Rule-Governed Versus Contingency-Shaped Self-Control in Preschool Children

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RULE-GOVERNED VERSUS CONTINGENCY-SHAPED SELF-CONTROL IN PRESCHOOL CHILDREN

by

Carol Sue Jones

A Thesis
Submitted to the
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in partial fulfillment
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Carol Sue Jones
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WESTERN MICHIGAN UNIVERSITY, M.A., 1979
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INTRODUCTION

A Theoretical Orientation

Although much research has been done in the area of self-control, it is a complex repertoire that demands much more exploration. Adults find it desirable to be able to forego specific immediate reinforcers or submit to immediate punishers so they can obtain long-term reinforcement or avoid long-term punishment. Often they are exposed to conflicting sets of contingencies where there are either immediate reinforcers but long-term punishers for engaging in some behavior or the individual can avoid immediate punishers but lose long-term reinforcers. For instance, daily exercise is important for a healthy cardiovascular system, but the immediate reinforcement of reading the paper before starting the day instead of jogging may result in poor health years later. The reinforcing effect of sugar to the palate may cause an individual to lose his/her teeth at an early age.

If an individual's behavior takes future consequences into account, s/he exercises self-control. The contingencies must be altered in such a way that the undesirable behavior becomes less probable. The critical issue then becomes how to shift the locus of control from the immediate consequences to the future consequences for desirable behavior.

Rachlin (1976) analyzed three forms of self-control. One form he called "brute force" self-control. His example was that of a student studying despite the temptation to go to the movies. In
this example, the student had come in contact with long-term consequences consistently and frequently enough that they controlled his/her studying. This form of self-control was contingency-shaped. Rachlin suggested that a person who learned to control one activity may more easily learn to control another activity. In as much as the individual is able to extract rules from the contingencies of reinforcement that shaped control over the other activity, this author agrees that s/he could more easily learn to control another activity.

Rachlin called the second form of self-control "self-reinforcement". He presented an example of a student reinforcing him/herself for studying by going to the movies afterward. His analysis was that in all likelihood, going to the movie would not support studying if good grades, knowledge, and social approval were removed. Going to the movie most likely served as a secondary reinforcer and acted as a discriminative stimulus for the student to compliment him/herself on good study habits. Rachlin proposed that this extra emphasis on a desired response may be more salient than other stimuli affecting the behavior and thus have a strengthening effect. There are numerous techniques for increasing the saliency of the relationship between the behavior and its long-term consequences, but those will be enumerated further on in the review.

Rachlin called the third form of self-control "commitment". He presented the following example. At a time when the long-term consequences are most salient, the student deposits a sum of money with a friend who is to check on him/her every half hour. If s/he
is not studying, the friend sends the money to a political party of opposing views. In an experiment with pigeons, Green and Rachlin (1976) were able to show that the pigeons did prefer the small immediate reinforcer over a large, delayed reinforcer and that the pigeons would commit themselves to obtain the larger, delayed reinforcer depending on the temporal proximity of the temptation. Commitment is an effective form of self-control because the individual takes action to prevent the undesirable response by altering stimulus conditions when the long-term consequences are salient. Later, when immediate reinforcers for the undesirable response are stronger, the undesirable response is prevented.

This form of self-control is most like rule-governed behavior in the sense that the individual establishes a specific rule that serves as a discriminative stimulus for the desirable response and states the consequences that will follow for emitting the desirable and/or undesirable response. In the future when the immediate consequences for an undesirable response are strongest, the rule will serve to make the undesirable response less probable despite the ongoing, "natural" contingencies.

Many health-related behaviors require such manipulation of the contingencies. Dental hygiene, for instance, requires regular check-ups, regular brushing and flossing, and good eating habits. These behaviors are time-consuming and for some quite aversive. Sugar is a reinforcer for most people. Unless one exercises some sort of control, the immediate reinforcers may easily lead to long-term punishment, such as decayed teeth or no teeth at all. Daily exercise
for cardiovascular health is another response that can easily fall by the way-side in a fast-paced life. Just how does an individual come to control his/her own behavior in such a way that s/he forfeits the immediate reinforcers readily available for the long-term reinforcers?

Skinner (1953) suggested a number of techniques for exercising self-control. Among these were physical restraint and removing the discriminative stimulus so that the undesirable behavior is not induced, or presenting an alternative discriminative stimulus so that the desirable behavior is more likely to occur. Other techniques included altering conditions of deprivation and satiation and manipulating emotional conditions. In addition, the use of reinforcement for engaging in the desirable response or punishment for engaging in the undesirable response may be effective techniques of self-control.

At a time when we value preventive health measures it seems essential that we start early in an individual's life to teach him/her to value such measures and to engage in health-related behaviors. As adults we are familiar with the natural contingencies that seem to interfere with our best efforts at engaging in such behaviors. Thus, it seems crucial to teach children, in addition to the value of engaging in such behavior, the techniques of self-control so that the child can emit responses which exercise some control over his/her own behavior and environment.
A great deal of research in the area of self-control has been
done by the cognitive-behaviorists under the heading of "delay of
gratification" or "resistance to temptation". The author will
briefly review the theory and paradigms used under these two head­
ings and point out their relationship to the present study.

Delay of gratification is described as the "ability to post­
pone immediate gratification for the sake of future consequences,
to impose delays of reward on oneself, and to tolerate such self­
initiated frustrations" (Mischel, 1974). Such behavior is seen as an
important component of "ego strength", "impulse control", and "inter­
nalization".

