of their responses, and non-contingent reinforcement. A fourth group learned to evaluate the accuracy of their responses using color-coded feedback in the workbook, and received non-contingent reinforcement. Both the contingent and non-contingent self-evaluation groups received feedback from the experimenter when they gave an incorrect self-evaluation.

During the second stage of the study, children continued instruction with the Peabody workbook, following the same procedures for each group as were described for Stage 1. In addition, children received instruction on letter-sound combinations with the Language Master. All children were taught to use feedback recorded on stimulus cards to evaluate the accuracy of their responses. After an initial training session, children were allowed to work independently with the Language Master. All children received non-contingent reinforcement. The purpose of this procedure was to determine if the deliberate pairing of self-evaluative responses with extrinsic reinforcement on one task would improve the ability of self-evaluation to maintain performance on a related task. Training procedures with the Peabody workbook were continued during Stage 2 to maximize generalization of the reinforcing effect of self-evaluation. If self-evaluative statements become more effective in maintaining responding when they are paired with external reinforcement, subjects trained to self-evaluate with contingent reinforcement should perform better on subsequent tasks requiring self-evaluation than subjects trained to self-evaluate with non-contingent reinforcement, or subjects trained with external evaluation. Specifically, it was predicted that, during the first stage, groups receiving contingent reinforcement would make more correct responses than those receiving non-contingent reinforcement. It was also predicted that the accuracy of self-evaluation would improve over trials during the first stage for both self-evaluation groups. The same pattern of results was predicted for performance on the Peabody Rebus Reading Program during the second

stage. For instruction with the Language Master, it was predicted that Group 2, which performed self-evaluation with contingent reinforcement, would make more correct responses than the other groups on the letter-sound combinations. In addition, it was predicted that both self-evaluation groups, contingent and non-contingent reinforcement, (Groups 2 and 4) would give more accurate self-evaluations on the transfer task, since they received feedback concerning the accuracy of self-evaluation during the training task.

CHAPTER II

METHOD

Subjects

Thirty-six subjects were selected from two United Day Care Centers and one private day care center. After obtaining parental permission (see Appendix A), 75 children from the ages of 4 to 6 years were screened for the study with the Lee Clark Reading Readiness Test. Testing was conducted in groups of five children. A minimum score of 38 was selected as a criterion for participation in the study, producing 39 eligible subjects. The maximum score possible on this test is 62; a score of 38 is considered to be low average.

Nine subjects were assigned to each of four groups. Groups were matched on the basis of age, reading readiness score, sex and race. Seven subjects were later dropped from the study, due to frequent absences or to their withdrawal from the day care center. Two subjects were dropped from Group 1, one subject from Group 2, three subjects from Group 3, and one subject from Group 4. Appendix B lists subjects' age, Lee-Clark Reading Readiness scores, race and sex. The results of analysis of variance for age and pretest scores are presented later.

Materials

The Peabody Rebus Reading Program, Introducing Reading Book I, is a programmed reading readiness workbook with a picture vocabulary. The program begins with matching pictures and progresses through sentence completion and questions and answers, using a picture vocabulary. The child chooses the correct answer from two or three alternatives. Answers

are marked with a moistened pencil eraser. The correct answer turns green, incorrect answers turn red. During the study, if a child completed Book I, he continued with Introducing Reading Book II.

The Language Master is a tape recorder. Stimulus cards have a tape strip with space for both the teacher and the student to record verbal responses on the card. Individual letters were presented on each card. The sound of each of 15 letters and 3 letter combinations was recorded on the cards by the experimenter. The specific stimuli used are listed in Appendix C.

Experimenters

In addition to the author, there were three other experimenters in the study. All were undergraduates receiving psychology course credit for participation in the study. For scheduling convenience, two experimenters instructed children on Tuesday and Thursday, and two experimenters instructed on Monday, Wednesday, and Friday. Undergraduate experimenters received written instructions which specified the procedure for the experiment. Instructions to the experimenters are presented in Appendix D.

Procedure

Following subject selection, the study was divided into two parts. The first part included instruction with the Peabody Rebus Reading Program. The second part included instruction with the Peabody Rebus Reading Program and the Language Master.

Instruction. Each subject received a total of 1 30-minute and 13 15-minute sessions of instruction during the two stages of the experiment. Each subject received instruction each day at approximately the same time, for 14 consecutive days (excluding weekends). Each stage of the study involved 7 sessions (1 training session and 6 instruction sessions). In some cases, absences made it necessary to extend the instruction period in order to complete 14 instruction sessions. Children who were absent for more than 1 week were dropped from the study. Eight to 12 children received individual instruction each day, until those children completed the experiment. Each set of 8 to 12 children included subjects from all four experimental groups. Experimenters recorded all of the subjects' responses on data sheets. The same data sheets were used throughout the two stages of the study. The data sheet is located in Appendix E.

Stage 1. During Stage 1, each subject received one training session of 30 minutes, and six 15-minute sessions of instruction with the Peabody Rebus Reading Program. For each new set of vocabulary words that were introduced in the workbook, the experimenter pointed to each word and said its name. The subject was asked to repeat each word after the experimenter. Then the subject was asked to point to each word and say its name. If the subject was incorrect, the experimenter gave the correct answer, and the subject repeated it. For the review sections of the workbook, the experimenter asked the subject to point to each picture and give its name. If the subject was incorrect, the experimenter gave the correct answer, and the subject repeated it. For the new skill

sections of the workbook, the experimenter explained the new skill and did one workbook frame with the subject. New word, review, and new skill exercises did not count in the subjects' scores.

Group 1 -- External Reinforcement. Each subject received one 30-minute training session to familiarize him with the workbook. The subject looked at each workbook frame and marked the correct answer with a pencil eraser dipped in paint to mask the color-coded feedback provided by the workbook. After each correct response, the experimenter said "you were right" and gave the subject a piece of candy. After each incorrect response, the experimenter said "you were wrong" and asked the subject to choose another alternative. This procedure continued until the subject chose the correct answer. The subject received a piece of candy only if his first choice was correct.

Instruction sessions were identical in procedure to the training session, except reinforcement was given with a token system to avoid satiation effects. The subject received a token after each correct response. Each time the subject earned five tokens he was allowed to choose a piece of candy.

