

MILD SHOCK FOR UNDESIRABLE BEHAVIOR USED IN CONJUNCTION WITH
REINFORCEMENT FOR DESIRABLE RESPONSES AS A PROCEDURE FOR
THE TRAINING OF RETARDED CHILDREN

by

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A Thesis Presented to the Department of Graduate
Studies in Partial Fulfillment of the
Requirements for the Degree
Master of Arts

UNIVERSITY OF MANITOBA

October 1969

ACKNOWLEDGMENTS

This research was conducted as part of a psychology program at the St. Amant Ward of the St. Vital Hospital, Winnipeg, Canada. I wish to express my appreciation to Dr. J. Pear and G. L. Martin, who are the founders of the psychology program at St. Amant and members of my committee, for their advice, encouragement, and comments. I also wish to thank J. A. Foster, Sister Bowman, Director of the institution and the nursing staff, for their excellent cooperation.

ABSTRACT

A mild electric shock procedure was compared to a time out procedure for eliminating inattentive behavior with two retarded boys. A picture naming task was used which required that the subjects be trained to sit quietly, pay attention to the experimenter and mimic verbal behavior. Also the ratio of incorrect responses per shock was increased, using aversive tokens as conditioned punishers. The shock did not suppress correct responding and was found to be more effective in reducing inattentive behavior. The higher ratios, using aversive tokens, were less effective than shock following every incorrect response.

TABLE OF CONTENTS

| CHAPTER | PAGE |
|-----------------------------|------|
| I GENERAL INTRODUCTION | 1 |
| II REVIEW OF THE LITERATURE | |
| A. Experiment I | 3 |
| B. Experiment II | 6 |
| III EXPERIMENT I | |
| Introduction | 10 |
| Preliminary Procedures | 11 |
| Subject Selection | 11 |
| Attention Training | 14 |
| Misbehavior | 17 |
| Picture Naming Task | 19 |
| Selection of a Reinforcer | 20 |
| Token Training | 22 |
| Word Baseline | 23 |
| Method | 27 |
| Subjects | 27 |
| Apparatus | 29 |
| Procedure | 30 |
| Results | 38 |
| Discussion | 42 |

| | PAGE |
|------------------|------|
| IV EXPERIMENT II | |
| Introduction | 47 |
| Method | 48 |
| Subjects | 48 |
| Apparatus | 48 |
| Procedure | 48 |
| Results | 50 |
| Discussion | 54 |
| V SUMMARY | 61 |

REFERENCES

LIST OF TABLES

| TABLE | PAGE |
|---|------|
| 1. Objects Used in Subject Selection Procedure | 13 |
| 2. Experimental Wordlist for Bobby | 24 |
| 3. Experimental Wordlist for Derrick | 25 |
| 4. Baseline Sheet | 28 |
| 5. Sessions Sheets for the Picture Naming Procedure | 33 |
| 6. Summary of Session Sheets | 35 |

LIST OF FIGURES

| FIGURE | PAGE |
|---------------------------------------|------|
| 1. Number of Time Outs Taken | 39 |
| 2. Ratio of Incorrect per 10 Correct | 40 |
| 3. Total Correct Responses | 41 |
| 4. Cumulative Number of Words Learned | 43 |
| 5. Number of Time Outs Taken | 51 |
| 6. Total Correct Responses | 53 |
| 7. Errors per 10 Correct Responses | 55 |

CHAPTER I

GENERAL INTRODUCTION

Historically, the use of electric shock as a punisher procedure has been avoided as a method of modifying human behavior. Reese (1966) presented some of the problems associated with the use of this method. Overall suppression of behavior, changes in emotional responses and variability in the conditions under which the shock is presented are some of the problems she mentioned. In spite of these drawbacks, recent reviews have been less critical of the use of shock because of its success in reducing undesirable behavior (Soloman, 1964; and Gardner, 1969). Shock, however, has been typically used as a severe aversive stimulus to reduce serious behavior problems, usually as a last resort (Risley 1968). Azrin and Holz (1966) suggested that punishment used in conjunction with reinforcement in an attentive response situation reduced some of the undesirable side effects of shock. One of the purposes of this study was to see if mild shock for undesirable behavior used in conjunction with reinforcement for desirable behavior was an effective method of training retarded children to name pictures.

Time out (TO) procedures have been most frequently used in tasks of this nature (Martin et al. 1968). TO is a procedure in which the opportunity for reinforcement is removed following an undesirable response. In a pilot study conducted by the author, however, the ef-

fectiveness of the TO procedure for reducing inattentive responses was questioned. A second purpose of this study, therefore, was to compare TO with a mild shock procedure for reducing wasted time. If shock is found to be effective, a further question could be raised. Namely, could the number of incorrect response per shock ratio be increased by substituting tokens. That is if each response resulted in a negative token and a specified number of tokens resulted in a shock, would the resulting reduction in the number of shocks delivered affect its power as a punisher.