In the most common paradigm employed to study this, subjects
were given a choice between immediate, lesser-valued rewards and de­
layed, more-valued rewards (Bandura and Mischel, 1965; Mischel,
Ebbesen and Zeiss, 1972; Mischel and Ebbesen, 1970; Mischel and
Moore, 1973; Mischel and Baker, 1975; Mischel and Staub, 1965; Newman
and Kanfer, 1976). Independent variables included the use of self­
instructions or distracting activities (Mischel, Ebbeson and Zeiss,
1972), the presence or absence of rewards (Mischel and Ebbesen,
1970), the use of the self-instructions that included either con­
sumatory or nonconsumatory qualities of the rewards (Mischel and
Baker, 1975), and the exposure to varying delay gradients in dis­

The studies involving resistance to temptation varied from the
delay of gratification studies only in the availability of the rewards. The subject had access to rewards throughout the session with the experimenter having no apparent control over these rewards. Like the delay of gratification studies, the subjects were given a choice between immediate, lesser-valued rewards and delayed, more-valued rewards. The dependent variable was the amount of time the subject waited before consuming or playing with the reward(s) present in the experimental chamber. The subject received the more-valued reward if s/he did not consume or play with the rewards present during the session. Independent variables resembled those used in delay of gratification. They included self-instructions (Hartig and Kanfer, 1973; Patterson and Mischel, 1975; 1976), the presence or absence of the experimenter during the session and instructions by the experimenter or subject (Kanfer and Zich, 1974), various instructions prior to the session regarding social punishment for playing with the "forbidden toy" (Ebbesen, Bowers, Phillips and Snyder, 1975).

Much of the literature emphasized cognitive processes. This author, in an attempt to be parsimonious and deal with only measurable and observable behavior, reviewed this literature to uncover basic dependent and independent variables that might provide a basis for establishing effective techniques of teaching self-control to preschool children. With such a variety of independent variables and oftentimes ambiguous or inconclusive data subjected to a variety of statistical analyses, there is some confusion about just what conclusions can be drawn from the literature.
The Relationship Between A Verbal Response and Other Behavior

An individual's description of what s/he has done is what Skinner (1957) called a "tact". The speaker learns to accurately describe what s/he has done as a result of differential, generalized reinforcement for accuracy. If s/he is reinforced irrespective of the accuracy of what s/he has done, the report may be distorted. The behavior of the speaker (as well as the audience) is the discriminative stimulus for the speaker to describe the behavior to a listener who provides generalized reinforcement for an accurate report. In this case the behavior of the individual is the controlling variable for the verbal response. Now let's look at the way in which verbal behavior can function as a controlling variable for other behavior.

The effect of an individual's verbal behavior on his/her other behavior involves a more complex set of variables than those involved with a tact. An individual's verbal behavior may control his/her other behavior in one of the following two manners. Describing what one will do in the future may affect the occurrence or non-occurrence of that behavior described. If an individual says that s/he will be cleaning the garage in the afternoon to another person, his/her verbal behavior may serve as a contract in the sense that the next time the other person sees him/her, the other person may differentially reinforce the individual for cleaning the garage. If the individual has not cleaned the garage, the other person may scold, or reprimand the individual for not doing as s/he said s/he would. In this sense, an individual's verbal behavior has motivational properties for
actually engaging in those activities described.

Describing what one will do in the future may also function as a discriminative stimulus. When an individual performs the activity, s/he repeats to him/herself the relevant part of the instruction or description to help him/her more effectively perform the task. For instance, a friend gives a person directions to her house. The individual repeats the directions several times to himself, perhaps writes down the directions. When he goes to the house, he repeats the name of the street to himself, later the house number. Each in turn increases the probability that he will be reinforced by seeing the street sign and be reinforced by seeing the street name or the house number.

The relationship between a set of self-instructions, such as "I will not push the buzzer so that I can get the surprise," and whether or not the child actually waits longer than when s/he does not repeat those instructions may be of two sorts. First, and seemingly most likely to the author, the instruction may function as a discriminative stimulus. Each time the child repeats the instruction it increases the probability that the child will wait longer and be reinforced for waiting longer and not touching the buzzer. Secondly, the training with the adult, learning to repeat the instruction with the adult, may provide motivation for not touching the buzzer. This assumes a history of differential reinforcement for doing what one says s/he will do. It is interesting to note at what age ranges children begin to exhibit the effects of such a history.

Luria (1959; 1961) proposed a developmental sequence in which
during the first stage a child cannot use his/her own verbal behavior to control his/her other responses, but the verbal behavior of adults can prompt behavior although it does not stop the child's on-going behavior. Later, the child's own verbal behavior may act as a prompt for other behavior but does not stop his/her on-going behavior. It is the third stage in which the child's own verbal behavior functions as a prompt as well as a controlling variable to prevent or punish inappropriate responses. This sequence is descriptive of the gradual acquisition of verbal behavior as it comes to affect other behavior.

Lovaas (1964) conducted a series of experiments with 4 to 11 year old children in which he was able to demonstrate rather conclusively that verbal operants may control the rate at which a child emits those verbal operants as well as rate, duration and latency of a manual response. His conclusions support the discriminative stimulus properties and motivational properties of verbal operants. According to Lovaas, verbal behavior functions as a discriminative stimulus after repeatedly presenting verbal operants and reinforcement contiguous with certain other behaviors of the child. Over time, the parent's verbal behavior comes to control the child's behavior. Eventually, the child will emit those verbal responses him/herself and the stimulus properties of those responses will generalize and come to control his/her behavior. Verbal behavior acquires its motivational properties as a result of a parent differentially reinforcing a child for doing what s/he has said s/he will do. Lovaas also found that older children's verbal behavior exercised more control over their manual responses than younger children's verbal behavior.
Israel and O'Leary (1973) conducted a study with 4-year olds in which they compared two training sequences: saying then doing, doing then saying. The dependent variable was the correspondence between the verbal saying, and nonverbal doing, response. Reinforcement for verbal behavior alone did not increase correspondence between what s/he said and what s/he did. When reinforcement was contingent upon an accurate description of what s/he had done or was going to do, the correspondence between saying and doing increased significantly more in the say-do sequence than the do-say sequence.

