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EFFECTS OF TASK TYPE AND DIFFICULTY LEVEL ON RATES OF SELF-REINFORCEMENT IN CHILDREN

by

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GRADUATE COLLEGE

I hereby recommend that this dissertation prepared under my direction by Arthur Irving Molho entitled Effects of Task Type and Difficulty Level on Rates of Self-Reinforcement in Children be accepted as fulfilling the dissertation requirement of the degree of Doctor of Philosophy

George W. Fabiano — 2/27/72

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After inspection of the final copy of the dissertation, the following members of the Final Examination Committee concur in its approval and recommend its acceptance:*

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ABSTRACT

The present study investigated the effects of two markedly different tasks, each of which was presented at two levels of difficulty, upon rates of self-reinforcement (SR) in 120 third grade children. SR was defined as a situation in which Ss self-determined and self-dispensed reinforcers (points) according to their judgments of how much they deserved for the efforts they had made on the task, regardless of the correctness of their responses. The two contrasted tests, presented in 10-page booklets, were (academic) reading selections, each followed by a multiple-choice question; and an ambiguous, gamelike (visual-motor) line-drawing task for which there were no criteria of correctness. Difficulty was varied by using reading selections for different grades and by varying the number of dots to be connected by lines. No correct answers were provided for the academic task. Subjects were categorized into blocks according to school reading achievement test scores to control for the effect of reading ability upon the academic test.

Primary hypotheses from previous research predicted the following: (1) boys would exceed girls in mean SR rates, (2) academic task Ss would exceed the ambiguous visual-motor task Ss in mean SR, (3) Ss given the difficult

levels of the tasks would take more SR than Ss given the simple levels, and (4) Ss in the lower blocks of reading achievement would take more SR than the Ss who tested higher in reading achievement. A 2 x 2 x 2 x 5 x 10 randomized blocks design with repeated measures within Ss was used, including sex of S, task type, difficulty level, blocks, and pages of the test booklet (the repeated measure). One task type and difficulty level of the task was assigned to each S randomly within his reading achievement block.

At each administration in a classroom setting, all Ss assigned to one of the tasks were present. They were told they could win prizes by working on the booklets; the Ss were also told that the points they would give themselves were worth prizes. The instructions for both tasks described how, for each page, the Ss were to decide how hard they had worked and assign themselves points (from 0 to 100) for that page based on their decision. Academic Ss were told that correct answers were not necessary. Visual-motor Ss were asked to connect dots with lines in any way they chose, according to an imaginary game in which a cartoon Martian tells things to Charlie Brown characters by drawing lines between dots. All Ss were given prizes at the end of the day.

The results showed significant (.05) differences for sex, in that boys took greater SR than girls, and for

the difficulty level, in that Ss having the difficult materials took more SR than Ss given the simpler materials. Visual-motor task Ss unexpectedly exceeded academic task Ss in mean SR (.05), but no significant differences appeared among the reading achievement blocks. Further analysis suggested that the academic Ss' lower SR rates were not the result of their basing SR on the correctness of their answers.

The findings supported hypotheses derived from research using the "deservingness" criterion of SR employed in this study, while not supporting hypotheses based on the "correctness" criterion of SR. Ambiguity apparently did not influence deservingness-SR in the same way as it affected correctness-SR in previous studies. Young children were shown capable of accurately evaluating the effortfulness of even ambiguous tasks and appropriately judging their deservingness. It was suggested that young children may respond to SR methods with greater appropriateness than has often been thought possible.

CHAPTER 1

INTRODUCTION AND BACKGROUND RESEARCH

The process of self-evaluation is a frequent human activity, and perhaps one of the most significant functions by which an individual directs his behavior toward selected goals. Indeed, it might be argued that the qualities of an individual's self-evaluations ultimately influence his emotional states, interpersonal relationships, and achievements. The present study restricts the consideration of self-evaluation to qualitatively positive forms, such as praise or reward, which are called self-reinforcements. While not all self-evaluations are positive, and some of the related studies cited have dealt with negative responses, the diverse research in this area primarily has focused upon positive self-appraisal, as defined operationally in each study.

Research derived from a number of theoretical orientations has contributed to the field of study which is generally termed self-reinforcement (SR). Carl Rogers and his associates provided much of the background work in self-concept research, which brought attention to the importance of self-evaluative processes in psychotherapy. Other major sources of interest in SR process have been

operant conditioning and related behavior modification techniques, and social learning theory.

Two aspects of Rogers' (1957, 1967) work have been important in the development of SR research. First, his personality theory emphasized the role played by covert self-evaluation in successful psychotherapy. In support of his theory, he hypothesized and studied the types of verbal and non-verbal therapist behavior (therapeutic conditions) which he considered to be desirable in maximizing client progress. His research, in effect, provided an analysis of methods for changing self-evaluative processes. In particular, he emphasized that the provision of "unconditional positive regard" by the therapist would lead to a greater positive self-evaluation by the client. One might define such an increase in positive self-evaluation as a higher rate of positive covert reinforcement or positive SR.

Marston (1965) presented an interesting discussion of the relationship between SR and another Rogerian therapeutic condition, that of accurate empathic understanding This involves the therapist's sensitive, and insightful restatement of the ideas and feelings revealed by the client. Marston viewed this condition as one in which the therapist acts as a generalized reinforcer of client self-evaluation, resulting in the client's increased use of, and reliance upon, his own self-evaluations.

Since self-evaluations frequently can be positively reinforcing (i.e., SR), they can support behavioral changes desired by the client. The behavioral changes become the source for additional positive self-evaluations; they also generate changes in the self-concept that guide further behavioral change.

Johnson and White (1971) provide support for Marston's formulation in an experiment based upon similar premises; they studied self-observation as a technique of behavior change. Two groups of college students were engaged in reporting the amount of time they spent either in studying or dating, ostensibly for a survey of student life. A third group served as no-contact controls. The students observing their studying time were told that they would not have to increase or decrease their usual study time.

Johnson and White assumed that the process of self-observing a value-laden act, would provide the setting for positive or negative self-evaluation. They further assumed, as did Marston (1965), that the self-evaluations thus generated could provide positive reinforcement or punishment for the observed behaviors. The frequency of the behaviors thus would be influenced; further influence might also derive from the individual's knowledge of the results of his self-observation (Kanfer, 1970).