Group 2 -- Self-Reinforcement. Each subject received one 30-minute training session to familiarize him with the workbook. The subject looked at each workbook frame and chose an answer by marking the space with a moistened eraser. If the space turned green, the subject said "I was right" and took a piece of candy. If the space turned red, the subject said "I was wrong" and chose another alternative. This procedure

continued until the subject chose the correct answer. The subject was instructed to take a piece of candy only if his first choice was correct. If the subject evaluated his response incorrectly, the experimenter asked him to repeat the correct evaluation. The experimenter said "Only say 'I was right' when you are correct and the answer space turns green."

Instruction sessions were identical in procedure to the training session, except reinforcement was given with a token system. The subject took a token after each correct response. Each time he earned five tokens he chose a piece of candy.

Group 3 -- External Evaluation. Each subject received a 30-minute training session to familiarize him with the workbook. The subject looked at each workbook frame and marked the correct answer with a pencil eraser dipped in paint. After each correct response the experimenter said "you were right." After each incorrect response, the experimenter said "you were wrong" and asked the subject to choose another alternative. This procedure continued until the subject chose the correct alternative. Each subject received non-contingent reinforcement (candy) on a variable time schedule. The amount and schedule of reinforcement was determined by yoking subjects receiving non-contingent reinforcement to those receiving contingent reinforcement. Subjects in Group 3 were yoked to subjects in Group 1.

Instruction sessions were identical in procedure to the training session, except that reinforcement was given with a token system. Tokens were given on a variable time schedule, determined by yoking subjects in

Group 3 to subjects in Group 1. Each time the subject received five tokens, he was allowed to choose a piece of candy.

Group 4 -- Self-Evaluation. Each subject received a 30-minute training session to familiarize him with the workbook. The subject looked at each workbook frame and chose an answer by marking the space with a moistened pencil eraser. If the space turned green, the subject said "I was right." If the space turned red, the subject said "I was wrong" and chose another alternative. This procedure continued until the subject chose the correct alternative. If the subject evaluated his response incorrectly, the experimenter asked him to repeat the correct evaluation. The experimenter said "Only say 'I was right' when you are correct and the answer space turns green." Each subject received non-contingent reinforcement, as described for Group 3. Subjects in Group 4 were yoked to subjects in Group 2.

Instruction sessions were identical in procedure to the training session, except that reinforcement was given with a token system. Tokens were given on a variable time schedule determined by yoking subjects in Group 4 to subjects in Group 2. Each time the subject received five tokens, he was allowed to choose a piece of candy.

Stage 2. During Stage 2, each subject received one 15-minute training session with the Language Master. Following training, each subject received six additional experimental sessions. During the first 5 minutes of each session, all subjects continued training with the Peabody Rebus Reading Program, each group following the procedures described for

it in Stage 1. During Stage 2, however, the token system was eliminated. The contingent reinforcement groups (1 and 2) received candy after each correct response when working with the Peabody workbook. Groups 3 and 4 received candy according to a variable time schedule determined by yoking subjects in Group 3 to subjects in Group 1, and yoking subjects in Group 4 to subjects in Group 2.

During the last 10 minutes of each session, subjects received individual instruction with the Language Master. All groups received the same training session and 10-minute instruction session with the Language Master.

Training Session. The subject was taught to operate the Language Master. He first listened to the tape of each card and repeated the answer. Then he was asked to guess the sound of each letter. After each response, the subject listened to the correct response. If his response was correct he said "I was right." If his response was incorrect, he said "I was wrong." During the training session, the experimenter corrected the subject's self-evaluations when they were incorrect. All subjects received non-contingent reinforcement on a variable time schedule, as is subsequently described. The average interval between reinforcers during Language Master instruction sessions was determined by calculating the average number of reinforcers received by all subjects during Stage 1. Subjects received an average of four reinforcers during each 15-minute session of Stage 1. The average interval between reinforcers during Stage 1 was, therefore, approximately 4 minutes. In order to maintain an average interval of 4 minutes during 10-minute

Language Master sessions, non-contingent reinforcement was administered after 3 minutes and after 8 minutes of each instruction session. During the 15-minute Language Master training session, non-contingent reinforcement was administered after 3 minutes, after 8 minutes, after 11 minutes, and after 15 minutes.

Instruction Sessions. The subject looked at each card and said the sound of the letter printed on it. After each response, the subject listened to the correct response recorded on the card. If the subject's response was correct, he said "I was right." If his response was incorrect, he said "I was wrong." The experimenter did not correct the subject's self-evaluations during these sessions. If the subject gave three responses without making a self-evaluation, the experimenter prompted him by saying "Don't forget to say whether you are right or wrong." If the subject forgot to give a response before putting the card in the machine, the experimenter prompted him by saying "Don't forget to guess the sound of the letter before you put the card in." All subjects received non-contingent reinforcement during each session, as was previously described.

Throughout the study, candy was put in small bags and given to the subjects at the end of each session. Candy was also given to the other children at the day care centers.

Dependent Measures

Three dependent measures were obtained for responses on Stages 1 and 2 of the Peabody Rebus Reading Program and the Language Master: per

cent of correct responses per session, number of responses per session, and per cent of responses per session for which a correct self-evaluation was given.

Table 10 shows the results of the analysis of variance for the following three dependent variables: the proportion of responses per session for which the subject gave a correct self-evaluation, the mean number of responses per session, and the mean per cent of correct responses per session. The first two analyses were conducted on the data from the first four sessions of the experiment, while the third analysis was conducted on the data from all eight sessions. The results of the analyses of variance are shown in Table 10. The results of the analyses of variance show that the main effect of treatment was significant for all three dependent variables. The results also show that the treatment by session interaction was significant for the proportion of correct self-evaluations and the mean per cent of correct responses per session, but not for the mean number of responses per session. The results of the analyses of variance also show that the treatment by treatment by session interaction was significant for the proportion of correct self-evaluations and the mean per cent of correct responses per session, but not for the mean number of responses per session.

Table 11 shows the results of the analysis of variance for the proportion of correct self-evaluations and the mean per cent of correct responses per session. The results of the analysis of variance show that the main effect of treatment was significant for both dependent variables. The results also show that the treatment by session interaction was significant for both dependent variables, but not for the treatment by treatment by session interaction. The results of the analysis of variance also show that the treatment by treatment by session interaction was significant for the proportion of correct self-evaluations and the mean per cent of correct responses per session, but not for the mean number of responses per session.

DISCUSSION

The "independent" and "dependent" analyses have demonstrated the importance of the treatment by session interaction in the analysis of variance. The results of the "independent" analysis show that the treatment by session interaction was not significant, while the results of the "dependent" analysis show that the treatment by session interaction was significant. The results of the "independent" analysis also show that the treatment by treatment by session interaction was not significant, while the results of the "dependent" analysis show that the treatment by treatment by session interaction was significant.