This seems to indicate that for subjects in the say-do condition, the verbal response acted as a discriminative stimulus for the other responses. During training, the verbal response gained stimulus control over the other responses specified in the verbal response as a result of reinforcement for engaging in the response specified.

Procedures for Training Verbal Behavior to Gain Control Over Other Responses

Meichenbaum and Goodman (1969a) continued Lovaas' work by examining the effects of verbal operants "faster" and "slower" on a finger tapping response with kindergarten and first grade children. The subjects were exposed to three different conditions: a) externally administered, in which the experimenter spoke the words "faster" and "slower", b) overt, in which the subject spoke the words aloud; c) covert, in which the subject made lip movements. Each condition consisted of six phases: 1) baseline, 2) the effect of the word "letter" on tapping speed, 3) the effect of the word "faster" on tapping speed, 4) the effect of the word "slower" on tapping speed, 5)
the effect of the word "letter" on tapping speed, and 6) baseline. First graders demonstrated more control when the verbal behavior was externally administered. Oddly enough, they demonstrated more control when the verbal behavior was covert rather than overt although not as much control as the externally administered verbal behavior. Kindergarteners' finger tapping response was more controlled by overt verbal behavior and externally administered verbal behavior than covert verbal behavior. First graders were more controlled by externally administered verbal behavior than the kindergarteners were.

When Meichenbaum and Goodman spoke of more or less control over the tapping response, they were comparing the difference in rate of tapping from one phase to another under the various conditions. The sole condition in which there was only a slight change in rate of finger tapping from one phase to another was covert verbalization with kindergarten children. Under all the other conditions, there was a significant change in rate of responding from one phase to another with some conditions affecting a greater change in rate than others. Because all conditions except the covert verbalization with kindergarten children showed changes in rate as a function of the words "faster" and "slower", this author is only able to conclude that kindergarten children were less controlled by covert verbalizations than overt or externally administered verbalizations and less controlled by covert verbalizations than first graders were. These results are consistent with findings that at younger ages children's responses are not controlled by covert verbalizations.

In another study by Meichenbaum and Goodman (1969b), they
compared the effectiveness of overt vs. covert self-instructions on a motor response with kindergarten children. There was no significant difference between the rate of finger tapping under covert or overt conditions with the use of the verbal instruction "faster" or "slower". Children in this study took Kagan's Matching Familiar Figures Test (MFFT) and the experimenters classified each child as "impulsive" or "reflective" based on his/her score on the test. There was no significant difference between the two groups when the self-instructions were overt. But under the covert condition, "impulsive" children demonstrated less verbal control over finger tapping than those children classified as "reflective". Perhaps it was the lack of covert verbal control over their response that caused the child to be classified "impulsive". A high MFFT score may reflect the use of covert verbal instruction.

Palkes, Stewart and Freedman (1972) did additional work with self-instructional training in "hyperactive" boys ranging in age from 7 to 13. Their results supported the hypothesis that training in overt self-instruction is the more effective technique for improving maze performance of "hyperactive" boys than training silent reading of instructions.

As in the Meichenbaum and Goodman studies, overt verbal instruction most effectively controlled other responses, particularly in younger children and "hyperactive" children. There are several plausible reasons for this. First of all, there is no way to measure if those children trained in covert self-instruction actually were using them. The overt self-instructions can be measured and observed; they
can be prompted during training and observed during testing. The experimenter cannot be sure that the covert self-instructional group actually used any self-instruction at all. Secondly, the use of overt self-instruction affects more sensory modalities than does a covert medium. Covert self-instruction involves the use of vocal musculature, but only enough to be detected by special equipment.

Meichenbaum and Cameron (1973) researched the use of self-instructional training to alter attention, thinking and language behaviors of hospitalized adult schizophrenics. In the first study, the subjects were divided into three groups: 1) a self-instructional training group, 2) a control group that met with the experimenter and 3) a control group that did not meet with the experimenter. Groups 1 and 2 practiced the digit symbol test and the Halstead's Trail-Making Test during training. During self-instructional training, the experimenter first modeled a task while talking aloud. The subject then performed the task while the experimenter instructed the subject. This was followed by the subject repeating the self-instructions and finally, covertly emitting the self-instructions.

The dependent measures were the scores on a digit symbol test and an auditory distraction digit recall test. The subjects in Groups 1 and 2 significantly improved their scores on the digit symbol test over Group 3 which had no practice with the test during training. But Group 1, with self-instructional training, significantly improved their scores over Group 2, with only practice \( (t=3.95, \text{df}=8, p .01) \). Two scores were obtained from the recall task -- a digit recall with distraction and with no distraction. On both scores, Group 1 improved
significantly over the other two groups. The analysis of variance for digit recall with no distraction yielded a significant trials effect (F=6.92, df=2/2, p < .001), and a significant group by trials interaction (F=6.92, df=2/2, p < .025). The analysis of variance for the digit recall test with distraction yielded a significant groups by trials interaction (F=10.21, df=1/12, p < .01).

The results indicate that self-instructional training does in fact improve the performance of schizophrenics on these specific tests designed to test attentional behavior.

The second study was designed to assess a broader range of behaviors. The dependent measures were interview behavior, the percentage of "sick talk" as compared with healthy talk, proverb interpretation, the score on an inkblot test and the scores on a digit recall test with and without distractions.

