A Classroom Investigation of the Effect of Delayed Time-Out from Activities of Different Reinforcing Value

Zamosky

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A CLASSROOM INVESTIGATION OF THE EFFECT OF
DELAYED TIME-OUT FROM ACTIVITIES OF
DIFFERENT REINFORCING VALUE

by

Alan Stuart Zamosky

A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment
of the
Degree of Master of Arts

Western Michigan University
Kalamazoo, Michigan
April 1975
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Alan Stuart Zamosky
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INTRODUCTION

A period of non-reinforcement, during training that normally involves reinforcement, in the presence of a particular stimulus, is known as time-out (Catania, 1968). Similarly, Sidman (1960) described time-out as the removal of the organism from the opportunity to respond. Animal laboratory studies have demonstrated that response contingent time-out periods can serve as aversive events in that they will weaken the behavior upon which they are contingent and/or produce escape and avoidance behavior (Ferster and Skinner, 1957; Leitenberg, 1965).

Time-out as a technique to employ with humans grew out of the experimental animal laboratories where it was used primarily in matching-to-sample studies in an attempt to eliminate incorrect responses (Ferster and Appel, 1961; Zimmerman and Bayden, 1963; Zimmerman and Ferster, 1963). In these studies the general procedure involved providing immediate reinforcement for correct responses and immediate time-out, consisting of a black-out of the experimental chamber and locking of the food dispenser, for incorrect responses.

If time-out is conceived more broadly to include contingent termination of any ongoing training, time-out may also function as a positive reinforcer; that is, it may increase the frequency of a behavior. In a laboratory study Thompson (1965) found that the experimental animal chose time-out to escape from the aversive
aspects of a fixed-ratio schedule, namely the effort and delay of reinforcement that were required. Thus, time-out can function as either a reinforcer or a punisher depending upon the schedule in which it is applied (Herrnstein, 1955; Ferster, 1957). If it occurs in a schedule which is relatively demanding or aversive, the time-out will increase the rate of the response which produced it. Inversely, if the time-out occurs within a relatively positively reinforcing schedule, it will decrease the rate of the response which produced it.

Time-out has recently been employed in applied settings to decrease or eliminate such problem behaviors as disruptive and aggressive behavior (Bostow and Bailey, 1969); tantrums, shouting and hitting in a home setting (Hawkins, Peterson, Schweid and Bijou, 1966); high rate inappropriate behavior in retardates (Pendergrass, 1972); tantrum behavior of an autistic child (Wolf, Risley and Mees, 1964); antisocial delinquent behavior (Baer, 1962) and multiple tics (Barret, 1962).

Time-out has also been proven to be an effective technique for eliminating undesirable behavior in the classroom. Carlson, Arnold, Becker and Madsen (1968) used time-out to successfully eliminate the tantrum behavior of a child in an elementary school. Kubany, Weiss and Slogget (1971) used time-out successfully to reduce disruptive behavior in the classroom. A special school program for children with behavior disorders, The School Adjustment Program (Hawkins, 1971), employs time-out to eliminate dangerous behaviors, behaviors that are disruptive to the class, behaviors that are
being maintained by their reinforcement from the other students and behaviors that appear to be unchanged by reinforcement practices.

Although time-out appears to be a reliable technique for reducing maladaptive classroom behaviors, parameters of its use have received little examination. Two recent studies have attempted to use a modification of the usual time-out procedure, the modification involving delaying the subject's removal from classroom activities. Ramp, Ulrich and Dulaney (1971), in an effort to eliminate talking-out and out-of-seat behavior, placed a light on the student's desk and told the student that when the light came on, it indicated that he would have to spend five minutes in a booth either at recess or after school. The effect was immediate and the disruptive behavior decreased dramatically. However, it is not clear whether this immediate response decrement was the effect of the delayed time-out or immediate feedback from the newly installed light on the student's desk. Frost (1973) attempted to assess the effectiveness of token punishers and delayed time-out for suppressing inappropriate behavior in a classroom. His results, however, were not as clear as those of Ramp et al.

There appear to be several possible advantages to delayed time-out, as opposed to immediate time-out, in a classroom setting. Frost (1973) listed the following: 1) The class is often disrupted when the teacher has to immediately remove the inappropriately behaving child. 2) Immediate time-out, like physical restraint, has the disadvantage of removing the child from the social situation and thus from the opportunity to immediately practice more adaptive
behaviors in the same situation. Delayed time-out would allow the child to remain in the environment and learn more appropriate behavior. 3) To avoid or escape a disliked activity or academic task, the child may find immediate removal from the situation more rewarding than remaining in the class; thus, his inappropriate behavior would be strengthened by the time-out and the general effectiveness of time-out as a punisher might be decreased. 4) Delayed time-out can be administered at times selected by the teacher rather than whenever the child is misbehaving. The teacher could defer time-out until a time more convenient for him or her. 5) Delayed time-out can be individualized to the child. The teacher can administer time-out for each child at the time most effective for that child. Time-out could be administered, for example, during recess, music, or physical education depending on the reinforcing value of the activity for the child. 6) Finally, as Clark, Rowbury, Baer and Baer (1973) have indicated, time-out removes the child from the educational setting and thus interrupts the continuity of an academic sequence and reduces the time available to teach him the academic skills for which the setting exists.