CHAPTER III

RESULTS

Experimental Design

Separate analyses were done for responses on the Peabody Rebus Reading Program -- Stage 1, the Peabody -- Stage 2, and the Language Master. Analysis of variance with two between-subjects factors (type of reinforcement, type of evaluation) and one within-subjects factor (six sessions) was analyzed for number of responses and per cent correct responses on the training tasks (Peabody program -- Stage 1, Peabody program -- Stage 2) and for all three dependent measures on the transfer task (Language Master -- Stage 2). Analysis of variance with one between-subjects factor (type of reinforcement) and one within-subjects factor (six sessions) was analyzed for the two self-evaluation groups for per cent of responses with a correct self-evaluation on the training tasks (Peabody program -- Stage 1, Peabody program -- Stage 2).

All tables are located in Appendix F. Group means are presented in Tables 1 - 11. Results of analyses of variance for unequal n are presented in Tables 12 - 22. There were seven subjects in Group 1 (external reinforcement), eight subjects in Group 2 (self-reinforcement), six subjects in Group 3 (external evaluation), and eight subjects in Group 4 (self-evaluation).

Pretest

The subjects' ages and pretest scores are listed in Appendix B. A one-way analysis of variance showed no significant differences among experimental groups in age in months ($M_1 = 66.71$, $M_2 = 65.38$, $M_3 = 67.83$,

$M_4 = 65.50$) (Tables 1 and 12) or Lee-Clark Reading Readiness scores ($M_1 = 46.14$, $M_2 = 49.00$, $M_3 = 46.50$, $M_4 = 48.00$) (Tables 2 and 13). Only the 29 subjects who completed the experiment were included in the analysis.

Stage 1 Peabody Rebus Reading Program (Training Task)

Per Cent of Correct Responses. It was predicted that groups receiving contingent reinforcement would give a higher per cent of correct responses per session than groups receiving non-contingent reinforcement. This prediction was confirmed. A three-way analysis of variance (Reinforcement X Evaluation X Sessions) showed that subjects receiving contingent reinforcement gave a higher per cent of correct responses per session ($M = 84\%$) than subjects receiving non-contingent reinforcement ($M = 75\%$), $F(1, 25) = 8.21$, $p < .01$ (Tables 3 and 14).

The per cent of correct responses decreased significantly over sessions ($M = 93\%, 81\%, 77\%, 74\%, 78\%, 74\%$), $F(5, 125) = 12.44$, $p < .01$ (Tables 3 and 14). Newman-Keuls post hoc analysis showed that the per cent of correct responses was significantly higher for sessions 1 and 2 than for sessions 3, 4, 5, and 6. There were no significant differences between sessions 1 and 2, or among sessions 3, 4, 5, and 6.

There were no significant differences in per cent of correct responses between groups receiving external evaluation of responses ($M = 81\%$) and groups using self-evaluation of responses ($M = 79\%$). There were no significant interactions among variables.

Number of Responses. A three-way analysis of variance (Reinforcement X Evaluation X Sessions) showed that the number of responses per session decreased significantly over sessions ($M = 37.17, 29.52, 24.31, 25.31, 21.76, 22.41$), $F(5, 125) = 35.22$, $p < .01$ (Tables 4 and 15). There was a significant Reinforcement X Sessions interaction, $F(5, 125) = 3.36$, $p < .01$ (Tables 4 and 15). A Newman-Keuls post hoc analysis of the interaction showed that, during the first training sessions, subjects receiving non-contingent reinforcement made more responses than subjects receiving contingent reinforcement. For subjects receiving contingent reinforcement, a significantly larger number of responses were made during sessions 1 and 2 ($M = 32.93, 29.93$) than during sessions 3, 4, 5, and 6 ($M = 23.80, 24.67, 21.00, 22.87$). For subjects receiving non-contingent reinforcement, a significantly larger number of responses were made during session 1 ($M = 41.71$) than during sessions 2, 3, 4, 5, and 6 ($M = 29.07, 24.86, 26.00, 22.57, 21.93$). A larger number of responses were made during sessions 2 than during sessions 5 and 6.

There were no significant differences between subjects receiving external evaluation of responses ($M = 26.95$) and subjects using self-evaluation of responses ($M = 26.58$). There were no other significant interactions among variables.

Per Cent of Responses with Correct Self-Evaluation. It was predicted that, for the two self-evaluation groups, the per cent of responses for which a correct self-evaluation was given would increase over sessions. This prediction was not confirmed. A two-way analysis

of variance (Reinforcement X Sessions) showed no significant differences over sessions ($M = 99\%, 99\%, 99\%, 99\%, 99\%, 99\%$) (Tables 5 and 16).

There was no significant main effect for type of reinforcement ($M = 99\%, 99\%$) (Tables 5 and 16). There were no significant interactions among variables.

Stage 2 Peabody Rebus Reading Program (Training Task)

Per Cent of Correct Responses. It was predicted that subjects receiving contingent reinforcement would give a higher per cent of correct responses per session than subjects receiving non-contingent reinforcement. Although this prediction was confirmed for Stage 1 of the Peabody program, it was not confirmed for Stage 2. A three-way analysis of variance (Reinforcement X Evaluation X Sessions) showed no significant difference in per cent of correct responses per session between subjects receiving contingent reinforcement ($M = 82\%$) and subjects receiving non-contingent reinforcement ($M = 77\%$) (Tables 6 and 17).

There were no significant main effects for type of evaluation ($M = 79\%, 80\%$) or for sessions ($M = 75\%, 80\%, 81\%, 83\%, 78\%, 81\%$) (Tables 6 and 17). There were no significant interactions among variables.

Number of Responses. A three-way analysis of variance (Reinforcement X Evaluation X Sessions) showed no significant main effects for type of reinforcement ($M = 6.74, 6.56$), type of evaluation ($M = 6.78, 6.55$) or sessions ($M = 6.93, 6.86, 6.62, 6.83, 6.31$) (Tables 7 and 18). There were no significant interactions among variables.

Per Cent of Responses with Correct Self-Evaluation. It was predicted that the per cent of responses for which a correct self-evaluation was given would increase over sessions for the two self-evaluation groups. This prediction was not confirmed. A two-way analysis of variance (Reinforcement X Sessions) showed no significant differences over sessions ($M = 99\%, 97\%, 99\%, 97\%, 96\%, 94\%$) (Tables 8 and 19).