Johnson and White (1971) hypothesized on the basis of the foregoing assumptions, that self-observation of a desired behavior would increase the frequency of that behavior, while observing disapproved behavior would decrease the frequency of the behavior. Academic achievement data for the three groups of Ss, who were all enrolled in the same course, supported the research hypothesis. Those Ss who self-observed studying had earned significantly more course credits after six weeks than the controls, while the observers of dating time earned an intermediate amount of credit. This experimental evidence suggests that perhaps one might interpret behavioral changes achieved by Rogerian therapy as resulting from newly established patterns of client self-evaluation.

The second aspect of Rogers' work which has influenced the field of SR research, was his effort to operationalize and quantify changes in the self-concept. He used rankings of verbal statements (Q sorts) to obtain a measure of the client's self-attitudes, including their positive and negative aspects. Although many aspects of the Q-sort technique have been controversial and seriously criticized (Cronbach and Gleser, 1954; Wylie, 1961), the method has been widely applied and has provided a useful measure of individual changes in self-attitudes.

Other researchers, some clinically and some experimentally oriented, were interested in modifying statements

expressed by subjects or clients. They approached the problem with the techniques of operant conditioning and produced a body of work known as verbal conditioning, which has also contributed to the study of SR processes (Krasner, 1965). A major thrust of this work has involved the exploration of the situations (Williams, 1959), stimuli (Weiss, Krasner, and Ullmann, 1963), and even the subject (Ayllon and Haughton, 1964) and experimenter (Reece and Whitman, 1962) characteristics which affect the conditioning of verbal behavior, using social reinforcement.

A variety of subject tasks has been used in these studies, some more typical of normal conversational activities than others. Reinforcements given by the experimenters have ranged from a very carefully uttered "mm-hmm" to a more unrestricted and combined use of verbal ("mm-hmm," "good") and non-verbal (smiling, nodding) stimuli, as determined by the individual experimenter.

Of interest here is the fact that by using this approach, acknowledged by many as a quasi-treatment procedure, a number of aspects of subject verbalizations have been changed. These include: the frequency of emotional or affect-related statements (Krasner, Ullman, Weiss, and Collins, 1961), the frequency of self-referring statements (Adams and Hoffman, 1960), the pleasantness of emotional words (Ullman, Krasner, and Gelfand, 1963), the quality of

word associations (Sommer, Witney, and Osmond, 1962), and the pathological character of verbalizations (Dinoff, Horner, Kurpiewski, Rickard, and Timmons, 1960).

Additionally, research using attitude and personality scale measurements has shown that verbal conditioning leads to changes in the responses made by subjects to these scales (Staats and Staats, 1958; Staats, Staats, Heard, and Finley, 1962). It has also been shown that an attitude changed by verbal conditioning will influence the subject to behave differently toward the object of that attitude (Krasner, Ullman, and Fisher, 1964).

Thus verbal conditioning research has provided an experimentally derived set of procedures capable of generating changes in Ss' verbal behaviors which parallel those described by Rogers. The conditioning process can increase SR by changing the proportion of positive to negative self-statements, and presumably those overt behaviors related to a more positive self-evaluation. It is significant that some of the specific verbal categories susceptible to conditioning, such as emotional words, are precisely those upon which many traditional forms of verbal psychotherapy focus their attention.

The psychological approaches mentioned thus far have considered the development or manipulation of the S's SR pattern as events achieved by the application of some sort of external influence, i.e., the behaviors of the

therapist or researcher. The contributions to SR research given by the school of operant conditioning also include, however, the concepts and related behavioral methods which were termed "self-control" by Skinner (1953). Self-control procedures, many of which are adaptations of principles of behavior modification therapy, generally involve the training of the patient in specific techniques which he applies to himself to change undesired behaviors (Cautela, 1969).

The major technique employed in these self-control procedures (and contained even within the respondent types of procedures such as relaxation training and desensitization) is the S's contingent application of positive and/or negative reinforcers (SR) to his own behaviors and thoughts. In the relaxation and desensitization techniques, some of the reinforcements obtained by the Ss are the inherently pleasurable relaxation responses, the reduction of anxiety and tension, and the ability to engage in a wider range of behaviors.

There are a variety of SR methods used in training Ss in self-control, which generally consist of manipulating cover or overt classes of responses (Ferster, Nurnberger, and Levitt, 1962; Goldiamond, 1965; Anant, 1967; Cautela, 1967; and Stuart, 1967). These classes may function as either the responses which are to be modified, or as the positive and negative reinforcing responses which

respectively increase or decrease the frequency of the response to be modified. When covert sensitization (Cautela, 1967) is used as a self-control technique, S attempts to reduce a maladaptive behavior by visualizing a series of highly aversive physical consequences that occur when he imagines or starts to perform the maladaptive behavior. The imaginal responses operate as covert negative reinforcers in this technique. Other methods of self-control similarly involve the covert rehearsal of unpleasant consequences, but differ from covert sensitization in that the consequences are those real, natural outcomes of engaging in the undesirable behavior (e.g., obesity, heart or liver disease).

Homme (1965) has described a self-control technique in which the purpose is to modify covert responses such as thoughts and attitudes towards a given behavioral pattern or toward oneself. The covert response chosen is one antagonistic to an undesirable behavior or attitude; the technique increases the frequency of the antagonistic "coverant" (covert + operant), while not directly eliminating the unwanted behavior or attitude. The coverant to be strengthened is reinforced by the use of a high probability response, according to the Premack (1959) principle: a response of high probability will reinforce one of lower probability.

A number of self-control procedures involve training the S to understand the functional relationships between behaviors and consequences and to use this information in SR of desired behaviors. The general object is for S to strengthen behaviors incompatible with maladaptive ones, either by using tangible reinforcers or alternatively by finding incompatible behaviors that are inherently reinforcing. Another significant aspect of overt self-control procedures is the manipulation by S of both stimulus and reinforcement in modifying behaviors. A new behavior is more rapidly established in new stimulus surroundings, which bear none of the older, undesirable stimulus-response associations. Thus patterns of eating, for example, can be modified more successfully if meals are not eaten in the same television-viewing room where marathon consumption patterns were previously developed.

A final self-control procedure is employed when the goal is reducing the rate of a behavior rather than eliminating it, as in the case of overeating (Ferster et al., 1962; Stuart, 1967). The S is trained to delay or interrupt the usual chain of behaviors preceding the final reinforced response; slowing himself down, interposing additional steps between the first and last responses, and making definite stops in the process in order to break the chain, are specific techniques used. This method thus

consists of a number of simple manipulations by S of his pattern of overt SR.