The subjects were divided in two groups: 1) a self-instructional training group and 2) a practice control group. The self-instructional group first performed several sensorimotor tasks while talking to him/herself. The experimenter used modeling and overt rehearsal and then fading to train the use of self-instructions. In the second phase, the subject practiced monitoring and evaluating his/her behavior through self-questioning. If s/he judged his/her performance as inferior, s/he self-instructed to produce a more satisfactory response. The experimenter used instructions, examples, modeling, discussions and rehearsal to train the subjects. In Phase 3, the subjects were encouraged to report on the verbal and nonverbal reactions of other persons toward him/her during sessions. The experimenter and subject
then modeled and practiced self-statements such as "be more coherent, be relevant".

The results showed a decrease of "sick talk" by 42%, more abstract interpretations of proverbs and more integrated inkblot responses after self-instructional training. The practice group showed only minimal changes. There was no report of statistical comparisons between groups for significant differences.

The subjects here were trained to observe their own behavior. These observations possibly served as discriminative stimuli for the patient to emit task-relevant self-instructions which in turn functioned as discriminative stimuli to emit appropriate behaviors.

Blackwood (1970) studied the effects of verbal self-instructions on misbehavior. Blackwood proposed that an individual's words can mediate between a behavior and delayed reinforcement. Those words may exert stimulus control over an individual's responses. In a school setting, a teacher's warning may gain control over a student's behavior so that s/he engages in a conditioned avoidance response and does not misbehave. But the teacher is not always present and it would be maximally effective if the student could produce his/her own verbal discriminative stimulus to avoid the temptation to misbehave. In addition, the child's own words could act as a conditioned reinforcer for engaging in an appropriate response. We might expect that the stimulus control of the teacher's warning would generalize to a child's self-warning due to the automatically reinforcing qualities of verbal behavior. But it is evident to this author that self-control is not automatic. Why leave to chance the training of self-control
when we can teach those skills given an effective technique?

Blackwood (1970) developed a technique for teaching the use of self-instructions to control misbehavior. Interviews with well-behaved children indicated that they verbalized both appropriate and inappropriate behaviors along with explicit descriptions of immediate and delayed consequences. The disruptive children did not verbalize the consequences of their behavior in these interviews. Based on these anecdotal findings, Blackwood set up a study in which eighth and ninth grade students were divided into two groups, experimental and control. Children in the experimental group were required to write mediation essays when they misbehaved. There were four questions and answers. The first question asked what the child did wrong and answered with a sentence describing that behavior. A second question asked why the behavior was inappropriate and answered with a paragraph describing the aversive consequences. The third question asked what the appropriate response would have been and was followed with a description of the appropriate responses. The last question asked the reasons for engaging in appropriate behaviors and then described the reinforcing consequences. The control group wrote a "punishment" essay of approximately the same length describing a steam engine when they misbehaved.

Blackwood found that the mediation trained group misbehaved significantly less than the group exposed to the "punishment" essay. Although treatment lasted only fifteen days, it appeared that training verbal mediation was more effective in decreasing misbehavior than merely requiring the child to write about a steam engine.
The Blackwood study points out the vital role that verbal behavior plays in self-control when it functions to control other responses. Meichenbaum and Goodman (1971) studied the relationship between a child's own verbal behavior and his/her attentional responses. They taught six to nine year old subjects by first modeling appropriate verbalizations, followed by the subject's overt verbalizations and then by covert verbalizations. Although the results were not overwhelmingly in favor of the treatment, there was a significant difference between the scores of the subjects trained in self-instruction on a variety of psychometric tests and the scores of children who spent just as much time with the experimenter, but had no self-instructional training. The experimenter also used a dependent measure to assess changes in classroom behavior after training, but failed to get any significant results. This may have been due to the subjectiveness of the measurement device, a teacher questionnaire, and the lack of a clear definition of appropriate behavior.

Robin, Armel and O'Leary (1973) studied the effectiveness of self-instruction on writing deficiencies in kindergarten children. The interesting aspect of this study was that the authors attempted to sort out the type of control self-instructions exert over other behavior. They observed that previous studies had not reported any direct measure of the children's use of self-instruction during testing, the nature of the self-instruction the children used, nor the relationship of those self-instructions to task performance. They hypothesized that those programs may have been effective due to direct training factors such as reinforcement and information feedback.
rather than the mediational effect of self-instruction.

They tested this hypothesis by dividing the subjects into three groups: 1) self-instruction, 2) direct training, and 3) no treatment. Group 1 received feedback (child's writing compared to a sample model), reinforcement and self-instructions similar to the Meichenbaum and Goodman procedure (1971) -- model, lead and test -- on questions regarding the nature of the task, answers to help overcome deficiencies, comments guiding the child's motion and correction of errors and reinforcement.

The dependent measures were scores on pre- and post-handwriting tests, scores on pre- and post-generalization tests, and the number of self-instructions emitted. After training, the self-instructional training group scored significantly higher than the other groups on the handwriting test. There was no significant effect on the generalization test. The subjects in the self-instruction group emitted a high rate of self-instructions during testing, but there was not a significant correlation between the number of self-instructions and handwriting performance. Due to this final result, the experimenters concluded that the self-instruction did not function to mediate control over nonverbal behavior. In fact, some subjects emitted self-instructions while making incorrect writing responses, an indication that the self-instructions did not function as a discriminative stimulus for a correct writing response. Another possible explanation for the lack of correlation between the self-instruction and the writing response is that the children may have been emitting a covert self-instruction which could not be recorded. In addition, the children may
not have been listening to their own verbal responses.

Despite the lack of correlation between the self-instruction and the writing response, the group trained to self-instruct performed significantly better than the other groups. Perhaps in this case, the self-instruction functioned as reinforcement for increasingly better performance.