While other research has suggested the efficacy of delayed time-out for reducing disruptive behavior (Ramp et al., 1971) and the efficiency of intermittent time-out (Clark et al., 1973), the purpose of the present study was to analyze a different parameter of the delayed time-out procedure. The present study was designed to assess the effectiveness of intermittent, delayed time-out from activities of different reinforcing value in suppressing inappropriate
classroom behavior. Unlike the Ramp et al. study, the present one was not designed primarily to be therapeutic. Instead, levels of the independent variables were set such that they would be unlikely to totally eliminate the undesirable behavior. If the behavior were eliminated by the first time-out condition employed, there would be no opportunity to test a second or third time-out condition. This procedure permitted the opportunity to assess the effect produced by removal of the subject from activities of different reinforcing value (according to his ranking, in order of preference). Thus, by leaving the behavior at some frequency above zero, it was possible to analyze the importance of selection of activities from which a subject is to be removed.
METHOD

Subjects and Setting

The subjects for this study were two male, nine year old, fourth grade, elementary school students. They were selected from a list of four students suggested by the teacher on the basis of her observations of their disruptive classroom behavior. This study was conducted at Amberly Elementary School in Portage, Michigan. There were 26 students in the class, including the two subjects. The teacher, who was 27 years old, had been teaching fourth grade for six years.

Apparatus

During the course of this study, the following apparatus was used. For the Buzzer and Black Token condition, a 3-6V D.C., 6-8V 60C Dixie Buzzer, manufactured by the Edwards Company was used to signal the teacher to dispense a token to the subject. The buzzer was powered by a 6V Eveready dry cell lantern battery which was wired with 20 gauge speaker wire to a 5/8 inch Nutone push button which the observer operated. The buzzer was located above the chalkboard at the front of the classroom. During the Light and White Chip condition and all Delayed Time-out conditions, the teacher was signalled by a 4.75V lantern bulb attached to the negative terminal of the 6V Eveready dry cell battery. This was also wired with 20 gauge speaker wire to a 5/8 inch Nutone push button.
which the observer operated. The battery and bulb were located on the teacher's desk where they were always visible to her but not visible to the class. For the purpose of controlling the duration of time the subjects spent in the time-out area, a Lux Minute Minder kitchen timer was employed.

Behavior and Recording

As a result of discussions with the teacher and informal classroom observation, talking-out was selected as the target behavior and was defined as follows: Any audible vocalization or whisper emitted by the subject which was not solicited by, or approved by the teacher prior to its emission.

Each episode of talking-out was recorded as one response provided that two seconds had elapsed since the end of the previous episode. Thus whenever the subject stopped talking, the observer silently counted "1001, 1002," in order to measure the passage of two seconds. It made no difference how many words the subject emitted or how long he talked, it was all considered one response until a two second lapse occurred.

The target behavior was observed and recorded only when the subject was within a specifically defined area of the classroom. This was done because there were areas within the room from which the subject could not be seen by the observer. The observer sat in a chair near the front left corner of the classroom. From this position both subjects were within 20 feet and were clearly visible at all times.
Observation of the two subjects took place five days per week between the hours of 10 and 11 A.M., which was the math period. Each subject was observed for a total of 20 minutes per session, as recorded by a stopwatch. The observer began timing when the subject was within the designated observation area and stopped timing whenever the subject left the observation area, regardless of his reason for leaving.

Talk-out responses were recorded using an event or frequency system (Hall, 1971). During baseline conditions, each occurrence of the target behavior was recorded on a data sheet by simply making an X in one of the squares provided. For the remainder of the study, during which talk-out responses were consequated on a variable ratio three (V.R. 3) schedule, a variable ratio tally form, based on one employed by Clark et al. (1973), was employed (Figure 1).

The range of responses per consequation on the V.R. 3 schedule was one to five. Each row of the tally form specified the number of occurrences specified in each row was scheduled unsystematically, except that within each group of five rows, each of the ratios one through five occurred once.

Reliability

Interobserver agreement on the frequency of talk-outs was obtained at least once during each condition of the study. A second, independent observer was given a written copy of the target response definition. She spent several minutes observing the behavior of
Figure 1. The variable ratio tally form which was used by the observer during all experimental conditions involving consequation. This form was used to determine which talk-out responses were to be consequated under the V.R. 3 schedule. The number of allowed, unconsequated responses is indicated in each row (term) by the number of blank blocks. When the last blank block in each row was marked, indicating that a response had occurred, the teacher was immediately signalled to administer a token to the subject, and the next term of the tally form was begun.
Figure 1

Variable Ratio 3 Schedule
the subjects and asking the experimenter questions prior to the start of the first reliability check. This was the only training provided.