The concept of self-control, which primarily employs reinforcement principles, has been used in a variety of clinical situations and in these applications has shown promise as an effective SR method. Self-control research has assumed the effectiveness of SR processes as a given effect capable of producing or eliminating specific behaviors. Other researchers have made SR itself the object of study. As an independent variable, its capacity to increase, maintain, or decrease behaviors has been studied; as a dependent variable, factors which affect the adoption, change, and maintenance of SR standards have been studied.

SR as an Independent Variable

The few studies of SR as an independent variable which have been made, validate the utility of SR shown in the clinical self-control procedures already described. Bandura and Perloff (1967) conducted a study comparing the behavior-maintaining ability of SR with that of external reinforcement. Their criteria for SR required that the S prescribe his own standard of behavior, have control over the reinforcers, and give himself the reinforcers. It is interesting that the process of setting one's own standard of behavior (and reinforcement) has not always been

included in this type of research. In general it would seem that the Bandura and Perloff (1967) criteria for SR define essential and correct procedures for any experiment in SR processes.

Bandura and Perloff had children engage in a simple motor activity in this study, and employed four groups: the SR group, an external reinforcement group yoked to the SR group for behavioral standard and magnitude of reinforcement, an incentive-control group given all the reinforcements at the outset, and a no-reinforcement control group. An additional comparison was made with two other small groups of non-reinforced Ss to establish the effect of simply setting one's standard of achievement as compared to having the standard externally imposed.

The results indicated that both the SR and the external reinforcement groups were significantly superior to the two control groups, but not significantly different from each other on the measure of mean number of total responses made. The additional small group comparison showed that the act of setting a behavioral standard itself did not contribute to the maintenance of the response. The findings of this study support the utility of SR processes in a laboratory setting in which Ss were tested individually.

Employing a modified field situation and group data collection, Glynn (1970) designed a study in the

classroom to test the comparative effect of self-determined versus experimenter-determined reinforcement upon learning academic materials. He also employed a group reinforced on the basis of chance, and a no-reinforcement control group. In this design, all reinforcement was administered by the Ss, but the person setting the standard of reinforcement varied. For one group, the experimenter set a specific standard for the number of correct answers needed to earn a token, while the self-determined group was told to make its own decision within the maximum limits of five possible tokens per trial, the same maximum allowed in the experimenter-determined group. There are some problems related to this method and that of Bandura and Perloff (1967) which will be discussed later.

Glynn (1970) found that both the self- and experimenter-determined groups were significantly superior to the chance-reinforced and non-reinforced groups in the mean number of correct test answers given during various phases of the experiment. The self- and experimenter-determined groups increased equally over their baseline performance levels. This result paralleled Bandura and Perloff's (1967) finding that SR and external reinforcement groups were equally superior in performance to the control groups. Another result in Glynn's (1970) study paralleled the latter experiment. He found that SR Ss tended to impose upon themselves the highest work-to-reinforcement

standards of all the groups, resulting in their having to perform the most for each token they took.

Some methodological issues regarding the foregoing studies (Bandura and Perloff, 1967; Glynn, 1970) tend to qualify their apparent demonstrations of the equal effectiveness of SR and external reinforcement in maintaining behavior. In the former study, the effect of yoking the external reinforcement group to the SR group, specifically in terms of magnitude of reward, re-casts the study as a comparison between unrestricted SR and a variable-ratio reinforcement schedule. The unpredictable nature of the amount of reward per trial for the external reinforcement group thus might have confounded the comparison between SR and external reinforcement, such that differences were minimized. Liebert, Speigler, and Hall (1970) performed a similarly designed experiment in which the externally reinforced Ss were allowed to set and change their standard, but were yoked for magnitude of reward to the SR Ss. The externally reinforced Ss, however, received tokens non-contingently. Nevertheless, they behaved as if there was a causal relationship between performance and reward, and changed their standards more often than the SR Ss. They seemed to be influenced by the unpredictable magnitude of reward, as may have occurred in the Bandura and Perloff (1967) study. Although Ss in the latter study could change

standards only once, their perseverance may have been affected.

In the Glynn (1970) study, the SR group was allowed to set both a standard of performance and to administer the reinforcement. Unfortunately, Glynn limited the SR Ss to a maximum number of reinforcers (five) per trial. This restriction creates a major discontinuity between the Glynn and the Bandura and Perloff studies. It would seem that unlimited self-selection of the reinforcement standard is a more realistic procedure for SR research. In addition, the externally-determined reinforcement Ss were allowed to administer their own reinforcements, enabling them to deviate from the standard set for them. The data show, in fact, that while the externally determined Ss had the smallest standard deviation in their performance-to-reinforcement ratios during the study, the SR Ss actually maintained ratios which were the closest to the standard set by the experimenter for the externally-determined group. Perhaps the results would have been different if the latter group had been held to the reinforcement standard set for them by the experimenter.

Johnson (1970) and Johnson and Martin (1971) produced two closely related studies which compared the potentials of SR, external reinforcement, and a control group, for maintaining behavior. Both experiments provided a situation in which a simple discrimination

learning task competed with attractive toys for the attention of the young Ss. The reinforcement contingencies for the task were set by the E in both cases and were based upon correct answers, as in Glynn (1970). All Ss were initially screened for capability on the experimental task.

In each study the SR group was carefully taught how to make the SR response according to E's criteria; later phases of each experiment permitted unsupervised SR responding, although contingencies remained as defined by E. Johnson and Martin (1971), however, never actually permitted Ss to self-administer the reinforcers. Instead their Ss were trained to emit the self-evaluative comment: "I was right," contingent upon a correct response. Points thus earned were visibly recorded by the experimental apparatus, which was under E's control. The reinforcement schedule in this study was also thinned from continuous to FR-5 over several sessions.

Johnson (1970) and Johnson and Martin (1971) found that both SR and external reinforcement had higher response rates during reinforcement and extinction periods than their respective control groups of non-reinforcement and non-contingent reinforcement. Most interesting was the finding, in both cases, that the SR groups demonstrated significantly greater initial resistance to extinction than the external reinforcement groups. Johnson and Martin (1971 also noted that the SR group had a significantly

higher response rate during FR-3 reinforcement than the external Ss. They tentatively explained this and other effects by reference to their theory that self-evaluation in the SR Ss became a conditioned reinforcer which maintained responding on unreinforced trials.