Moreland (1978) compared the amount of time four different groups of first graders waited when given a second cookie for waiting. One group was a control group. A second group was taught to repeat a nursery rhyme, and a third group repeated, "I should wait for my cookie." A fourth group repeated, "I can wait for my cookie." The hypothesis was that the fourth group would generate an "expectancy" and wait longer than any other group. The results demonstrated no significant different between the amount of time the various groups waited.

These results were contrary to the results Mischel and Staub (1965) found in a study with eighth grade boys. The different in results was attributable to the difference in procedures for developing "expectancy". After assessing a generalized "expectancy for success", Mischel and Staub exposed all subjects to a test and arbitrarily assigned them scores based on which group they were assigned to, not on how well they performed. The groups were: 1) a successful scoring group, 2) a failure scoring group, and 3) a no information group. Afterward, the subjects chose between lesser valued, noncontingent reinforcers and more valued, contingent on successful performance on several problems. The successful subjects chose contingent reinforcers more often than those who failed on the problems. In addition, those
children assessed as having a high "expectancy for success" and in
the no information group, chose contingent reinforcers more frequently
than those with a low "expectancy for success" in the same condition.

In this study, the authors not only assessed the children's prior
exposure to success and failure, but also created a contrived exposure
to success and failure before measuring their choices for lesser valued,
noncontingent reinforcers vs. more valued contingent reinforcers. In
the Moreland (1978) study, the instruction alone, "I can wait" was
designed to generate "expectancy", but no prior exposure to success
or failure was assessed or created. The Mischel, et al. study is note­
worthy for demonstrating how a history of reinforcement affects choices
for more/lesser valued contingent/noncontingent reinforcers.

The Temptation Paradigm

Several studies have been conducted in which the subject was exposed
to the reinforcers and was given a set of instructions describing
the rules for administration. The experimenter had no apparent con­
trol over the administration of reinforcement.

Hartig and Kanfer (1973) conducted a study with kindergarten and
first graders in which they compared the amount of time children wait­
ed under different conditions when toys were present in the experiment­
al room with the child. The children were divided into groups and
taught one of the following instructions: 1) "I must not turn around
and look at the toy. If I do not look at the toy, I am a good girl/boy." 2) "I must not turn around and look at the toy. If I do look
at the toy, I am a bad girl/boy." 3) "I must not turn around and
look at the toy." 4) a nursery rhyme, and 5) no instructions.

The self-instructions regarding the temptation were more effective in increasing the amount of time the children waited than a nursery rhyme or no verbalizations at all. Even the nonverbalizers in Groups 1, 2 and 3 waited longer than those in Groups 4 and 5. Perhaps the children were engaging in covert self-instructions.

Patterson and Mischel (1975) studied the use of self-instructions as a means of helping four to five year old children ignore a distraction and continue a repetitive task. They compared the effects of multiple instructions vs. a single instruction and rehearsal of the instruction vs. no rehearsal. The results demonstrated that self-instructional training increased the amount of time spent on the task, but multiple instructions and rehearsal did not have a significant effect over self-instructional training.

These two experiments clearly demonstrate that teaching preschool children self-instructions can enhance their self-control. They also indicate that rehearsal and teaching more than one self-instruction are probably unnecessary, at least with the population used in these studies (upper-middle class children).

Patterson and Mischel (1976) conducted a similar study in which they compared the effectiveness of two different kinds of self-instruction on the amount of time three year ten month old to five year five month old children spent on a repetitious task in the presence or absence of a distraction. There were four groups. Group 1 was taught to emit the self-instruction, "I'm going to look at my work," when the Clown Box talked. Group 2 was taught to emit the self-
instruction, "I'm not going to look at the Clown Box," when the Clown Box talked. Group 3 was taught to emit both when the Clown Box talked. Group 4 was a control group and received no self-instructional training. During the testing phase, the children were given a pegboard task to do. The experimenter asked the child to promise to finish the task before s/he returned, stressing that the Clown Box would tempt the child to play, but if s/he did so they would not have time to finish the task.

The dependent measures were the amount of time spent working, the amount of work completed, the rate of work during the time spent working, the number of times the child was distracted, and the length of each distraction. The results showed that Groups 2 and 3 spent significantly more time working than the other two groups (Group 1 = 73%, Group 2 = 84%, Group 3 = 83%, and Group 4 = 62%) and completed more work than the other groups. (Group 1 inserted a mean of 106.4 pegs, Group 2 = 134.8, Group 3 = 118.5 and Group 4 = 96.6.) There were no significant differences among groups in the rate of work or the number of times the child was distracted. But the length of each distraction was significantly shorter for Group 2. When looking at these results, it is important to note that the greatest actual difference in the mean amount of time each group spent working was a matter of 2.2 minutes (Group 2 = 8.4, Group 4 = 6.2). With only twelve children in a group and a standard deviation ranging as high as .29 for Group 4, it seems probable that individual children in Group 4 may have spent as much time working as some of the children in Group 2. Although the statistical analysis reveals a significant effect,
there appears to be enough variation among individual children, especially in the control group, to seriously consider motivational variables as having a considerable impact on the amount of time each child spent working.

The authors concluded that an instruction that specifies how to behave with respect to the distracting stimulus is more effective than an instruction that does not. This is consistent with the Hartig and Kanfer study (1973). The effective self-instructions specified how the child should behave with respect to the distracting stimulus. There remain questions about the generality of these findings. There may be different results given an older population of subjects. If the distracting stimulus was more salient or if there were no distracting stimuli and the child was only required to wait for the experimenter to return, self-instructions of different content might be effective.

Unfortunately, in all these studies, the data were presented in terms of group means and the variation between individuals and from test to test is obscured. The results would be more convincing if the data were presented in terms of individual scores.