Subjects receiving non-contingent reinforcement gave a significantly higher per cent of responses with a correct self-evaluation ($M = 99\%$) than subjects receiving contingent reinforcement ($M = 94\%$), $F(1, 14) = 4.71$, $p < .05$ (Tables 8 and 19). There were no significant interactions among variables.

Stage 2 Language Master (Transfer Task)

Per Cent of Correct Responses. It was predicted that Group 2 (self-reinforcement) would give a higher per cent of correct responses on the transfer task than the other experimental groups. This prediction, the central prediction of the study, was not confirmed. A three-way analysis of variance (Reinforcement X Evaluation X Sessions) showed no significant main effects for type of reinforcement ($M = 23\%, 25\%$) or type of evaluation ($M = 20\%, 28\%$) (Tables 9 and 20). There were no significant interactions among variables.

The per cent of correct responses increased significantly over sessions for all four groups ($M = 16\%, 18\%, 24\%, 28\%, 28\%, 31\%$), $F(5, 125) = 12.45$, $p < .01$ (Tables 9 and 20). A Newman-Keuls post hoc analysis showed that the per cent of correct responses was significantly higher for session 6 than for sessions 1, 2, and 3. The per cent of correct

responses was significantly higher for sessions 3, 4, and 5 than for sessions 1 and 2.

Number of Responses. A three-way analysis of variance (Reinforcement X Evaluation X Sessions) showed no significant main effects for type of reinforcement ($M = 36.61, 38.63$), type of evaluation ($M = 39.32, 36.18$) or sessions ($M = 34.66, 38.72, 37.59, 37.13, 37.97, 39.45$) (Tables 10 and 21). There were no significant interactions among variables.

Per Cent of Responses with Correct Self-Evaluation. It was predicted that subjects using self-evaluation of responses during the training task would give a higher per cent of responses with a correct self-evaluation on the transfer task than subjects receiving external evaluation of responses during the training task. This prediction was not confirmed. A three-way analysis of variance (Reinforcement X Evaluation X Sessions) showed no significant difference in the per cent of responses with a correct self-evaluation between subjects trained with external evaluation ($M = 66\%$) and subjects trained with self-evaluation ($M = 59\%$) (Tables 11 and 22).

The per cent of responses for which a correct self-evaluation was given increased significantly over sessions for all four groups ($M = 52\%, 59\%, 62\%, 69\%, 69\%, 64\%$), $F (5, 125) = 2.36$, $p < .05$ (Tables 11 and 22). A Newman-Keuls post hoc analysis showed that the per cent of responses with a correct self-evaluation was significantly higher during session 4 than during session 1. There were no other significant differences among sessions.

There was no significant main effect for type of reinforcement ($M = 59\%, 66\%$) (Tables 11 and 22). There were no significant interactions among variables.

CHAPTER IV
DISCUSSION

In general, the results of the study are not consistent with the predicted results.

Accuracy of Responses -- Training Task

The only predicted result which was obtained was the higher per cent of correct responses for subjects receiving contingent reinforcement than for subjects receiving non-contingent reinforcement during Stage 1 of the training task. This relationship has been firmly established in previous research with both adults and children. There was no difference between the number of responses produced by subjects receiving contingent and non-contingent reinforcement. It can be concluded, therefore, that contingent reinforcement increased the accuracy of responses, rather than the rate of responding. The higher per cent of correct responses for subjects receiving contingent reinforcement was not observed during Stage 2 of the training task. There are several reasons for this result. The Peabody Rebus Reading Program became progressively more difficult. During Stage 2, most of the subjects showed a decrease in accuracy of responses, although this decrease was not significant. Therefore, the effect of reinforcement decreased. Another factor which could have decreased the effect of reinforcement is satiation. It is possible that the children became less interested in the candy reinforcement as the study progressed.

Changes in the Accuracy of Self-Evaluation -- Training Task

It was expected that the accuracy of subjects' self-evaluation in the two self-evaluation groups would increase over sessions during Stage 1 and Stage 2 of the training task. This result was not observed. All subjects achieved almost perfect accuracy of self-evaluations on the Peabody program during the first session and maintained fairly good accuracy thereafter. Therefore, there was no opportunity for improvement.

Accuracy of Responses -- Transfer Task

On the transfer task during Stage 2, the predicted superiority of Group 2 (self-reinforcement) which systematically paired reinforcement and self-evaluation during training was not observed. There was no significant difference between groups in the per cent of responses on the Language Master which were correct. This result is not consistent with Johnson and Martin's (1972) hypothesis that self-evaluation becomes a conditioned reinforcer through pairing with primary reinforcers. Johnson and Martin (1972) found that self-evaluative responses increased resistance to extinction when they were paired with primary reinforcement during acquisition. There are several possible reasons for failure to obtain results consistent with the hypothesis derived from Johnson and Martin's research.

One factor which influenced the lack of significant differences between groups is the large error variance in the statistical analysis. There was a large amount of variability between subjects. Between-subject variability could have been produced by several factors. The experimenters made several errors in procedure throughout the study.

Future research of this type should, when possible, increase the time spent in training experimenters. Another factor which increased between-subject variability was large individual differences in initial performance on the letter-sound combinations. The selection of subjects using the Lee Clark Reading Readiness pretest did not produce a homogeneous group of subjects with respect to knowledge of letter-sound combinations. Future research involving this task should use a pretest which involves the names or the sounds of the letters.

Another reason for the absence of differences between groups on the accuracy of responses is the brevity of the training period. It is possible that the number of sessions spent with the Peabody Rebus Reading Program was not sufficiently long to produce observable effects of pairing reinforcement with self-evaluation.

A third factor which could have produced the lack of differences between groups during the transfer task is the dissimilarity of the training and transfer tasks. It is possible that the effects of the training task did not generalize to the transfer task because the tasks and the types of feedback used were too dissimilar.

Finally, it is probable that the children used in the study had some previous experiences which paired self-evaluation and reinforcement. Self-evaluative responses may already serve to maintain behavior for children of this age. It is possible, therefore, that experimental pairings of self-evaluative responses with reinforcement had little effect above the effect of previous pairings in the natural environment. Future research should investigate the effects of pairing self-evaluation and

reinforcement with younger children. Another possibility would be to select children whose behavior is not maintained by self-evaluation, and observe the effects of pairing self-evaluative responses with reinforcement.