The first section of Experiment I deals with some of the preliminary procedures which were necessary before the experimental task could be undertaken. A picture naming task was used. This task required that the subjects sit quietly, pay attention to the experimenter and mimic words. Experiment I examines two questions. Firstly, can a mild shock used in conjunction with reinforcement for desirable behavior effectively train retarded children to name pictures. Secondly, is shock or TO a better procedure for preventing wasted time? The two conditions, shock and TO, were run simultaneously, rather than an ABAB design. This was done since in the pilot study it was felt that daily fluctuations and long term changes in the subjects' behavior had more effect on the results than the experimental procedures. Experiment II examines the effect of increasing ratio of incorrect responses per shock (fewer shocks per specified number of incorrect responses) and the effectiveness of aversive tokens for bridging the gap between the incorrect response and the shock. This section also includes a return to the conditions of the first experiment and a reversal to the highest ratio used in Experiment II for each subject.

CHAPTER II

REVIEW OF THE LITERATURE

A. EXPERIMENT I

Time out has been extensively used in experiments as a punishment procedure. Leitenberg (1965) discussed the various time-out paradigms and reviews the literature on the subject. Bostow and Bailey (1969) used a two minute TO for punishing aggressive and disruptive behavior while reinforcing desirable behavior. One of the behaviors to be eliminated was the loud screaming of a retarded woman. The aggressive behavior (biting, kicking, etc.) of a retarded boy was the other undesirable behavior. Following a loud vocal response, the woman was removed from her wheelchair and placed on the floor for two minutes plus a minimum of fifteen seconds of silence. Edible reinforcers were delivered throughout the day for desirable behavior. The other subject was locked in a TO booth for two minutes following an aggressive response. He received edible reinforcers for each two minute period of desirable behavior. The authors state that the frequency of the problem behavior in each patient was reduced to near-zero level in less than a week when the brief TO for undesirable behavior and reinforcement for other behavior was used.

Zimmerman and Baydan (1963) manipulated the duration and frequency of TOs following incorrect responses on a matching task.

The TOs in the alternative response situation were 2, 10, 60 or 120 seconds. The matching accuracy of the human subjects increased as the TOs increased and this result was primarily due to the effect of the TO duration of the punished response. The unpunished responses were not consistently affected except for a suppression of this response during the 120 second TO. Various ratios of TO were then used while holding the TO duration constant. A decrease in matching accuracy was observed when the frequency of TO was decreased.

Wolf et al. (1964) used a TO procedure to reduce temper tantrums, throwing of eye glasses and self-destructive behavior. After an instance of one of these behaviors, the subject was placed in a room and the door closed. This procedure appeared to be very effective in eliminating the undesirable behavior of the retarded boy. A word learning procedure was also described by the author. An attendant would emit the name of the picture until the subject mimicked her. The mimic was reinforced with "Good" or "That's right" and a bite of the subject's meal. Although his repertoire is still below normal it was greatly improved by this procedure. A similar procedure was elaborated further by Risley and Wolf (1967). They used a TO procedure to eliminate undesirable behavior and they also explained how the parents could continue these procedures in the home.

Martin et al. (1968) used a TO procedure in conjunction with reinforcement for desirable behavior to train autistic children to name objects, to trace figures, to identify objects and to respond to various questions. Following undesirable behavior the experimenter removed the opportunity for reinforcement (TO) and ignored the subjects until they sat

quietly and attended to the experimenter for five seconds. The study is of special interest because of the detailed description of the various procedures used.

Risley (1968) used several techniques to reduce climbing behavior in a disturbed girl. A ten minute TO was used in the home but discontinued after fifty days without a reduction in climbing. Reinforcement for incompatible behaviors and extinction for climbing in the laboratory were then used with no apparent effect. A painful shock procedure was finally used to reduce climbing behavior. The voltage ranged from 300 to 400 V with occasional spikes reaching 1000 V. The rate of climbing was almost completely suppressed during the shock sessions. The authors examined the side effects of the shock and conclude: "..... side effects in the form of behavioral contrast or 'symptom substitution' did occur, but these side effects were primarily desirable."

A number of other people have used a severe shock procedure, including Lovaas et al. (1965) and Tate and Baroff (1966). The latter used a painful electric shock to eliminate self-injurious behaviors in an autistic boy. Initially a TO procedure was employed. If the subject hit himself while walking with the experimenters, they let go of his hand and ignored him for the duration of the inattentive responding plus three additional seconds. At the end of this time they again held his hand and continued the walk. Although this procedure was reducing the undesirable behavior, the subject was in danger of destroying his right retina. A stock prod delivering a 130 V stimulus for approximately .5 seconds was therefore used following each self-injurious response. The authors con-

cluded that this behavior was immediately reduced by the painful shock the undesirable behavior had not occurred for a six month period.

Herman and Azrin (1964) reported the effects of punishment by noise in an alternative response situation. A Lindsley manipulanda delivered cigarettes on a one minute variable interval schedule of reinforcement to three male patients from a mental hospital. Two levers were available (R-1 and R-2) during the alternative response situation and either one would result in reinforcement. In the next phase reinforcement continued but a 96 db. noise, considered annoying but not painful was delivered following each response on R-1. In the single response situation only R-1 was available. Under this condition the subjects continued to receive reinforcement on a one minute VI. During one phase they were not punished and during the other they received the noise. In the single response situation the punished responses were only partially suppressed. In the alternative responses, however, the punished response was almost completely suppressed. Also, an increase in the unpunished response occurred when the alternative response was punished.