For the most part, the literature covered here dealt with self-control as a function of rules that describe how the child should behave while waiting for a reward and/or avoiding a tempting stimulus. Self-control skills can also be acquired through contingency-shaping.

Rules are often useful in teaching self-control because the desirable consequences are often so delayed that the contingencies shape undesirable behavior. Rules can be derived and evoke appropriate behavior when the reinforcing consequences are delayed. But there are
some problems with rule-governed behavior. Rule-governed behavior is often simpler than contingency-shaped behavior in the sense that a rule can never completely describe the conditions under which the behavior should be emitted. The controlling variables for rule-governed behavior are not exactly like those for contingency-shaped behavior and so the rule-governed behavior may not change in the same way in response to new variables (Skinner, 1969).

Newman and Kanfer (1976) investigated the effect fixed, gradually increasing or decreasing delay of reward in discrimination training had on the amount of time a child would wait for a reward at a later time. The subjects were 150 first graders. The children were taught a simple discrimination task in which each child matched each of four animals with a specific color by pressing a button. Each correct response was immediately reinforced with a candy. The children were then assigned to one of three groups: 1) a fixed delay group in which each child was randomly assigned to one of five delay conditions where candy was delivered either 0, 10, 20, 40, or 60 seconds after a correct response; 2) a decreasing delay group where candy was delivered 60 seconds after the first four trials, 40 seconds after the next four trials, 20 seconds after the next four trials, 10 seconds after the next four trials, and 0 seconds after the last four trials; 3) an increasing delay group where candy was delivered 0 seconds after the first four trials, 10 seconds after the next four trials, and so on until there were four trials with a delay of 60 seconds.

The subjects were exposed to a delay tolerance test immediately after the last trial in each condition. The child was given a button
and instructed to say, "Go," to start the game. The longer s/he waited before pressing the button, the more candy s/he could receive in the bottle placed on the table. The experimenter left the room and returned when the child pressed the button or after five minutes. The child then played the same game for toys of variable value.

The results demonstrated that prior exposure to increasing delays of reward led to significantly longer waiting for a reward. Groups 1 and 2, with fixed delay and decreasing delay training respectively, waited a mean of between ten and twenty seconds, while Group 3, with increasing delay training, waited a mean of one hundred thirty seconds for candy. The children in all groups waited longer for toys than for candy, but the difference between groups remained the same.

These results are quite convincing due to the large population sample. The study was conducted with ten replications of fifteen subjects each. And the difference between Groups 1 and 2 and Group 3 was great. This study nicely demonstrates the role contingency-shaping can play in self-control.

The two main purposes of the present study were to investigate the effect of a simple self-instruction, "I'm going to wait for ____ (the experimenter's name) to return," on the amount of time a child would wait for a reward, and the effect of gradually increasing the amount of time the child was required to wait after training. A secondary purpose was to compare the effectiveness and acquisition time of both procedures.

The effect of the simple self-instruction on the amount of time the child would wait was investigated in a pilot study conducted
several months prior to the present study. Three year, seven month old to four year, five month old children were given a choice between one of several toys and a picture. The child received a toy of his/her choice to play with for three minutes if s/he waited for the experimenter to return (fifteen minutes) and a picture to take home if s/he rang the bell and called the experimenter back. The child was allowed to choose a toy and then instructed that s/he could play with the toy if s/he did not ring the bell and waited for the experimenter to return. If s/he got tired of waiting, s/he could ring the bell and the experimenter would return but s/he would only get the picture and return to the classroom. The child then sat in the chair; the experimenter left the room taking the toys with her and started the stopwatch. The experimenter returned and presented the child with a picture if s/he rang the bell. If the child did not ring the bell, the experimenter returned after fifteen minutes and presented the child with the toy of his/her choice. They played together three minutes and the child returned to his/her classroom.

Extended baseline demonstrated that without training few of the children waited the fifteen minutes. Two of the six children were introduced to self-instructional training. During training the experimenter and the child practiced a simple self-instruction, "I'm going to wait for ____ (the experimenter's name) to come back." One of the children successfully used the self-instruction and consistently waited fifteen minutes. She repeated the self-instruction as often as twenty-six times in one session, but there were other sessions when she waited for fifteen minutes without overtly emitting
the instruction. It is quite likely that she may have been engaging in covert self-instruction. When the self-instructional training was no longer conducted before each session, the child rang the bell after less than three minutes of waiting. This seems to indicate that although the child could effectively use self-instructions to wait for the experimenter to return with daily practice, there was no generalization when the practice sessions were removed.

The second child introduced to self-instructional training had less success. She used the self-instruction consistently but waited for the experimenter to return only two of the thirteen sessions.

There were several reasons why these children did not successfully wait for the experimenter to return. The value of the reward was arbitrarily assigned by the experimenter. The picture the child received when s/he rang the bell may have been more reinforcing than the opportunity to play with one of the toys. The picture was a permanent product the child could take home; other adults often praised the child for getting a picture. In addition, the child may have only liked one or two of the toys and after two or three opportunities to play with the toy may have been satiated.

Another reason for the lack of success may have been the length of time the child was required to wait for the toy. The data indicate that it was more reinforcing to ring the bell and get out of a somewhat aversive situation and receive a picture to take home than to wait fifteen minutes and get a few more minutes to play with a toy. Ten minutes may have been a more feasible requirement.

The present study was similar to the pilot study, but the type of
reward was changed and the length of a successful waiting period was shortened to ten minutes. The children who rang the bell did not receive a reward and those who waited the full ten minutes received a small plastic toy s/he took home with his/her. In addition, a contingency-shaping phase was introduced with some of the subjects.
baseline, eight sessions of contingency shaping, six sessions of testing and three probes.