Accuracy of Self-Evaluation -- Transfer Task

It was predicted that subjects who were trained in self-evaluation on the training task (self-reinforcement and self-evaluation groups) would give more accurate self-evaluations on the transfer task. This result was not obtained. The most probable reason for this result is that all the subjects were able to give accurate self-evaluations on both tasks. There were very few inaccurate self-evaluations given on either task. Therefore, the feedback given by the experimenter on the accuracy of self-evaluations had no effect. It is also possible that the types of feedback which served as the basis for self-evaluation on the two tasks were too dissimilar. If this were true, the effects of training in self-evaluation would not generalize from the training task to the transfer task. Several significant results were obtained which were not predicted.

Changes in the Accuracy of Responses -- Training Task

During Stage 1, there was a significant decrease in the per cent of correct responses per session over sessions. This decrease in the accuracy of responses reflects the increasing difficulty of the material in the Peabody Rebus Reading Program. For this sample of children, the programmed sequence of steps progresses too quickly.

Number of Responses -- Training Task

On the training task during Stage 1 there was a significant Reinforcement X Sessions interaction for number of responses. During the first session of Stage 1 with the Peabody Rebus Reading Program, subjects receiving non-contingent reinforcement gave more responses than subjects receiving contingent reinforcement. There is no apparent explanation for this result.

For both groups, more responses were made during sessions 1 and 2 than during subsequent sessions. This decrease in rate of responding probably reflects the increasing difficulty of the material.

Accuracy of Self-Evaluation -- Training Task

During Stage 2 of the training task, subjects receiving non-contingent reinforcement gave a higher per cent of responses with a correct self-evaluation than subjects receiving contingent reinforcement. This result was due to a procedural error made by the experimenters during several of the sessions with the Peabody Rebus Reading Program. The experimenters did not prompt some of the subjects to give a self-evaluation. By chance, this error differentially affected the experimental groups. Failure to prompt subjects in the contingent reinforcement group to give self-evaluations resulted in a decrease in the per cent of responses for which a correct self-evaluation was given in this group.

Changes in the Accuracy of Responses -- Transfer Task

On the transfer task during Stage 2, there was a significant increase in the per cent of correct responses over sessions. This

indicates that the children were able to learn letter-sound combinations, using only the feedback from the pre-recorded Language Master tapes. This suggests that the Language Master may be an effective method of teaching basic phonetic skills to pre-school children.

Changes in the Accuracy of Self-Evaluation -- Transfer Task

On the transfer task during Stage 2, the per cent of responses for which a correct self-evaluation was given increased over sessions. It is not possible to determine from the statistical analysis whether the rate of self-evaluation or the accuracy of self-evaluation increased. From observation of the data, it appears that the rate of self-evaluation increased over sessions. The children were reminded to give self-evaluations after three responses without a self-evaluation. It is probable that this prompting served to increase the rate of self-evaluation over time. The children acquired the habit of evaluating their responses.

Conclusions

The results of this study do not support Johnson and Martin's (1972) hypothesis that self-evaluation becomes a conditioned reinforcer when it is paired with primary reinforcement. However, the procedural difficulties which arose during the present study, discussed above, limit the conclusions which can be drawn from the study. In addition, the present study used a transfer of training paradigm, rather than the resistance to extinction paradigm used by Johnson and Martin (1972). Further research in this area is needed.

Replications of the present study should incorporate changes designed to avoid the procedural difficulties described previously. Pre-tests used to match groups should be directly related to the experimental task, to avoid the large individual differences encountered in the present study. A longer training period for experimenters would reduce the number of procedural errors made during the study. Experimental reliability could also be increased by the presence of a second experimenter during each experimental session to record procedural errors made by the primary experimenter. To insure the avoidance of reinforcer satiation effects, toys or trinkets could be substituted for candy reinforcers.

In addition to general procedural changes, replications of the present study should include new paradigms for the assessment of conditioned reinforcement effects. The current literature on conditioned reinforcement includes paradigms which are considered to be more useful than the resistance to extinction paradigm used by Johnson and Martin (1972) and the transfer of training paradigm used in the present study.

Additional research is needed to distinguish between theories which propose that self-reinforcement maintains behavior through its stimulus properties and theories which propose that self-reinforcement serves a reinforcing function.

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Appendix A
Parental Permission Letter

January 21, 1974

TO: Parents of Cinder-Fella Children
FROM: Mrs. Holmes, Dr. Nelson, Ms. Newell
RE: Project at Cinder-Fella by UNC-G

Dr. Rosemary Nelson (379-5013) and Ms. Mary Newell of the Psychology Department at UNC-G would like to do a project which would involve the 4- and 5-year-old children at Cinder-Fella. The purpose of the project is to teach the children how to evaluate their own work in reading readiness as being correct or incorrect.

The project would involve three types of materials: the Lee-Clark Reading Readiness Test, the Peabody Rebus Reading Readiness workbook, and the Language Master. Each child would be involved in the project for 13 days, $\frac{1}{2}$ -hour per day. All parts of the project would be conducted at Cinder-Fella. The results of the project would be available at Cinder-Fella.

If you have any questions, or if you do NOT want to give your child permission to participate in this reading readiness project, please ask at Cinder-Fella or call Dr. Nelson (379-5013). Thank you very much for your cooperation.

Appendix B

Subjects

		Age in Months	Race	Sex	Pretest Score
Group 1 (ER)	S ₁	68	N	M	40
	S ₂	67	N	F	60
	S ₃	58	N	F	38
	S ₄	60	W	F	54
	S ₅	70	N	M	39
	S ₆	67	N	M	49
	S ₇	77	N	F	43
Group 2 (SR)	S ₈	71	N	M	49
	S ₉	65	N	F	61
	S ₁₀	57	N	F	38
	S ₁₁	57	N	M	43
	S ₁₂	59	N	M	52
	S ₁₃	71	N	M	55
	S ₁₄	67	N	F	51
	S ₁₅	76	N	F	43
Group 3 (EE)	S ₁₆	71	N	M	43
	S ₁₇	71	N	F	50
	S ₁₈	73	N	F	38
	S ₁₉	55	N	F	40
	S ₂₀	70	N	M	59
	S ₂₁	67	N	M	49
Group 4 (SE)	S ₂₂	71	N	M	44
	S ₂₃	60	N	F	38
	S ₂₄	71	N	M	42
	S ₂₅	64	W	M	56
	S ₂₆	51	N	F	45
	S ₂₇	67	N	F	49
	S ₂₈	73	N	F	54
	S ₂₉	67	N	F	56

Appendix C
Language Master Stimulus Cards

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Appendix D
Instructions to Experimenters

Stage 1

General Instructions

New Words: Point to each picture, say its name and ask the subject to repeat it. Then ask the subject to point to each picture and say its name. Correct him if the answer is incorrect and ask him to repeat the correct answer. Then, whether or not the subject has answered correctly, go on to the next frame.