To estimate the accuracy of the primary observer's (experimenter's) data, the second observer independently observed each of the subjects for a 20 minute session on nine occasions. During these reliability checks, the two observers were separated by a moveable screen to prevent each from influencing the other. During the experimental conditions for which the variable ratio tally form was employed, the second observer used a data sheet without the variable ratio indicated. This served as another measure to keep recording by the two observers independent, because consequation of a response by the primary observer would otherwise indicate to the second observer how many responses the primary observer had recorded. Reliability was determined by dividing the smaller total of talk-out responses, by the larger total and multiplying the result by 100.

The results of the nine reliability assessments on Mike's data and the nine assessments on Jeff's data are presented in Table 1. The reliability scores ranged between 82% and 100%. The mean inter-observer agreement for Mike's data was 97.4% while the mean inter-observer agreement for Jeff's was 93.9%. The mean reliability over the entire study was 95.6%.
Table 1. The interobserver reliability results for the nine reliability assessments on the data of both Mike and Jeff. The agreement between independent observers of the behavior of the individual subjects during each of the experimental conditions is indicated in percentages and the mean overall interobserver agreement for both subjects together is also presented.
### Table 1

**Interobserver Reliability**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Subject</th>
<th>Mike</th>
<th>Jeff</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>96% + 92%</td>
<td>93% + 87%</td>
</tr>
<tr>
<td>Baseline I</td>
<td></td>
<td>$\bar{x} = 94%$</td>
<td>$\bar{x} = 90%$</td>
</tr>
<tr>
<td>Buzzer + Black Token</td>
<td></td>
<td>100%</td>
<td>82%</td>
</tr>
<tr>
<td>Baseline II</td>
<td></td>
<td>88% + 100%</td>
<td>91% + 92%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$\bar{x} = 94%$</td>
<td>$\bar{x} = 91.5%$</td>
</tr>
<tr>
<td>Light and White Chips</td>
<td></td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Delayed Time-out from Least Reinforcing Activity</td>
<td></td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Delayed Time-out from Most Reinforcing Activity</td>
<td></td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Delayed Time-out from Least Reinforcing Activity</td>
<td></td>
<td>94%</td>
<td>--</td>
</tr>
<tr>
<td>$\bar{x}$</td>
<td></td>
<td>97.4%</td>
<td>93.9%</td>
</tr>
<tr>
<td>Overall $\bar{x}$</td>
<td></td>
<td>95.6%</td>
<td></td>
</tr>
</tbody>
</table>
Experimental Conditions

Baseline I

This initial phase of the study was in effect for 12 sessions. Under the Baseline condition, the teacher was instructed to continue her customary supervision of the class and to administer her normal amount of praise and reprimands, as appropriate. Since there had been observers in the class fairly continuously for several weeks prior to the beginning of Baseline I, there was no apparent class disruption at the outset of this phase. The observer did not interact with any members of the class and remained as inobtrusive as possible.

Throughout the course of this experiment, Mike was observed for 20 minutes, then Jeff was observed for 20 minutes. Neither child was told that he was being observed and neither appeared to detect this fact until consequence procedures were begun.

Buzzer and black token

The purpose of this experimental condition was to assess the effect of the simple response contingent presentation of a 2" x 2" piece of black cardboard on the rate of the target behavior. These tokens were contingent upon the occurrence of talk-outs on a V.R. 3 schedule. Since later phases of the study were to involve a delayed time-out procedure that involved these tokens, it was decided to assess the effect of the tokens without the time-out they would later represent.
Intermittently contingent upon every third response, on the average (as determined by the data sheet), the observer signalled the teacher by sounding the buzzer for two seconds. The teacher would then immediately walk to the subject, place a black token on his desk and then return to her desk. No explanation or further consequation was given either at that time or subsequently. During all conditions involving consequation, the teacher was cued as to which subject was to receive the token by an 8" x 12" piece of construction paper which was yellow (for Mike) on one side and red (for Jeff) on the other side. The appropriate color was displayed for each subject for only the daily 20 minute sessions. The teacher was asked to continue her normal procedures at all other times. This procedure was in effect for four sessions.

Baseline II

This condition was reinstated in an attempt to verify the effect of the Buzzer and Black Token. During this phase, as in Baseline I, the teacher was instructed to exert only her customary control over the class. This phase of the study remained in effect for 10 sessions.

Light and white chip

Based on the results of the Buzzer and Black Token condition, which will be discussed later, it was decided to substitute a concealed light for the buzzer and a white poker chip for the black card. As with the black token, the response produced poker chip
was presented contingent upon the occurrence of a talk-out on the V.R. 3 schedule. Because later phases of the study were now planned to involve delayed time-out procedures that would include these new tokens, it was decided to assess the effect of these tokens independently of the time-out they would later represent.