The foregoing studies while supporting the effectiveness, even superiority, of SR methods are based upon the definition of SR as a judgment of "correctness," a matter discussed in more detail below. Another recent comparative SR experiment involving a field situation was presented by Bolstad and Johnson (1971). Some of the procedures of the above studies were used, such as having the E set the reinforcement criteria, dispense the reinforcers, and initially check the SR Ss' accuracy in following this standard. The definition of SR, however, was not one of "correctness" but involved the Ss self-observing the frequency of their deviant disruptive behaviors.

SR Ss were compared with externally reinforced and non-reinforced Ss, all of whom met a baseline criteria measure of high frequencies of deviant behaviors. Deviant behavior rates were modified (for the SR and external reinforcement Ss) by differentially rewarding lower rates of deviancy during specific phases of the study. The results showed that the reinforced groups reduced their rates of deviant behavior significantly more than the controls. Furthermore, the SR group reduced their deviancy

significantly more than externally reinforced Ss during two phases of the experiment; but the authors considered that there were no significant differences in resistance to extinction among the groups. The overall impression was that SR procedures were somewhat superior to external reinforcement methods; at two points in the study the magnitude of the SR superiority was shown by a 40% lower deviancy rate than the externally reinforced Ss.

While these studies (Johnson, 1970; Johnson and Martin, 1971; and Bolstad and Johnson, 1971) indicate promise for SR procedures, they have defined SR in markedly different ways than either Bandura and Perloff (1967) or Glynn (1970). They have not allowed Ss to self-determine reinforcement standards, nor (with one exception) actually have control over and administer the reinforcers to themselves. It is considered here that the lack of these procedures is significant; in many ways these studies are demonstrations of modified external reinforcement techniques, rather than independent SR methods.

One must also consider a factor in these studies whose effect is difficult to evaluate. This type of study presents the Ss with situations in which they are expected to engage in SR. Even the description of the activity as one in which SR may occur, is likely to alter the Ss' expectations about engaging in SR. It is therefore difficult to study SR processes directly, in comparison

with other processes, without taking the risk of subtly influencing the extent to which SR will be manifested by Ss. Such unintended experimental influence has been well documented by Rosenthal (1966).

Furthermore, one must consider the effects of the material reinforcers used. Deci (1971), in a study of the effects of external reward upon intrinsic motivation, validates the principle that material reward (e.g., money) reduces intrinsic motivation to engage in an activity. His findings imply that the material rewards offered in some of the foregoing studies may have reduced the Ss' intrinsic motivation to engage in SR. The purpose of these studies, however, was to compare SR and external reinforcement with regard to their effectiveness in maintaining behavior; thus no evaluation of the influence of material "back-up" reinforcement upon the rate of SR was made. Indeed, it is difficult to conceive of a limited experimental situation in which baseline rated of SR could be obtained without also introducing unwanted experimenter influence.

SR as a Dependent Variable

SR has been the dependent variable studied through experiments conducted in the frameworks of social learning theory and operant conditioning. The experimental tasks in these two groups of studies have differed rather

consistently in their definitions of SR (Bandura, 1970). The operant conditioning studies, which largely follow the pattern of Kanfer and Marston (1963b), require the S to make judgments of the correctness or accuracy of his responses and on that basis to reinforce himself. The reinforcements are typically lights or similar discriminative stimuli.

In the studies conducted in the social learning paradigm, the definitions of SR involve "deservingness," the criteria for which may be given in a rule prescribed in the instructions, or by the model's example, or may be left to S's discretion. The distinction between "correctness" and "deservingness" is significant in that the two may not be positively correlated in a given situation. If the S is asked to perform what he considers to be a meaningless or easy task, he may judge his response as being accurate, but may not feel it merits self-praise (Bandura, 1970). Thus the different definitions of SR have produced a major discontinuity between these two groups of studies.

In general, the social-learning studies have explored various ways in which the SR standard of the S can be influenced. Primary among the variables used has been variations upon modeling (Bandura and Kupers, 1964; Bandura and Whalen, 1966; McMains and Liebert, 1968; Bandura, Grusec, and Menlove, 1967; Allen and Liebert,

1969b; Herbert, Gelfand, and Hartmann, 1969; McMains, 1969; and Ora, 1969). In a typical modeling study, investigating SR standards, the S is invited to play a game (a bowling game with predetermined scores is used nearly universally) which is demonstrated by the model. Using several experimental groups, different SR standards are modeled, after which Ss play the game alone and administer their own SR. Results are analyzed to establish whether or not a modeling effect was induced.

Some experimenters have varied qualitative aspects of the models themselves, such as alleged competency (Bandura and Whalen, 1966), sex (Ofstad, 1967), age and positive interactions with S (Bandura et al., 1967), or live versus symbolic modeling (Allen and Liebert, 1969b). Other studies have concerned themselves with comparisons between modeling procedures and other techniques for influencing the S to adopt a specific SR standard. Direct external reinforcement of the S, variations in the magnitude of direct reward, and variations in the explicitness of the model's statements are comparisons which have been made (Liebert and Allen, 1967; Davis, 1968; Liebert and Ora, 1968; Allen and Liebert, 1969a; Liebert, Hanratty, and Hill, 1969).

Modeling has been successful in both establishing a standard of SR (Bandura and Kupers, 1964), maintaining it in the face of instigations to change it (Davis, 1968),

and eliciting deviation from a previously adopted standard (Allen and Liebert, 1969b). Direct external reinforcement has proven effective in eliciting deviancy from a modeled standard or one already adopted (Allen and Liebert, 1969a; Liebert and Ora, 1968). Modeling was shown to be as effective in imparting a standard of SR as direct reinforcement for adherence to the standard, or verbal instructions regarding the standard (Davis, 1968; Liebert and Ora, 1968; Liebert et al., 1969; McMains, 1969). Increasing the explicitness of the model's self-rewarding or derogating statements while performing led to greater adherence to the SR standard (Liebert and Allen, 1967).

The studies produced in the operant conditioning framework differ in their definition of SR, as previously mentioned, and therefore their findings are difficult to relate to the social learning studies. In general, the design of these experiments involves some discriminative learning (or other judgment) task in which actually correct (or arbitrarily chosen) responses were reinforced with a light or other stimulus. At some point in the experiment, S was asked to push the light switch himself if he thought he was correct in his prior response to the task; SR was defined as the S's administering the light to himself.