Review Frames: Ask the subject to point to each picture and say its name. If he is incorrect, say the correct answer and ask him to repeat it. Do this only once and go on to the next frame.

New Skills: Explain the task, work through the first frame with the subject, demonstrating the correct procedure if necessary. Do not count this first frame of the new skill in the data. However, follow the procedure for the different groups, giving reinforcement to reinforcement groups (1 & 2) if correct the first time, and have the self-evaluation groups (2 & 4) say "I was right" or "I was wrong" as described in the instructions.

Reinforcement: Reinforcement will be small pieces of candy. For contingent reinforcement groups (1 & 2), each time the child marks a correct answer, a piece of candy will be put in a small bag. Second and third choices are not reinforced, even if they are correct. For non-contingent reinforcement groups (3 & 4), candy will be put in their bags at intervals determined by subjects in Groups 1 and 2. For instance, if a subject in Group 1 received candy at 3, 7, 9, and 20 minutes into the interval, the next subject in Group 3 will receive candy at exactly those intervals, regardless of whether he has answered a problem correctly.

Data Sheets: Each time the subjects marks an answer space, put an "X" under either correct or incorrect response on the data sheet. Put the "X" next to the number indicating how many minutes have passed in the interval when the subject marked the answer pace. For Groups 2 and 4, mark either correct or incorrect self-evaluation, when the subject says "I was right" or "I was wrong."

Specific Instructions for Groups

Group 1 (External Reinforcement)

Training Session: Tell the subjects they are going to play a game. Tell them you will put candy in their bags each time they mark a correct answer, and that they may take their candy home with them at the end of

the day. Turn to the first page of the book. Show them the first set of new words and say "Each of these pictures stands for a word." Then introduce the first set of words, using the procedure described above for new words. Then go to the next frame. Point to the box. Say "I want you to see if you can find a picture just like this one over here." Ask the subject to point to the correct answer. Then show him how to dip his pencil eraser in the paint and mark the space under the picture. Tell him to color in the space under the correct answer. If the subject chooses the correct answer, say "you were right," and tell him to choose a piece of candy to put in his bag. If the subject chooses the incorrect answer, say "you were wrong" and ask him to choose another answer. Repeat the above procedure until the subject chooses the correct answer.

Instruction Sessions: The procedure is the same as the one used during training, except that the initial demonstration of how to mark the answer is not necessary. However, if the subject seems to have forgotten how to answer the problems you may tell him to dip his pencil eraser in the paint and mark the answer space. Continue the procedures for new skills, new words, and review words for 15 minutes. Mark all responses as correct or incorrect on the data sheet. Do not count second or third guesses in the data.

Group 2 (Self-Reinforcement)

Training Session: Tell the subjects they are going to play a game. Tell them you will put candy in their bags each time they mark a correct answer, and that they may take their candy home with them at the end of the day. Turn to the first page of the book. Show them the first set of new words and say "Each of these pictures stands for a word." Then introduce the first set of words, using the procedure described above for new words. Then go to the first frame. Point to the box. Say "I want you to see if you can find a picture just like this one over here." Then show him how to dip his pencil eraser in water and mark the space under the answer. Say "If you pick the correct answer, your mark will turn green. Green means go ahead, you were right. If you are right and the answer space turns green, I want you to say 'I was right.' If you mark the wrong answer, your mark will turn red. Red means stop, you were wrong. If you are wrong and the answer space turns red, I want you to say 'I was wrong' and pick another answer. When you are right and the answer space turns green, you may choose a piece of candy to put in your bag." Now ask the subject to choose an answer, and follow the procedure described above, in a step-by-step manner. Prompt the subject for each step. If the subject's answer is wrong, ask him to choose another answer and repeat the evaluation. If the subject evaluates his response incorrectly, say "Only say 'I was right' when you have picked the right answer and the mark has turned green." Ask him to repeat the correct evaluation.

Instruction Sessions: The procedure is the same as the one used for training, except initial demonstrations of how to mark the answer space and how to evaluate the responses are not necessary. However, if the

child seems to have forgotten any of the procedures, you may prompt him verbally. If he forgets to evaluate his response say "You forgot to say whether you were right or wrong." Follow the procedures for new words, review words, and new skills for 15 minutes. Mark all responses as correct or incorrect on the data sheet. Do not count second or third guesses in the data.

Group 3 (External Evaluation)

Training Session: Repeat the procedure described for Group 1, except, before the training begins, say that you will drop candy into the bags while the subjects are working, and that they may take their candy home with them at the end of the day. Follow the procedure for administration of non-contingent reinforcement, described previously.

Instruction Sessions: Repeat the procedure for Group 1, except, follow the procedure for administration of non-contingent reinforcement.

Group 4 (Self-Evaluation)

Training Session: Repeat the procedure described for Group 2, except, before training begins, say that you will drop candy into the bags while the subjects are working, and that they may take their candy home with them at the end of the day. Follow the procedure for administration of non-contingent reinforcement, described previously.

Instruction Sessions: Repeat the procedure described for Group 2, except follow the procedure for administration of non-contingent reinforcement.

Stage 2

During this stage, subjects will work for 5 minutes with the Peabody books, and for 10 minutes with letter-sound combinations with the Language Master. When working with the Peabody, follow the same procedures as were followed for Stage 1, except eliminate the tokens. The contingent groups will get a piece of candy after each correct response, and the non-contingent groups will be yoked to the contingent groups as before. When working with the Language Master, all groups will follow the same procedures, and all groups will receive non-contingent reinforcement, the same amount each day. The procedure for the Language Master is as follows.

Training Session

Tell the subject that each letter makes a sound and if he puts the card in the machine it will tell him what sound the letter makes. For 5 minutes, have the subject put each card in the machine, listen to the sound and repeat it. Then ask the subject to look at each letter and give its sound. After he answers, tell him to put the card in the machine and listen to the correct answer. If his answer was the same as

the one on the card, he will say "I was right." If his answer was different from the one on the card, he will say "I was wrong" and repeat the correct answer.

Give non-contingent reinforcement to all subjects. I will write out the schedule to follow when giving reinforcement. It will be the same for all subjects, and will be the same each day. Tell the subject that you will be putting candy in his bag while he works.