This time when the subject talked-out, the observer signalled the teacher by flashing the light on her desk until it was apparent that the teacher had seen it. The teacher would then immediately walk over to the subject and place a chip on his desk and then return to her desk. No explanation or further consequation was given. The teacher was cued as to which subject was to receive the token by the colored sheet of construction paper. This phase of the experiment was in effect for eight sessions for Mike and 18 sessions for Jeff.

**Delayed time-out from the least enjoyable activity**

On day two and again on day ten of Baseline II, both subjects had been given an activity preference questionnaire to complete. This questionnaire had asked them to rank, in order of preference, the 12 activities that the class participated in on a regular, if not daily, basis.

On day six of the Light and White Chip condition, both subjects had been given another rating scale to complete. This time they were asked to rank, in order of their dislike, six of the twelve activities from the first two rating scales. The six activities chosen were two designated on the previous scales as most liked, two
most disliked and two that previously were ranked intermediately by the individual child. The results of these questionnaires are presented in Table 2.

During this initial delayed time-out condition of the study, each token received by the subject resulted in two minutes of time-out from an activity that he ranked as most disliked on the final questionnaire. This condition was selected because it would be analogous to the situation in which a teacher has arbitrarily selected the activity from which a student would be removed, perhaps using removal from that activity as a supposed punisher for misbehavior by any member of her class, regardless of each individual child's preference or dislike for the activity. Such arbitrary selection would appear to entail considerable risk of the teacher actually reinforcing misbehavior in some students who dislike the activity, and being ineffective in weakening the misbehavior of some others.

For Mike, the most disliked activity was Free Reading, which was scheduled daily from 12:30 to 1:00. For Jeff, the most disliked activity was Spelling, which was held from 11:00 to 11:30 each day. Therefore, if Mike emitted 12 talk-out responses during his 20 minute observation period and received four chips, for example, he would spend eight minutes in time-out during Free Reading period that same day.

The time-out area employed during this study was a 3' x 3' cubicle in the front right corner of the classroom. The corner of the room served as two sides of the cubicle and a portable,
Table 2. The class activities preference rating results for the three activity preference questionnaires. Each subject completed three questionnaires and the results from both Mike and Jeff are indicated. The number one indicates highest preference for, and the number twelve indicates lowest preference for that activity.
Table 2

Class Activities Preference Rating

<table>
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<tr>
<th></th>
<th>Mike</th>
<th></th>
<th>Jeff</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ranking #</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>Ranking #</td>
</tr>
<tr>
<td>-------</td>
<td>----------------</td>
<td>-------</td>
<td>---------------</td>
<td>-------</td>
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<tr>
<td></td>
<td>10 12 5</td>
<td></td>
<td>12 12 6</td>
<td></td>
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<td>3 2 2</td>
<td></td>
<td>4 4</td>
<td></td>
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<td>7 7</td>
<td></td>
<td>10 9</td>
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<td></td>
<td>6 10</td>
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<td>11 10 5</td>
<td></td>
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<tr>
<td></td>
<td>12 11 6</td>
<td></td>
<td>7 7 4</td>
<td></td>
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<td></td>
<td>9 3</td>
<td></td>
<td>1 2 3</td>
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<td>4 5 3</td>
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<td>5 4</td>
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<td>6 6 2</td>
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<td></td>
<td>2 6</td>
<td></td>
<td>8 8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 8 4</td>
<td></td>
<td>2 1 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11 9</td>
<td></td>
<td>9 11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 1 1</td>
<td></td>
<td>3 5</td>
<td></td>
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</table>

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non-transparent room divider, 6' high, served as the other two sides. The only item available within this enclosed space was a chair. There were no other manipulable stimuli present.

Prior to the observation period on the first day of this experimental condition, the teacher gave each subject, individually, the following information: "I want you to learn to study better. From now on, for each (poker) chip you receive, you will sit in the corner, behind the partition for two minutes during ______." The appropriate activity was included for each subject.

Not longer than five minutes after the beginning of the activity from which the subject was to be removed, the teacher would approach the subject and say, "You have X chips." She would then escort the subject to the time-out area, providing physical assistance if necessary, and say, "You will stay here for ___ minutes because you got these chips. Stay here until I come and get you." The subject was required to remain physically and verbally quiet while in the time-out area. The subject had to remain quiet for at least one minute before being permitted to leave the time-out enclosure. This experimental condition remained in effect for eight sessions for Mike and five sessions for Jeff.

Delayed time-out from the most enjoyable activity

During this phase of the study, each chip that the subject received resulted in two minutes of time-out, later that day, from an activity that each subject rated as least disliked (most preferred) on the final rating scale. For Mike, this activity was
Writing, which took place between 11:30 and 12:00 daily. The activity which Jeff rated as least disliked or most preferred was Reading, and accordingly, this was the activity that he was removed from. Reading occurred daily between 1:15 and 2:00.

Prior to the observation period on the first day of this experimental condition, each of the subjects was given the same information that they were before the initial delayed time-out condition. The only difference was that this time the subjects were informed that they would be spending time away from different activities; Writing for Mike and Reading for Jeff. There were no further alterations of procedure. This phase of the study was in effect for eight sessions for Mike and four sessions for Jeff, concluding Jeff's participation in the study.