It was found that Ss could be operantly conditioned, at varying rates, to engage in SR thus defined; rates of SR established in a training task generalized to a test task

(Kanfer and Marston, 1963a). Increasing the degree to which a task had been learned, prior to testing, resulted in a higher rate of SR and more correct or accurate SR responses. Changing the stimulus materials after initial learning produced a lower rate of SR, but more incorrect SR's. It was also found that when the S was given more rigid or lenient instructions regarding the rules for SR, the rate of SR was reduced or increased, respectively, in relation to the SR rate of control Ss. More lenient instructions also produced more inaccurate SR (Kanfer and Marston, 1963b).

Kanfer (1966) used a task for which it was nearly impossible to make the correct response; thus a S who gave him elf SR for the correct answer was actually cheating. He found that younger children, as well as those given external reinforcement, or those who observed a model engage in SR for this task, gave more inappropriate SR's. Children ranked low in school performance by their teachers took more inappropriate SR's in the reinforcement and modeling groups, and during another task, than did higher-ranked Ss. The first experimental task in this study, however, seems to be inappropriate for analyzing SR since it is primarily a measure of cheating.

In another experiment, also using the "correctness" definition of SR, Marston (1964) studied some variables which are of interest here. He explored the effects of

different reinforcing stimuli and different tasks upon the rate of SR. Subjects were instructed to respond to the various tasks, and evaluate each response (as instructed in the different experimental groups) by turning on a light, taking a chip, or rating their responses on a four-point confidence table. The results indicated that there were no effects upon SR due to the different reinforcing stimuli, but distinct effects related to the different tasks.

Among the tasks used were two unstructured activities (word association and inkblots), two less ambiguous tasks for which S was allowed to see another S's response after he had made his own response (clinical judgment and a visual retention test), and a verbal discrimination task learned to a 50% criterion. Only the SR rates for the verbal learning task and the visual retention test increased over the days of the experiment. This was explained by the author as a practice effect, based on faster acquisition and better retention of the verbal task in the second day. The explanation was supported by previous findings that the amount of learning of a task is related positively to the SR rate (Kanfer and Marston, 1963b).

When the SR rates (proportion of responses reinforced) for the various exercises were studied, it was found that the tasks were clustered according to their relative levels of ambiguity. The clinical judgment and visual retention tests, which were accompanied by another

person's sample responses, had the highest mean SR rates (.8 and .9 respectively), followed by the verbal learning task (.5). The most ambiguous tasks, word association and inkblots, obtained the lowest mean SR rates (.3 and .4 respectively). These findings, together with those relating to the practice effect in two of the tasks, suggest that decreases in ambiguity led to increases in the rate of positive SR--stated differently, more certainty, more positive SR (Marston, 1964).

Except for the latter study, which unfortunately is based upon the "correctness" definition of SR, no studies have examined the effect of the experimental task upon SR rates. Studies made in the social learning framework by Bandura and Perloff (1967) and Glynn (1970) used vastly different situations and SR criteria which make comparisons across tasks difficult. Bandura and Perloff (1967) required Ss to execute a simple motor response; Glynn (1970) employed meaningful academic materials, but prevented Ss from truly setting their own SR standards.

Interestingly, both of the two latter studies found that SR Ss who set their own standards tended to impose the highest work-to-reinforcement ratios of all Ss, earning the least reinforcement for their efforts. There was no clear explanation for this, although Bandura (1970) suggested that Ss may impose such lean reinforcement schedules on themselves to reduce self-devaluation should they take

rewards for trivial work. Glynn (1970) ostensibly prepared academic materials appropriate for the grade-level of his Ss. If, however, they were not sufficiently difficult, Bandura's (1970) suggestion might explain why they imposed such high standards on themselves.

CHAPTER 2

GENERAL PURPOSES AND HYPOTHESES

It has been seen that research in SR has been based upon various tasks and different definitions of SR, and that with but one exception (Marston, 1964), task and methodological differences are confounded across studies, thus impairing comparisons among them. Researchers have often defined procedures for SR experiments which prevent S from setting his own behavioral standards and contingencies or from controlling and dispensing reinforcers as he chooses. It is considered here that the latter practices have actually eliminated many essential self-selecting features from the SR situation.

The present research was designed to avoid the simultaneous confounding of differences in task, method, and SR definition which was found among the studies discussed above. The principal aim was to examine the effects upon SR frequency produced by contrasting types of activities presented consistently within the "deservingness" definition of SR. The procedures required Ss to self-prescribe, self-control, and self-administer their own reinforcers based on their evaluation of what their performances deserved, regardless of correctness.

To obtain a clear contrast between the activities, tasks as different from each other as those used by Bandura and Perloff (1967) and Glynn (1970) were selected, but these were presented within as uniform a procedural context as possible. The two markedly different tasks chosen for the present research were a highly academic activity (reading) and an ambiguous visual-motor activity (line drawing). A finding by the latter researchers that SR Ss tend to choose the leanest reinforcement schedules was also evaluated by varying the difficulty levels of the two contrasted tasks. These variations in the difficulty of the tasks, when related to a measure of the Ss' reading abilities, provided a test of the generality of this research finding and Bandura's (1970) self-devaluation hypothesis. Additionally, sex differences among Ss were evaluated by separate analyses of male and female data.

After consideration of the previously discussed SR research, the following hypotheses were made regarding the expected SR patterns of Ss in the current study:

Hypothesis 1. Boys assign themselves a greater average amount of SR than girls, as indicated by the findings of Bandura and Perloff (1967).

Hypothesis 2. Those Ss given a meaningful and highly structured academic task assign themselves more SR per unit of work than Ss given a relatively unstructured, meaningless, visual-motor task. This

prediction is based upon the data of Kanfer and Marston (1963b) and Marston (1964) which showed that reduced ambiguity leads to higher SR rates.

Hypothesis 3. Those Ss given the materials of either task type at the simple level of difficulty take less SR per unit of work than Ss given the more difficult materials, according to Bandura's (1970) self-devaluation hypothesis.

Hypothesis 4. As a consequence of Hypotheses 2 and 3, the rank order of mean SR frequencies for the different treatment combination groups is, from highest to lowest respectively, difficult academic, simple academic, difficult visual-motor, and simple visual-motor.

Hypothesis 5. Subjects with lower measured ability in reading take a higher average amount of SR on all tasks than Ss with higher measured ability, as indicated by Kanfer (1966).