Procedure

Baseline

The experimenter brought the subject from the classroom to the experimental room and gave the subject a seat. She told the subject she had a nice surprise for the subject. S/he could have the surprise if s/he could wait for the experimenter to return. If s/he got tired of waiting, s/he could ring the bell and the experimenter would return, but the child would not get a surprise. The experimenter asked the child, "How do you get the surprise?", prompted the answer if the child did not answer and repeated the question until the child could repeat the answer without prompting. The experimenter then asked, "What do you do if you get tired of waiting?" and followed the same procedure. The experimenter then left the room.

When she shut the door, she began timing with a stopwatch. When the subject rang the bell, she stopped the timer and returned to the room. If the subject did not ring the bell, the experimenter returned after ten minutes, praised the subject for good waiting, and let the child select a surprise from the grab bag. In either case, the experimenter observed the subject on a video monitor, recording the amount of time the child spent engaging in motor activities and talking and/or singing.

Contingency-shaping

After bringing the child from the classroom, the experimenter
METHOD

Subjects

The subjects were four children attending the Child Development Center of the Psychology Department at Western Michigan University. They ranged in age from three years, five months to five years, four months.

Setting

The experiment was conducted by a female experimenter at the Child Development Center. The experimental room contained a small table and chair. A bell and microphone were placed on the table. A video camera was mounted on the wall.

Design

A multiple baseline across subjects design was used. In addition, intervention conditions were presented in different sequences to control for order effects. Subject 1 was exposed to five baseline sessions, five sessions of self-instructional training, five testing sessions, followed by four probes. Subject 2 was exposed to the conditions in the same order but spent eight sessions in the initial baseline, six sessions of self-instruction, eight sessions in testing and four probes. Subject 3 was exposed to five baseline sessions, eleven sessions of contingency-shaping, eleven testing sessions, twelve sessions of self-instructional training, and five testing sessions, followed by two probes. Subject 4 was exposed to eight sessions of
told the child she had a nice surprise for the child. S/he could have the surprise if s/he could wait for the experimenter to return. The experimenter determined the amount of time she would wait before returning with the surprise by taking an average of the amount of time the child waited the previous five sessions. After the appropriate amount of time passed, the experimenter returned to the room, praised the child and presented him/her with a surprise.

In the following sessions, the child was given identical instructions but the experimenter waited a longer period of time before returning. The experimenter determined the waiting time by increasing the first waiting time (the average of the five previous sessions) by two minutes. If at any point the child rang the bell before the allotted time, the experimenter returned and took the child back to the classroom. The following sessions's waiting time would return to the longest time the subject had successfully waited for the experimenter to return. The contingency-shaping phase continued for a specific subject until s/he successfully waited ten minutes without ringing the bell.

**Self-instructional training**

After bringing the child from the classroom, the experimenter sat down with the subject and said, "Let's talk about these times you spend in this room waiting for me to come back. It must be really hard to sit and wait so long. Is it? (pause for subject to reply) "I've got an idea for you to make it easier to wait. Here's something you can say out loud to help you wait for the surprise. When
you want to ring the bell, you can say, "I'm going to wait for ____ (the experimenter's name) to come back."

The experimenter had the subject repeat the instruction, "I'm going to wait for ____ (the experimenter's name) to come back" with her several times and then asked the subject to repeat it alone. After the subject could repeat the instruction alone, the experimenter left the room and began timing. If the subject rang the bell the experimenter stopped the stopwatch and returned the child to the room. If the subject did not ring the bell, the experimenter returned after ten minutes praised the child for good waiting and let the child select a toy from the grab bag.

During each session of this phase the subject spent the first few minutes with the experimenter talking about self-instructions and repeating the instruction, and then was tested to determine the amount of time s/he could wait for a surprise.

Testing

This phase was conducted exactly like baseline.

Reliability

Independent observations were performed on each subject. A second observer say in front of the television screen and began timing when the experimenter closed the door to the experimental room and stopped her stopwatch when the subject rang the bell. Percentage agreement was calculated by dividing the smaller score of the one observer by the larger score of the other observer. The range was from 98% to 100%.
RESULTS

Both procedures, contingency-shaping and self-instructional training, were effective in increasing the amount of time the subjects waited.

Figures 1 and 2 show the effect of self-instructional training on the amount of time Subjects 1 and 2 waited. Subject 1 waited an average of one minute, 1 second during baseline. After only one sessions of self-instructional training, she waited ten minutes and continued to do so throughout the self-instructional phase. She used the rule frequently: as many as sixteen times on the second day of intervention and an average of four times on the six other days. She continued to use the rule for three days during the testing phase when she no longer practiced the self-instruction with the experimenter at the beginning of each session.

Subject 2 (Figure 2) waited an average of two seconds during baseline. During the second session of self-instructional training she waited ten minutes and continued to do so throughout self-instructional training. She overtly emitted the self-instruction only once during the second day of intervention although she consistently waited ten minutes. She continued to wait ten minutes for the experimenter to return during the testing phase.

Both subjects continued to wait the full ten minutes during probe sessions. Two months after intervention, Subject 1 waited ten minutes for the experimenter to return. A probe session conducted one and a half months after intervention showed Subject 2 waiting ten minutes for the experimenter to return.
Figure 1. Number of minutes Subject 1 waited during all conditions.
Figure 2. Number of minutes Subject 2 waited during all conditions.
Subjects 3 and 4 (Figures 3 and 4) were initially exposed to the contingency-shaping condition. Subject 4 waited an average of one minute, fifteen seconds during baseline. During contingency-shaping he consistently waited longer each session for the experimenter to return as the criteria increased, despite a two-week vacation between Sessions 12 and 13. There was only one day when he failed to meet criterion - Session 11. During testing, he consistently waited the full ten minutes during each session and continued to do so during follow-up probes.