**Delayed time-out from the least enjoyable activity II**

This final experimental condition was instituted as a reversal of conditions, for Mike only, to further assess the relative effects of the previous two conditions. During this phase Mike was once again removed from Free Reading, the activity that he had rated as most disliked. Again, he was informed of this change prior to the beginning of this condition. It was hypothesized that if delayed time-out from Writing was more aversive than delayed time-out from Free Reading, then the rate of talk-out responses emitted by Mike would increase during this final phase above the rate emitted during the second delayed time-out condition. This experimental condition was in effect for four sessions. After the fourth session
the study was terminated because the school year was drawing to a close.

It is important to note that the procedure employed in this study was designed not to completely eliminate the behavior under observation. Rather, it was designed to examine the differential effects of the interventions employed.
RESULTS AND DISCUSSION

Mike

Each point in Figure 2 represents one session and indicates the number of talk-out responses emitted by Mike during that session. The median rate of talk-out responses during each of the experimental conditions is indicated by the horizontal broken line and the mean rate of response is presented numerically for each experimental condition. Table 3 presents the median response rates data in tabular form.

During Baseline I (sessions 1-12), the talk-out rate for Mike averaged 25.0 per 20 minute observation period. The frequency of talk-outs ranged from 8 to 46 per session. Mike's rate of response increased fairly steadily during this phase.

Subsequent to the initial baseline period, the Buzzer and Black Token condition was initiated. Beginning with session 13, every third talk-out response, on the average (a V.R. 3 schedule), resulted in the sounding of the buzzer and the presentation of a black token to the subject by the teacher. The purpose of this phase was to determine the effect of the token alone on the response rate. It was assumed that the effect would be minimal; that the baseline rate would be either maintained or even increased, due to the attention being provided for talking-out. This, however, was directly opposite to what occurred. Mike's rate of talk-outs decreased to a median of 6.0. This dramatic decline in response rate
Figure 2. The rate of Mike's talking-out behavior for each session of the seven experimental conditions is presented. The median response rate for each experimental condition is represented by the broken horizontal line. The mean rate of response is also indicated numerically for each condition of the experiment.
Figure 2

MIKE

RESPONSES PER SESSION

SESSIONS (DAYS)

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Table 3. The median response rate for each subject during each experimental condition is presented numerically.
Table 3.

Median Response Rate for Each Subject During Each Experimental Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Subject</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mike</td>
<td>Jeff</td>
</tr>
<tr>
<td>Baseline I</td>
<td>25.0</td>
<td>26.5</td>
</tr>
<tr>
<td>Buzzer + Black Token</td>
<td>6.0</td>
<td>4.5</td>
</tr>
<tr>
<td>Baseline II</td>
<td>35.0</td>
<td>33.5</td>
</tr>
<tr>
<td>Light + White Chip</td>
<td>28.0</td>
<td>13.0</td>
</tr>
<tr>
<td>Delayed Time-out #1</td>
<td>11.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Delayed Time-out #2</td>
<td>8.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Delayed Time-out #3</td>
<td>16.0</td>
<td>----</td>
</tr>
</tbody>
</table>

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rate may be attributed to the buzzer, which produced an unpleasant sound, or to the token itself. A third possible explanation for this decrement in response rate is that the sound of the buzzer alerted the entire class to the consequation procedure and the event of consequation, in turn, became a socially embarrassing experience for Mike. It was not the purpose of this study to analyze these variables, but rather the effects of various delayed time-outs, so this experimental condition was terminated after four sessions and it was decided to use a concealed light instead of the buzzer and a white poker chip instead of a black card after an increased stable rate of responding had been established.

Beginning with session 17, Baseline II was instituted in an attempt to regain a more substantial rate of responding with which the effect of the light and white chip could be compared. Mike’s rate of talking-out increased over the previous condition to a median of 35.0 responses per session, which was considerably higher than his rate during Baseline I. His frequency of response ranged from 12 to 66 and displayed variability over this entire experimental condition. The generally increasing trend of response rates over the two baseline conditions will be discussed later.

In Condition IV, beginning with session 27, every third talk-out response, on the average, resulted in the presentation of a white poker chip to the subject by the teacher. During this condition, Mike’s rate of response averaged 28.0 talk-outs per session. This median rate represents a substantial decrease in responding as compared with the median rate obtained in Baseline II.
Following the Light and White Chip condition of the study, three delayed time-out conditions were sequentially implemented for Mike; time-out from the least enjoyable activity, time-out from the most enjoyable activity and finally, time-out from the least enjoyable activity again. This represented a reversal (A-B-A) design (Baer, Wolf and Risley, 1968). Mike began the first delayed time-out condition of the study on day 36. Each consequated talk-out response (on the V.R. 3 schedule) resulted in time-out from Free Reading, Mike's most disliked activity. Over the eight sessions that this condition was in effect, Mike's rate of talk-outs ranged from 5 to 17 with a median rate of 11.0 responses per session.