Instruction Sessions

For the first 5 minutes of each session, work with the Peabody books, following the same procedures as before, except give candy instead of tokens, as described above. During the last 10 minutes of each session, work with the Language Master. Before each session, remind the subject that he is to guess the sound of each letter, then put the card in the machine to see if he was right. If his answer is the same as the one on the card, he should say "I was right." If his answer is different from the one on the card, he should say "I was wrong" and repeat the correct answer. After giving these instructions start timing the 10 minutes. Do not correct the subject when he gives the wrong self-evaluation. Just let him work. If he stops working, you may prompt him by saying "Why don't you do the next one?" However, don't give any other prompts or instructions, and do not correct any mistakes. Give candy non-contingently, following the schedule I give you.

Revisions and Clarifications

Stage 1

During 15-minute instruction sessions, reinforcement will be on a token system. For Groups 1 and 2, a token will be given after each correct answer. When the subject has earned five tokens, he may chose a piece of candy to put in his bag. For Groups 3 and 4, tokens will be given on a variable time schedule, determined by yoking subjects in Group 3 to subjects in Group 1 and yoking subjects in Group 4 to subjects in Group 2. The procedure for determining the schedule by which tokens are given non-contingently is the same as was described previously for the non-contingent administration of candy. After the subject has received five tokens, he may choose a piece of candy to put in his bag.

Stage 2

When working with the Language Master, if the subject does not guess before putting the card in, count it as an incorrect answer. After this do not count it if he gives a self-evaluation, since there was no response for him to evaluate. Just mark under incorrect answer and go on to the next card.

When working with the Language Master, if the subject gives an answer, but does not give a self-evaluation, mark under correct or incorrect answer, but do not ask him whether he was right or wrong. Just let him go on to the next card. For the Peabody books, continue to ask the subject to give a self-evaluation when he forgets to evaluate his response.

If the subject gives three answers without giving a self-evaluation when working with the Language Master, remind him that he should tell you whether he is right or wrong. But only count self-evaluations given after future cards. In other words, if you remind him and he says "I was right" or "I was wrong" referring to the card he just completed, do not count this self-evaluation. Only count self-evaluations which are made after responses which follow the reminder.

If the subject forgets to guess before putting a Language Master card in the machine, remind him to guess before the next card.

Appendix E

Data Sheet

Child's Name _____ Date _____
Experimenter's Name _____

Minutes	Correct Response	Incorrect Response	Correct SE	Incorrect SE
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

Total Number Correct Responses _____ Total Number Correct SE _____
Total Number Incorrect Responses _____ Total Number Incorrect SE _____

Table 1

Mean Age of Subjects

Age-related Group	% Age of Sample
Group A: Centenarian individuals	66.25
Group B: Middle-aged individuals	27.50
Group C: Younger individuals	6.25
Group D: Control individuals	5.00

Appendix F**Tables**

Table 1
Mean Age of Subjects

Experimental Group	\bar{X} Age in Months
Group 1 (external reinforcement)	66.71
Group 2 (self-reinforcement)	65.38
Group 3 (external evaluation)	67.83
Group 4 (self-evaluation)	65.50

Table 2
Mean Lee Clark Reading Readiness Score

Experimental Group	\bar{X} Score
Group 1 (external reinforcement)	46.14
Group 2 (self-reinforcement)	49.00
Group 3 (external evaluation)	46.50
Group 4 (self-evaluation)	48.00

Table 3
Mean Per Cent Correct Stage 1 Peabody Rebus Reading Program (Training Task)

		Sessions					
		1	2	3	4	5	6
Contingent Reinforcement	External Evaluation Group 1	97	87	83	80	85	75
	Self-Evaluation Group 2	94	86	84	78	75	80
Non-Contingent Reinforcement	External Evaluation Group 3	92	70	65	66	80	73
	Self-Evaluation Group 4	87	76	72	72	72	67

Table 4
Mean Number of Responses Stage 1 Peabody Rebus Reading Program (Training Task)

		Sessions					
		1	2	3	4	5	6
Contingent Reinforcement	External Evaluation Group 1	31.86	32.86	24.43	24.43	22.00	23.72
	Self-Evaluation Group 2	33.88	27.38	23.25	24.88	20.13	22.13
Non-Contingent Reinforcement	External Evaluation Group 3	39.83	26.67	26.00	24.67	23.50	23.83
	Self-Evaluation Group 4	43.13	30.88	24.00	27.00	21.88	20.50

Table 5

Mean Per Cent Responses with Correct Self-Evaluation Stage 1
Peabody Rebus Reading Program (Training Task)

	Sessions					
	1	2	3	4	5	6
Contingent Reinforcement Group 2	99	99	98	99	99	99
Non-Contingent Reinforcement Group 4	99	99	99	99	99	99

Table 6
Mean Per Cent Correct Stage 2 Peabody Rebus Reading Program (Training Task)

		Sessions					
		1	2	3	4	5	6
Contingent Reinforcement	External Evaluation Group 1	84	77	70	78	87	88
	Self-Evaluation Group 2	84	81	93	85	72	80
Non-Contingent Reinforcement	External Evaluation Group 3	65	86	66	85	83	69
	Self-Evaluation Group 4	62	76	86	83	70	83

Table 7

Mean Number of Responses Stage 2 Peabody Rebus Reading Program (Training Task)

		Sessions					
		1	2	3	4	5	6
Contingent Reinforcement	External Evaluation Group 1	7.86	7.29	7.43	5.57	6.57	6.00
	Self-Evaluation Group 2	7.50	7.13	5.50	7.75	6.25	6.13
Non-Contingent Reinforcement	External Evaluation Group 3	6.50	7.00	7.33	6.67	6.17	7.00
	Self-Evaluation Group 4	5.88	6.13	6.50	7.13	6.50	6.25

Table 8

Mean Per Cent Responses with Correct Self-Evaluation Stage 2
Peabody Rebus Reading Program (Training Task)

	Sessions					
	1	2	3	4	5	6
Contingent Reinforcement Group 2	99	93	99	91	91	79
Non-Contingent Reinforcement Group 4	99	99	99	99	99	99

Table 9
Mean Per Cent Correct Stage 2 Language Master (Transfer Task)

		Sessions					
		1	2	3	4	5	6
Contingent Reinforcement	External Evaluation Group 1	11	12	19	22	23	28
	Self-Evaluation Group 2	22	23	22	33	32	33
Non-Contingent Reinforcement	External Evaluation Group 3	11	18	23	22	21	29
	Self-Evaluation Group 4	18	19	32	32	32	35