CHAPTER 3

METHOD

Design

The proposed research involved four experimental groups: difficult academic (DA), simple academic (SA), difficult visual-motor (DVM), and simple visual-motor (SVM). The groups were formed by a random assignment of Ss both within their classrooms and within five previously determined experimental blocks based upon scores from their most recent standardized reading test. Each block contained an equal number of males and females, and an equal number of Ss were assigned to each cell of the analysis of variance design matrix: $S_3[A_2(\text{sex}) \times B_2(\text{task}) \times C_2$ (difficulty level), $\times D_5(\text{blocks})] \times E_{10}(\text{pages})$ (Myers, 1969). The dependent variable was the number of self-reinforcement points assigned by S per unit (page) of the task he completed.

Subjects

One hundred and twenty, third grade children of both sexes were used as Ss from schools in San Mateo County, California, after parental permission had been obtained for their participation. The schools that participated in this study were located within one school district

and were selected to be in socioeconomically similar areas. Any child who was believed to have neurological disorders or who was under psychiatric treatment or who was not a full-time member of his classroom was excluded from the sample.

Materials

The task materials of both types and both difficulty levels were contained in individual booklets of ten pages each--a total of four different booklets. On each page of the academic materials, there were two short paragraphs with a multiple-choice question following each paragraph. The selections were drawn from commercially available educational materials that were compiled separately by grade levels, ranging from first through sixth grades (Boning, 1962). The specific reading skills involved were searching for facts, coming to conclusions, and selecting the main idea. The simple level of the academic task included a mixture of materials for the first, second, and third grades; the difficult level used fourth through sixth grade materials. Correct answers were not provided on the academic task.

The visual-motor task essentially required the Ss to draw lines connecting dots. To remove any possible clue regarding what was a "good" or "correct" performance, the task was presented in a gamelike framework, as follows.

The Ss were asked to pretend that they had arrived from another planet (Mars) where the people cannot talk and do not use letters or words, but where people tell each other things by drawing lines between dots. On each page of the task they were asked to "say something in Martian" by connecting dots with lines, in any way they chose. Interest and creativity were stimulated by having a simple drawing printed on each page, showing a "Martian" pointing, looking, or doing various things on Earth. The dots were located in the foreground below the drawing. The difficult visual-motor task involved twice as many dots per page as the simple visual-motor task. A small box was drawn at the bottom of each page on all of the materials; here Ss chose to write in the number of points they felt they deserved for their performance on that page, regardless of its correctness. A sample of the visual-motor materials is presented in Appendix A.

Procedures

A reading achievement test was administered in the school district just after the experiment was completed. Scores for all Ss on this test were obtained and used to categorize Ss into five experimental blocks, thus allowing for an evaluation of the effects of reading ability upon SR frequency, as described above. Prior to conducting the experiment, the Ss in each classroom were randomly assigned

to one of the two experimental tasks and then randomly to a level of difficulty.

The experiment was conducted in the school setting. The male experimenter (E) was introduced to the class by the teacher at the start of the first hour of the morning. The Ss assigned to one of the task types (i.e., half of the class) were taken to the experimental room and each S was given the materials of the difficulty level that had been randomly selected for him. The other experimental task was administered to the remaining Ss during the second hour. Thus during each administration, there were Ss present from the various levels of the experimental blocks (based on reading achievement scores) and these Ss received either the simple or difficult level of the same task. Throughout the study each task type was presented an equal number of times during the first and second hours.

After the Ss were seated in front of their designated task booklets, the appropriate instructions were read to them, according to their group assignment. (The complete instructions are presented in Appendix B.) The booklets were then opened and two practice pages were completed aloud to insure that the task was clearly understood by all Ss. The review included the process of deciding how hard S had worked, choosing the number of points deserved, and writing that figure in the box. The Ss were instructed to choose their points within a range of 0 to

100 points in order to provide a meaningful degree of reasonably unrestricted self-selection, while avoiding confusion and wildly extreme scores.

When the trial pages were completed and any questions answered, Ss were allowed to begin the booklet and proceed at their own pace through the ten pages. Completed booklets were collected as Ss finished the task, and word puzzles were given out to occupy those who were finished, until all Ss completed the booklet or until a maximum of thirty minutes had passed. At the end of each administration, the Ss were told that the prizes would be distributed by their teacher at the end of the day. The group of Ss was escorted back to the classroom, with the request not to discuss the booklets with their classmates. Equivalent packages of carnival-type toys had been assembled and each was labeled with a S's name; these were delivered to the teacher on the morning of the experiment, and were distributed by her on that day.

CHAPTER 4

RESULTS

The mean number of points assigned by Ss per page are reported for each of the main variables (sex, task type, difficulty level, and blocks) in Table 1. The raw data were submitted to an analysis of variance using the BMD-OBV computer program developed by the University of California at Los Angeles (1970) according to the experimental design: $S_3(A_2 \times B_2 \times C_2, \times D_5) \times E_{10}$ (Myers, 1969).

The effects of three of the experimental variables were significant. Boys exceeded girls in the number of points they assigned themselves over all conditions (F 1, 80=4.02, $p < .05$), thus supporting Hypothesis 1. Visual-motor Ss took more points per page than the academic task Ss (F 1, 80=6.02, $p < .05$), a finding that directly contradicted the prediction of Hypothesis 2. Subjects having the more difficult materials of either type awarded themselves more points than Ss given the simple materials (F 1, 80= 4.49, $p < .05$), thereby supporting Hypothesis 3.

Hypothesis 4, regarding the rank ordering of means for the different treatment combinations, was not supported due to the reverse findings involving the task types (Hypothesis 2). The actual ranking, high to low according

Table 1. Means for Main Variables

		Task		Difficulty Level		Blocks				
	Sex	Academic	Visual Motor	Simple	Difficult	1	2	3	4	5
Boys	60.3	54.4	66.3	56.2	64.5	46.4	73.6	48.7	68.4	64.6
Girls	50.7	45.0	56.5	44.7	56.7	40.8	43.7	52.2	57.8	59.3
All Subjects	55.5	49.7	61.4	50.5	60.6	43.6	58.7	50.4	63.1	61.9

to mean scores, was as follows: DVM (66.37), SVM (56.55), DA (54.95), and SA (44.49). Hypothesis 5 also was not supported since the differences in mean SR associated with the blocking variable of reading ability approached, but failed to reach, significance (F 4, 80=2.41, .10 > p > .05). Mean values for the five blocks, from lowest to highest reading ability respectively, were as follows: (1) 43.64, (2) 58.70, (3) 50.48, (4) 63.14, and (5) 61.99. These data suggest that contrary to prediction, there was some tendency for the Ss with higher measured reading ability to take a greater amount of SR than those of lower reading ability. Differences among mean SR scores for each of the ten pages of the booklet considered as separate trials, were non-significant as were all interaction terms between variables.