During the next experimental condition, Mike was removed from the activity that he had rated as most liked. Each poker chip received by Mike resulted in later time-out from Writing. This condition went into effect for Mike on day 43 and remained in effect for eight sessions. His rate of response was rising over the initial sessions of this condition and after decreasing to a low of one response during session four, the rate began to once again increase steadily during the final four sessions to a high of 10 responses on the final day. The median rate of Mike's talk-out responses was 8.0 per session during this condition.

The final experimental condition for Mike began with session 51 and was in effect for four sessions. During this time, for every chip he received for talking-out, Mike spent two minutes in time-out from the activity that he disliked the most, Free Reading.
During this condition, Mike's rate of responding increased above that of the previous delayed time-out conditions. The frequency of response during this phase ranged from 14 to 17 with a median of 16.0 talk-out responses per session.

It must be recognized that although there was an increase in Mike's rate of response when the time-out activity was changed to least preferred, the last few days of the previous condition had produced data that were already rising and there may well have been no real effect. Had there been time left in the school year, a reversal to use of the most enjoyable activity would have been conducted.

The change in behavior obtained when Mike received delayed time-out from his least preferred activity is strongly suggestive that this condition was effective, though there was no replication of this effect within the experiment with Mike. The difference between the effects obtained with the two different activities must be considered only mildly suggestive.

The mean variable ratio of talk-out responses to consequations during each of the experimental conditions is presented in Table 4. For Mike, the ratio ranged between 2.93 and 3.35, with a mean of 3.10.

Jeff

Figure 3 shows the number of talk-out responses emitted by Jeff during each session of the six experimental conditions in which he was involved. The median rate of response is also indicated for
Table 4. The mean variable ratio of talk-out responses to consequations is indicated for each subject for each experimental condition involving consequation. In addition, the overall mean variable ratio for both subjects together is presented.
Table 4

<table>
<thead>
<tr>
<th>Condition</th>
<th>Total # of Talk-out Responses</th>
<th>Total # of Tokens Administered</th>
<th>Mean Variable Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buzzer + Black Token</td>
<td>57</td>
<td>17</td>
<td>3.35</td>
</tr>
<tr>
<td>Light + White Chip</td>
<td>250</td>
<td>84</td>
<td>2.98</td>
</tr>
<tr>
<td>Delayed Time-out #1</td>
<td>85</td>
<td>29</td>
<td>2.93</td>
</tr>
<tr>
<td>Delayed Time-out #2</td>
<td>56</td>
<td>18</td>
<td>3.11</td>
</tr>
<tr>
<td>Delayed Time-out #3</td>
<td>63</td>
<td>20</td>
<td>3.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$\bar{X} = 3.10$</td>
</tr>
</tbody>
</table>

Jeff

<table>
<thead>
<tr>
<th>Condition</th>
<th>Total # of Talk-out Responses</th>
<th>Total # of Tokens Administered</th>
<th>Mean Variable Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buzzer + Black Token</td>
<td>22</td>
<td>7</td>
<td>3.14</td>
</tr>
<tr>
<td>Light + White Chip</td>
<td>332</td>
<td>110</td>
<td>3.01</td>
</tr>
<tr>
<td>Delayed Time-out #1</td>
<td>69</td>
<td>22</td>
<td>3.14</td>
</tr>
<tr>
<td>Delayed Time-out #2</td>
<td>7</td>
<td>2</td>
<td>3.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$\bar{X} = 3.20$</td>
</tr>
</tbody>
</table>

Overall $\bar{X} = 3.17$

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Figure 3. The rate of Jeff's talking-out behavior for each session of the six experimental conditions. The median response rate for each experimental condition is represented by the broken horizontal line. The mean rate of response is also indicated numerically for each condition of the experiment.
Figure 3

Jeff

Baseline I: Buzzerd & Black Token
Baseline II: Light & White Chip
Delayed Time Out from Least Preferable Activity
Delayed Time Out from Most Preferable Activity

Responses per Session

Sessions (Days)

- Baseline I: Mean = 24.1
- Baseline II: Mean = 5.5
- Activity: Mean = 32.0
- Activity: Mean = 18.3
- Activity: Mean = 14.0
- Activity: Mean = 1.8

Median Line

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each condition by the broken horizontal line and the mean rate of response is presented numerically for each experimental condition. These same median response rate data are also presented in tabular form in Table 3.

Jeff's rate of response during Baseline I averaged 26.5 talk-outs per session, with a range between 11 and 32. These data displayed an increasing trend, with the exception of session eight.

Beginning with session 13, approximately every third response resulted in the sounding of the buzzer and the presentation of a black token to Jeff by the teacher. Over the four days of this condition, Jeff's rate of response averaged 4.5 talk-outs per session, with a range from 4 to 9. There is clearly evidence of a dramatic decrease in responding for Jeff during this condition as compared with the previous condition. As stated previously, the decline may be attributed to the unpleasant sound produced by the buzzer, the token itself, or the socially embarrassing experience.