Table 10
Mean Number of Responses Stage 2 Language Master (Transfer Task)

		Sessions					
		1	2	3	4	5	6
Contingent Reinforcement	External Evaluation Group 1	35.14	42.43	39.14	35.57	37.71	38.71
	Self-Evaluation Group 2	32.88	33.25	35.00	36.38	36.13	38.13
Non-Contingent Reinforcement	External Evaluation Group 3	39.17	43.33	41.33	41.50	36.33	42.67
	Self-Evaluation Group 4	32.63	37.50	36.00	36.00	41.25	39.00

Table 11

Mean Per Cent Responses with Correct Self-Evaluation Stage 2 Language Master
(Transfer Task)

		Sessions					
		1	2	3	4	5	6
Contingent Reinforcement	External Evaluation Group 1	32	69	69	73	67	64
	Self-Evaluation Group 2	48	48	45	64	69	64
Non-Contingent Reinforcement	External Evaluation Group 3	66	68	68	78	73	73
	Self-Evaluation Group 4	64	55	70	63	66	58

Table 12
Analysis of Variance for Age of Subjects

Source	df	MS	F
Between Groups	3	9.06	<1.00
Error	25	47.21	

Table 13

Analysis of Variance for Lee Clark Reading Readiness Test Scores

Source	df	MS	F
Between Groups	3	12.96	<1.00
Error	25	57.61	

Table 14

Analysis of Variance for Per Cent Correct Stage 1 Peabody Rebus
Reading Program (Training Task)

Source	df	MS	F
Between Subjects			
Reinforcement	1	2.40	8.21**
Evaluation	1	0.06	<1.00
Reinforcement X Evaluation	1	0.03	<1.00
Error	25	0.29	
Within Subjects			
Sessions	5	1.12	12.44**
Reinforcement X Sessions	5	0.06	<1.00
Evaluation X Sessions	5	0.11	1.22
Reinforcement X Evaluation X Sessions	5	0.05	<1.00
Error	125	0.09	

** $p < .01$

Table 15

Analysis of Variance for Number of Responses Stage 1 Peabody Rebus
Reading Program (Training Task)

Source	df	MS	F
Between Subjects			
Reinforcement	1	144.52	1.65
Evaluation	1	8.18	<1.00
Reinforcement X Evaluation	1	33.06	<1.00
Error	25	87.43	
Within Subjects			
Sessions	5	974.55	35.22**
Reinforcement X Sessions	5	92.89	3.36**
Evaluation X Sessions	5	28.25	1.02
Reinforcement X Evaluation X Sessions	5	30.16	1.09
Error	125	27.67	

**p < .01

Table 16

Analysis of Variance for Per Cent Responses with Correct Self-Evaluation Stage 1 Peabody Rebus Reading Program (Training Task)

Source	df	MS	F
Between Subjects			
Reinforcement	1	0.01	<1.00
Error	14	0.02	
Within Subjects			
Sessions	5	0.02	<1.00
Reinforcement X Sessions	5	0.03	<1.00
Error	70	0.03	

Table 17

Analysis of Variance for Per Cent Correct Stage Peabody Rebus
Reading Program (Training Task)

Source	df	MS	F
Between Subjects			
Reinforcement	1	0.71	<1.00
Evaluation	1	0.05	<1.00
Reinforcement X Evaluation	1	0.01	<1.00
Error	25	1.07	
Within Subjects			
Sessions	5	0.15	<1.00
Reinforcement X Sessions	5	0.27	<1.00
Evaluation X Sessions	5	0.60	2.06
Reinforcement X Evaluation X Sessions	125	0.29	

Table 18

Analysis of Variance for Number of Responses Stage 2 Peabody Rebus
Reading Program (Training Task)

Source	df	MS	F
Between Subjects			
Reinforcement	1	1.49	<1.00
Evaluation	1	2.14	<1.00
Reinforcement X Evaluation	1	0.99	<1.00
Error	25	10.73	
Within Subjects			
Sessions	5	2.00	<1.00
Reinforcement X Sessions	5	4.50	1.16
Evaluation X Sessions	5	5.85	1.50
Reinforcement X Evaluation X Sessions	5	1.92	<1.00
Error	125	3.90	

Table 19

Analysis of Variance for Per Cent Responses with Correct Self-Evaluation Stage 2 Peabody Rebus Reading Program (Training Task)

Source	df	MS	F
Between Subjects			
Reinforcement	1	3.87	4.71**
Error	14	0.82	
Within Subjects			
Sessions	5	0.46	1.77
Reinforcement X Sessions	5	0.41	1.58
Error	70	0.26	

** $p < .01$

Table 20

Analysis of Variance for Per Cent Correct Stage 2 Language Master
(Transfer Task)

Source	df	MS	F
Between Subjects			
Reinforcement	1	0.03	<1.00
Evaluation	1	1.51	<1.00
Reinforcement X Evaluation	1	0.01	<1.00
Error	25	1.88	
Within Subjects			
Sessions	5	0.61	12.45**
Reinforcement X Sessions	5	0.05	<1.00
Evaluation X Sessions	5	0.02	<1.00
Reinforcement X Evaluation X Sessions	5	0.03	<1.00
Error	125	0.05	

**p < .01

Table 21

Analysis of Variance for Number of Responses Stage 2 Language
Master (Transfer Task)

Source	df	MS	F
Between Subjects			
Reinforcement	1	177.26	<1.00
Evaluation	1	477.16	<1.00
Reinforcement X Evaluation	1	7.43	<1.00
Error	25	734.60	
Within Subjects			
Sessions	5	79.45	<1.00
Reinforcement X Sessions	5	1.63	<1.00
Evaluation X Sessions	5	67.72	<1.00
Reinforcement X Evaluation X Sessions	5	42.27	<1.00
Error	125	98.94	

Table 22

Analysis of Variance for Per Cent Responses with Correct Self-Evaluation Stage 2 Language Master
(Transfer Task)

Source	df	MS	F
Between Subjects			
Reinforcement	1	0.95	<1.00
Evaluation	1	0.92	<1.00
Reinforcement X Evaluation	1	0.03	<1.00
Error	25	3.08	
Within Subjects			
Sessions	5	0.50	2.36*
Reinforcement X Sessions	5	0.27	1.31
Evaluation X Sessions	5	0.23	1.11
Reinforcement X Evaluation X Sessions	5	0.21	<1.00
Error	125	0.21	

* $p < .05$