The possibility that Ss based their SR for the academic task upon an evaluation of the correctness of their answers, rather than deservingness, was investigated by a further analysis. If academic task Ss judged some of their answers to be incorrect or were unsure of their answers, they might have been less generous in their SR than the visual-motor Ss who knew that any response was correct. A pattern of such SR judgments based on correctness could have contributed to the reverse finding that visual-motor Ss took more SR than academic Ss.

Total correct responses out of a possible 20 therefore were tallied for each academic S and a correlation coefficient (Pearson r) for all academic Ss was calculated between these scores and each S's mean SR per page. To avoid loss by averaging, four additional correlations were computed: two for each sex, for the two levels of difficulty of the academic task. The overall coefficient was small and non-significant ($r = -.18$); the others were similarly non-significant, the largest being -.33. Since mean SR per page and correct responses thus were not significantly and positively associated, it is unlikely that the reverse findings concerning Hypothesis 2 resulted from SR judgments based on correctness.

CHAPTER 5

DISCUSSION

The results of this study indicate that the distinction between deservingness and correctness as criteria for SR judgments is an important one. The present findings supported hypotheses derived from the research and theory of Bandura and Perloff (1967) and Bandura (1970) in which deservingness criteria were applied; specifically, Hypotheses 1 and 3 were validated. On the other hand, Hypotheses 2, 4, and 5, which were drawn from studies designed according to the correctness definition of SR, were not supported (Marston, 1964; Kanfer, 1966).

While the higher frequency of the boys' SR was congruent with the data of Bandura and Perloff (1967), it could not have been due to the same factor, strength, to which they attributed their findings. No satisfactory explanation for this result is apparent, although the influence of self-esteem (discussed below) offers a plausible alternative.

The confirmation of Hypothesis 3 supports the conclusion that Ss did base their selection of SR points upon the subjective evaluation of their deservingess. Clearly no Ss were able to compare the relative ease or difficulty

of their materials with the other materials of the same task type, yet Ss given the simple level materials took less SR overall than Ss given the difficult materials. This was also true of the data reported for four of the five reading achievement blocks, and tends to support Bandura's (1970) notion that avoidance of negative self-appraisal keeps Ss from taking large amounts of SR for easy tasks. It would seem that Ss applied some subjective referents of ease and difficulty to their efforts and judged their deservingness accordingly. Furthermore, no precise criteria were stated for deservingness in the instructions, although general guidelines were provided for determining how hard one had worked.

As the correlations indicated, the reverse findings concerning Hypotheses 2 and 4 did not seem to be based upon the use of correctness judgments by academic task Ss; such judgments could have led them to reduce SR if they considered their answers to be incorrect. Other factors apparently influenced the visual-motor task Ss to be more generous in their SR than the academic Ss. A possible explanation is that the novelty of the line-drawing task, which was presented in the context of an imaginary, game-like activity, may have affected the Ss' perceptions of the deservingness of their efforts. This theory could be evaluated by comparing the SR produced in the visual-motor task with SR's produced by Ss given a simple straight line

drawing task and with other Ss given a "dot-to-dot" activity.

A more significant point, however, is that the studies which disclosed the positive relationship between ambiguity and low rates of SR had defined SR in terms of correctness (Kanfer and Marston, 1963b; Marston, 1964). Thus the present finding simply may indicate that ambiguity does not affect deservingness-SR in the same way as correctness-SR. In a recent study, Reschly (1971) also explored the effect of ambiguity upon SR, using three tasks which varied in ambiguity. His seventh grade Ss were allowed to evaluate their performances on each of the three tasks. No appropriate standards for choosing the amount of SR were given, but Ss were told that the investigator was concerned with their performances on the measures of perceptual ability (the three tasks). The study thus appeared to employ a correctness definition of SR.

Reschly's (1971) results agreed with the previously cited research, in that rates of SR were related inversely to the degree of task ambiguity; thus ambiguous tasks resulted in lower rates of SR. It would seem, therefore, that the effect of ambiguity upon SR, defined in terms of correctness, has been repeatedly established, but its effect remains to be verified in regard to deservingness-SR. A simple comparison could be made by presenting several tasks which vary in ambiguity to different groups

of Ss for whom the SR criterion is defined either as correctness or deservingness.

The failure to support Hypothesis 5 was somewhat surprising, in that no significant differences of any kind appeared among the blocks. This was contrary to the expectation that the reading achievement variable would be correlated at least with performance on the academic task. The additional analysis which showed low correlations between correct answers and SR rates on the academic task, provided additional evidence that the blocking variable was not significant in this study.

The slight tendency for Ss with higher reading achievement scores (blocks four and five) to take more SR might be explained in terms of self-esteem. In the study by Reschly (1971) discussed previously, the effect of self-esteem status on rates of SR was also examined using an inventory measure. Self-esteem status was found to be directly related to rates of SR. Interestingly, Reschly also found a non-significant correlation between the level of S ability on the tasks and rates of SR, as found in this study. The explanation of SR variation based upon self-esteem was not, however, supported by Berwick (1971), using several measures of self-acceptance, a closely related concept. He found no differences in SR rates between Ss classified as high or low in self-acceptance. This view is opposed by Bandura (1970), who has argued cogently that SR

or positive self-evaluation is closely tied to the individual's self-esteem. To clarify this issue, further research should focus on the nature of the task used in studying the relationship between SR and self-esteem.