In an effort to obtain a more substantial rate of response, Baseline II was begun on day 17. Jeff's rate of talking-out during this condition, which lasted for 10 sessions, ranged from 13 to 47, with a median rate of 33.5 responses for each session. This rate was substantially higher than the Baseline I rate.

During the next experimental condition, which began with session 27, every third talk-out response, on the average, resulted in the presentation of a white poker chip to Jeff by the teacher. After responding at a high rate during sessions 27 through 29, Jeff's rate of talking-out behavior declined to zero over the
next five sessions and then slowly began to increase once again, with two inconsistencies (sessions 37 and 41). Beginning with session 42, the rate steadily increased to a high of 35 responses during session 44, the final session of this condition for Jeff. The median rate of responding during this experimental condition was 13.0 which was considerably lower than the rate emitted by Jeff during Baseline II.

It is interesting to note that during this condition, Jeff developed a system of non-verbal communication, consisting of head nodding and shoulder shrugging, as a substitute for his previous talk-outs. Of the two subjects, he appeared to be the more unhappy about the receipt of the poker chips and on several occasions he was heard to say, "I don't want to get any more of those chips." This dislike appeared to diminish, however, as his rate of talk-outs began increasing rapidly between sessions 41 and 44.

The initial phase of the delayed time-out procedure began for Jeff on day 46. Approximately every third talk-out response resulted in his receiving a white chip worth two minutes of delayed time-out from Spelling, Jeff's most disliked activity. His frequency of talk-outs was 26 on the first day of this condition and it then decreased over the next three sessions. On the fifth day the frequency increased to 29, which was the high for this phase. The lowest frequency of response was four talk-outs and the median rate of responding over this entire condition was 6.0. A comparison of the response rate data from the Light and White Chip condition and this initial delayed time-out condition provides no evidence for
the conclusion that time-out from the least preferred activity had a suppressive effect on the rate of Jeff's responding.

During the next experimental condition, which concluded Jeff's participation in the study, he was removed from Free Reading, his favorite school activity. This condition began for Jeff on day 50 and remained in effect for four sessions. During this period his rate of responding showed a decline that reached zero on the final day. The median rate of response was 1.5, with a range of zero to four talk-outs per session.

The results presented in Figure 3 strongly suggest that suppression of talking-out resulted from delayed time-out from Jeff's most preferred activity. These results give some support to a conclusion of differential effectiveness of delayed time-out from activities of varied reinforcing value, as suggested also by Mike's data.

Table 4 presents the mean variable ratio of talk-out responses to consequations during each of the experimental conditions. For Jeff, the V.R. ranged between 3.01 and 3.50, with a mean of 3.20. While the ratio was programmed to be 3.00 responses per consequation, the actual ratio ranged from 2.93 to 3.50 over all experimental conditions for both subjects, with an overall mean of 3.17.

**Intersubject Effects**

An analysis of the data presented in Figures 2 and 3 reveals that the behavior of Mike and the procedures employed with him had little effect on the behavior emitted by Jeff until the first
sessions of the Light and White Chip condition. During the first three sessions of this condition, a kind of "contest" developed between Mike and Jeff as to who could accumulate the most chips. There was also a great deal of class participation in this contest, with a majority of the rest of the students participating as active supporters for either Mike or Jeff, or imploring the observers to honor them with some chips. During this time the teacher made little effort to restore order to the classroom. While she was customarily in complete control of the class, she later reported that during these three sessions she hesitated to conseuate disruptive behaviors for fear of "messing up the study."
The third session of this condition was on the day before Easter vacation. Following this session the teacher was instructed to resume her normally controlling behaviors when school re-opened after the holiday. When school re-opened, the teacher began controlling the behavior of the class through her normal use of praise and verbal reprimands and the rate of talk-out responses declined for both subjects.

Until session 35, the experimental conditions in effect for both Mike and Jeff had been identical. On day 35, Mike began his first delayed time-out condition, while Jeff remained in the Light and White chip condition. An analysis of the data presented in Figures 2 and 3 shows that on the following day (day 36), Jeff's rate of response, which had for four sessions been sharply declining and for two sessions been at zero, began to become variable. This sudden change in Jeff's response pattern may be accounted for
by the fact that Jeff saw that while Mike was being administered
time-out for talking-out, he (Jeff) was not.

It should also be noted that the lapse of one day for Mike's change in experimental conditions to affect Jeff's behavior is in congruence with the fact that Jeff most likely would not have known of the change to delayed time-out for Mike until its application, after the observation period. Mike was individually informed of the change in conditions prior to the start of the observation period, however, there is the possibility that the subjects could have exchanged information about their respective conditions just before, or even during, the observation period. It does not appear likely that this occurred on day 35.