Subject 3 (Figure 3) showed an inconsistent effect. He waited an average of two minutes, fifty-nine seconds during baseline. As can be seen in Figure 3, it was a rapidly declining baseline. During contingency-shaping, he consistently waited longer each session for the experimenter to return as the criterion increased, missing criterion only twice out of eleven sessions. He did not perform as consistently during testing. The first day of testing he waited only fifty-seven seconds. He waited the full ten minutes four of the next five sessions, but the last five sessions of testing he waited less than two minutes each session. At this point he was introduced to self-instructional training (Sessions 29 and 30); he did not wait ten minutes for the experimenter to return until Session 34. During Session 34, he successfully waited ten minutes and continued to do so for five more sessions, overtly emitting the rule an average of one time each session. During testing he continued to wait ten minutes. During the probes he waited ten minutes once and eight minutes, thirty-four seconds the other.
Figure 3. Number of minutes Subject 3 waited during all conditions.
Figure 4. Number of minutes Subject 4 waited during all conditions.
DISCUSSION

The self-instructional training effectively increased the amount of time the subjects waited for reinforcement. Although all the subjects did not overtly emit the rule each session, it can be speculated that they may have been covertly repeating the rule.

The contingency-shaping procedure effectively increased the amount of time two of the subjects waited. This procedure allowed the child to come in contact with reinforcement for a very short wait. This increased the probability that s/he would wait again the second session. With only small increases in the amount of time the child had to wait for reinforcement each session, s/he was able to wait successfully session after session. It is possible that the subjects may have waited the full ten minutes sooner than observed in the study. There were no probes conducted during the contingency-shaping phase to assess if the subjects would wait the ten minutes for reinforcement.

These results are consistent with Newman and Kanfer's findings (1976). Those subjects who were exposed to increasing delays of reinforcement were able to wait significantly longer than other subjects for reinforcement. Contingency-shaping seems to be an effective procedure for establishing a history of success with respect to delaying immediate reinforcement for long-term reinforcement. Mischel and Staub (1965) demonstrated the importance of a subject's exposure to success or failure in his/her choice for more or lesser valued, contingent or noncontingent rewards. A history of success increases the probability that a subject will choose a more valued, contingent
In this study, Subject 3 did not continue to wait for the reward over a long period of time. There may have been several reasons for this. There was an age difference between Subjects 3 and 4 that may have played an important role. Subject 3 was three years, eleven months old at the beginning of the study, while Subject 4 was five years, four months old. The younger child, Subject 3, may have been more successful with self-instructional training. Subject 2 was three years, five months old and was successful with self-instructional training. Perhaps she would not have been as successful with contingency-shaping. The contingency-shaping procedure may be more effective with older children. Further research in this area could reveal if contingency-shaping or self-instructional training is more effective with younger or older children.

During the selection of subjects, it was found that quite a few four-year old children were able to wait the ten minutes without training. Six children tested between the ages of four years, three months and five years, four months successfully waited ten minutes without training. The oldest child who participated in the study was five years, four months old. Age does not seem to be a good indication of whether or not a child can benefit from self-control training. A child's ability to wait for a reward is probably more dependent on his/her history of reinforcement with respect to delaying immediate reinforcement rather than age.

It seems important that a child be exposed to situations in which s/he must forego an immediate reinforcer. A child who is allowed to play only after s/he brushes his/her teeth may be more...
likely to wait ten minutes for a reward or exercise self-control. For the young child, it may be necessary for the adult or parent to control access to reinforcers such as toys, but as the child grows older, frequently being reinforced for brushing his/her teeth as well as being taught rules about caring for teeth, the child gradually comes to acquire the skills of self-control. As the child grows up, the parent has less control over access to reinforcers and so it is important that the child is able to exercise self-control.

In much of the literature regarding delay of reinforcement, there is reference to "coping responses". Skinner (1953) suggested that one technique of self-control is to present alternative or distracting stimuli so that the undesirable response is less likely to occur. In this study, the subjects engaged in a great deal of distracting behavior. Some of the subjects sang, hit the table, walked around the room, sucked on a finger, or played with their hair. There was no correlation between the amount of time spent engaging in these distracting behaviors and the amount of time waited. It would be interesting to observe and compare the amount of time a subject would wait if given a distracting activity to engage in while waiting such as a pegboard. Few adults just sit and wait when delaying reinforcement. Usually they engage in some other behavior while waiting. Adding a distracting task may provide data more consistent with everyday practices.

Further research in this area is necessary to explore the generality of the self-control skills acquired through these two procedures. It is possible to speculate that when a child learns to wait for a reward in an experimental setting, there is a greater probability
that the child will be able to forego immediate reinforcement for a long-term reinforcer. But research is needed in more naturalistic settings such as the classroom and the home environment to support this. Perhaps one procedure would be found to train more generalizable skills than the other. In the self-instructional phase, only one task-specific rule was taught. It is not clear from this study whether or not such a young child could devise an appropriate rule in another setting where waiting for a delayed reward would be desirable. It would seem probable that contingency-shaping would train skills that generalize to other settings more readily than self-instructional training.

This study taught children to wait for reinforcement. Further research is needed to explore the direct application of these procedures for teaching self-control of health-related behavior. From the results of this study, it is probably true that teaching the children a rule would be most efficient. But there still remains a question regarding maintenance. In a situation where the reinforcement is delayed for long periods of time, perhaps years, it may be important to look for additional variables such as antecedent control and intermediate reinforcers.

Self-control involves a complex set of variables. This study compared two procedures for increasing the amount of time a young child would wait for a reward. Hopefully, further research will explore more complex components of self-control and procedures to effectively teach individuals to exercise self-control.
REFERENCES