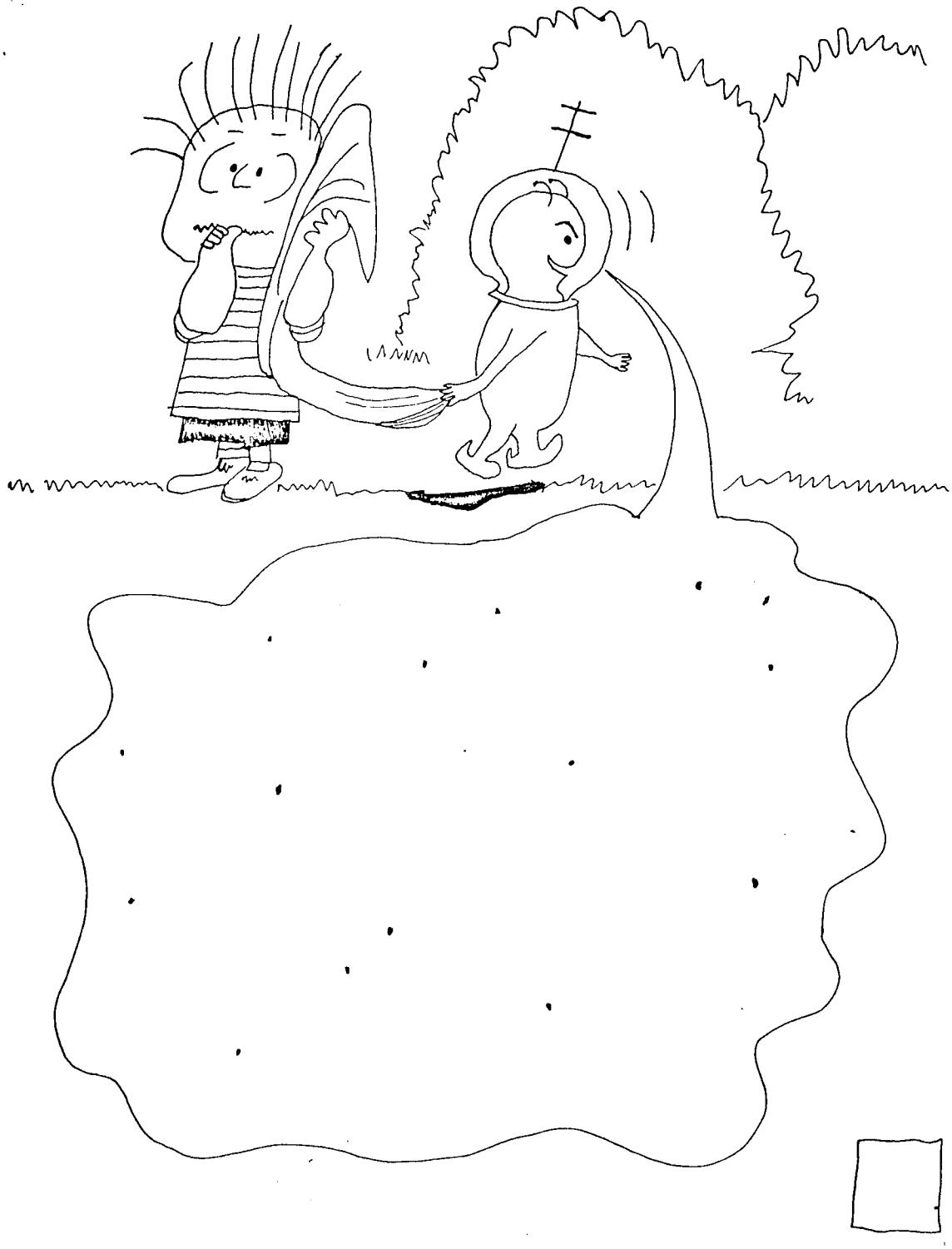
A number of studies previously cited have shown the effectiveness of SR procedures in developing and maintaining responses (Bandura and Perloff, 1967; Cautela, 1967; Glynn, 1970). The value of SR was further extended in a classroom study (Lovitt and Curtis, 1969) which showed that when a student regulated his behavior by setting his own standards for reinforcement, his academic response rate was higher than when the teacher set the contingencies.

The findings of the present study support the appropriateness of the method used by Lovitt and Curtis (1969). It was revealed here that young children, in the absence of standards of comparison, were capable of accurately determining the relative extent and merit of their efforts or attainments, even when performing a task for which no familiar external criteria existed. The data also showed that the children discriminated between the qualitatively different tasks in terms of their SR rates. These findings perhaps demonstrate that children of this age are more capable of accurately and effectively judging their achievements and the goals worthy of their efforts than has often been considered. Taken together, it would seem that the results of this study and of previous

research indicate great promise for SR methods in a variety of applications. Some of these uses include: the clinical self-control techniques previously described, programs for developing independent judgment in children, and innovative educational programs for individualizing curricula and motivating students. SR may also prove to be a valuable research tool when the experimenter finds it desirable or necessary for the S to be responsible for independently maintaining a given behavior.

APPENDIX A

SAMPLE OF VISUAL-MOTOR MATERIALS



APPENDIX B

INSTRUCTIONS

General Instructions

"Boys and girls, I have brought your class some special booklets. You can win prizes by working on the booklets, I will tell you how, and then we will practice. Listen carefully, but don't open the booklets yet."

Academic Task Instructions

On each page in the booklet you will read some stories and then mark the answer you think is best to the question that comes after each story. When you finish the page, stop and think: "How hard did I work?" How would you know if you worked hard? Well, if you worked hard, maybe you had to sound out the words, or it took you a long time to read. Perhaps you had to think a lot to remember what you read or you looked back to find the answer. If you didn't work hard, you'd know because you read fast, knew all the words, or maybe you understood the story and knew the answer without looking back.

When you have decided whether you worked hard or didn't work hard, then you can choose how many points from zero to one hundred that you deserve for the job you did on that page. If you decide that you worked hard, you might

give yourself a larger number of points, and if you decide that you didn't work hard, you may want to give yourself a smaller number of points. Remember, you don't have to get the right answer to deserve points, but do the best you can. Put the number of points you choose in the box at the bottom of the page. The points are worth prizes, the more points, the more prizes. Read every story and answer every question.

Visual-Motor Task Instructions

We are going to pretend that we are Martians who have just landed on Earth. Now on Mars, people don't talk or use words, but they tell each other things by drawing lines between dots. On each page you will see a Martian telling something to Charlie Brown or one of his friends. Your job is to show what you think he is telling them, by connecting the dots on the page with lines, in any way you want.

When you finish a page, stop and think: "How hard did I work?" How would you know if you worked hard? Well, if you worked hard, maybe you thought about which lines to draw, or drew the lines carefully, or had a lot of dots to connect. If you didn't work hard, you'd know because you didn't think about the lines you drew, or you drew them quickly, or only had a few dots to connect.

When you have decided whether you worked hard or didn't work hard, then you can choose how many points from zero to one hundred that you deserve for the job you did on that page. If you decide that you worked hard, you might give yourself a larger number of points, and if you decide that you didn't work hard, you may want to give yourself a smaller number of points. Remember, you can connect the dots any way you want. Put the number of points you choose in the box at the bottom of the page. The points are worth prizes, the more points, the more prizes. Do every page.

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