Again on day 43 the experimental condition for Mike was changed, while Jeff remained in the Light and White Chip condition. As on day 36, Jeff's rate of response increased sharply on day 44. This rate increase may also be attributed to the fact that Jeff now saw Mike engaged in a new time-out condition, while he, Jeff, had still received no consequence, other than the poker chips, for talking-out. It may be postulated that at this point, as on day 36, Jeff assumed that he would receive no further consequences, and as a result of this conceptualization, he began talking-out at a high rate.

During the remaining sessions of the study, there appears to be no reason to believe that the behavior of one of the subjects had any influence on the behavior of the other. While the response rates for both subjects show an increasing trend during sessions 47 through 49, they appear to do so independently.
General Discussion

This study was designed to determine the relative punishing properties of delayed time-out from classroom activities of differing reinforcing value, according to written reports by the subjects. The study by Ramp et al. (1971) reported the efficacy of a delayed time-out procedure; however, the results obtained in that study may reflect the effect of the light which came on contingent upon the occurrence of a target behavior, as well as the effect produced by the contingent delayed time-out. Clark et al. (1973) provided evidence that relatively low rates of disruptive behavior can be maintained by intermittent schedules of time-out that involve a probability of time-out of 0.23 or greater. A justification for the use of intermittent time-out was presented by these authors:

"The less frequent application of punishment procedures (e.g., time-out) in educational settings is particularly desirable because removal of the child from the setting interrupts and reduces the time available to teach him the academic skills for which the educational setting exists." (Clark et al., 1973.)

The present study incorporated the use of intermittent punishment.

The results presented in Figures 2 and 3 together provide evidence that the punishing or suppressive effect of the delayed time-out functionally varied with the reported attractiveness of the activities from which the subjects were removed. When both subjects were removed from the activities that each rated as least enjoyable, their median rates of talking-out were 11.0 and 6.0, respectively. This condition was then changed to time-out from the activities
that each rated as most enjoyable and their median response rates dropped to 8.0 and 1.5, respectively. In the case of both subjects, the rate of talk-out response emitted during the initial delayed time-out condition was reduced by the second condition. For Mike, the reinstatement of the initial delayed time-out condition resulted in a rate of response higher than that obtained in either of the first two delayed time-out conditions. These findings provide support for the hypothesis that as time-out is applied to activities of greater reinforcing value, the suppression of disruptive behavior will increase.

An analysis of the data presented in Figures 2 and 3 shows that except for several inconsistencies the rate of talk-outs for both subjects follows an increasing trend from the beginning of Baseline I to the end of Baseline II (excluding the Buzzer and Black Token condition). There may be several explanations for this rate increase. During the baseline conditions, the teacher was providing very minimal punishing consequence for the subjects' disruptive behavior. She intentionally exercised this option in order to avoid, in her own words, "confounding the study." In addition, she was providing very minimal positive reinforcement for incompatible behavior, such as praise for working quietly. Finally, the other students in the class often provided positive reinforcement for the disruptive behavior, that is, talking-out of Mike and Jeff and this positive reinforcement was usually not conseuated by the teacher. It would appear that these three explanations in combination account for the increasing trend of talking-out behavior.
on the part of the two subjects over the two baseline conditions.

Again it is important to point out that the procedure employed in this study was designed not to completely eliminate the behavior under observation. Rather, it was designed to facilitate the examination of the differential effects of the intervention employed. Had the procedure been applied throughout the school day, or with a smaller ratio of responses to consequence, perhaps any of the delayed time-out conditions would have been successful in eliminating the talk-out behavior.

The results of this study indicate the possible usefulness of delayed time-out on an intermittent schedule as a viable alternative to immediate time-out. In addition to being effective in suppressing disruptive classroom behavior, this procedure can be administered at times selected by the teacher rather than whenever the subject is misbehaving; at times more convenient for him or her. Delayed time-out can also be individualized to the particular student (Frost, 1973). As in the present study, the teacher can administer time-out for each student at the time most effective for that student.

While the present study has attempted to provide practical data concerning one variable of the delayed time-out procedure, another aspect of this procedure deserves further inquiry. There appears to be no systematic applied research concerning the effect of the length of delay between the emission of a response and the application of time-out. This line of research could prove to be of considerable importance in determining the optimal effectiveness
of the delayed time-out procedure.

The highly suppressive effect produced by the Buzzer and Black Token condition is also worthy of further investigation. Based on the effect produced in the present study, the systematic application of a similar procedure might prove to be an effective technique for controlling disruptive classroom behavior.

At the conclusion of this research, the experimenter discussed it with the class teacher. While there are no data to substantiate this, the teacher reported that she had observed some degree of generalization of non-disruptive behavior on the part of the subjects, from math (the period during which the study was conducted) to other academic periods. She also stated that she was impressed enough with the delayed time-out procedure and the results that it produced, that she was considering implementing it in her classroom during the next academic year.
REFERENCES


Barret, B., "Reduction in Rate of Multiple Tics by Free Operant Conditioning Methods." Journal of Nervous and Mental Disease, 1962, 135, 187-195.


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