In summary, it appears that T0 has been used to effectively suppress behavior in many situations. However, the evidence also suggests that electric shock has been used more effectively as a punisher than T0.

B. EXPERIMENT II

Ayllon and Azrin (1965) in a classic study showed how a token system can be administered by non-professional personnel, applied to large numbers, and utilizing numerous reinforcement. The results showed

that tokens are very effective reinforcers, in fact token reinforcement "exerted almost complete control over whether a patient worked". When tokens were eliminated performance deteriorated to a near zero level. The results also indicated that reinforcement, to be effective, must be contingent on the desired performance. The procedure seemed effective regardless of I. Q., diagnosis, or length of hospitalization.

Girardeau and Spradlin (1964) used tokens as conditioned reinforcers for female retardates. The primary reinforcers included items from the canteen, and objects such as washing machines which could be rented. A chart of reinforcement values for tokens was used and stress was placed on individual improvement. The costs of the primary reinforcers were also manipulated, so that desirable behavior would increase. The authors noted an increase in desirable behavior.

Staats et al. (1964) used a reinforcing token system to teach reading skills to three, four year old children. The tokens (marbles) were backed up with a variety of toys chosen by the child. This system was ineffective in maintaining the child's behavior for long periods of time. The good control established allowed the experimenter to vary other parameters important for reading acquisitions.

Watson (1968) conducted two experiments: one to evaluate the conditioned reinforcement properties of poker chips, the other to determine the primary reinforcement preferences of the severely retarded child. The results of experiment one indicated that the poker chips acquired reinforcement properties as a result of the back-up reinforcers. In the second experiment, 14 severely retarded male children were allowed to select their own primary reinforcement by inserting the tokens earned in-

to various vending machines. Initially more chips were spent on manipulatable toys than candy, but by session 5 this was reversed. The long term preferences (70 sessions) then examined using 7 children showed that the candy preferences were maintained. Wolf et al. (1968) used a trading stamp style of token reinforcement system in a remedial education program. In Experiment I the maximum point value for each reading unit was first decreased and then increased again. The decrease radically reduced the number of stories read while increasing the points increased the reading rate. Experiment II examined the effects of point manipulation on different tasks. Thus the maximum number of points for English could be halved or doubled. Shifts to zero point value caused cessation of the behavior while lesser shifts produced immediate but variable changes. The reading task once increased tended to stay high in spite of point manipulation while the English and math tasks declined under these conditions.

Birnbrauer et al. (1965) established a token reinforcement system in a class of 17 retarded children. In order to determine its effectiveness in maintaining accuracy and rate of studying, the tokens were discontinued and after 21 days reinstated. Verbal reinforcements for correct responses, extinction for incorrect, and a time-out procedure for disruptive behaviors were used during all phases of the program. The effects of this procedure on each of the students were examined and three basic patterns noted. "(1) Five Ss showed, for all practical purposes, no adverse effects of NT (no tokens). (2) Six Ss increased in percentage of errors in NT, but continued to cooperate and to complete the same or greater number of items. (3) Four Ss increased in percentage of

errors, accomplished less work, and became serious disciplinary problems during NT. After tokens were reinstated, most of the Ss completed progressively more work and stabilized at levels of percentage of errors that were lower than at any previous time."

It appears that tokens function well as conditional positive reinforcers under certain conditions. Therefore the question is raised concerning the feasibility of negative tokens.

CHAPTER III

EXPERIMENT I

INTRODUCTION

Time-out has been shown to be effective as a punishment procedure. It has been used in a number of forms and for preventing a wide range of undesirable behaviors. Several experimenters have used it as a punishment procedure in a word learning task. In a pilot study conducted by the author, however, it was felt that time-out was not effective as a punishment procedure for reducing wasted time on a word learning task. In fact, it may have been reinforcing. This effect was also noted by Steeves (1969). Other studies, dealing with serious behavioral disorders, have frequently resorted to severe shock when time-out as a punishment was ineffective. Soloman (1964) and Gardner (1969) in recent reviews have been only mildly critical of shock as a punishment procedure. In these reviews shock has typically been used in a severe form to eliminate chronic behavior disorders which occur frequently. A number of studies have shown that even mild punishment can be effective in eliminating undesirable behavior when a readily available alternative response is reinforced (Herman and Azrin 1964, Azrin and Holz 1966).

Although severe shock has usually been used, a mild form might be effective if used in conjunction with reinforcement for desirable be

havior. The use of mild shock would eliminate some of the undesirable side effects associated with the use of severe shock. If this is the case, then mild shock might be an effective procedure in reducing the less chronic types of undesirable behavior. More specifically, mild shock might be an effective method of reducing wasted time and incorrect responding on a word learning task. Time-out in conjunction with reinforcement for desirable behavior has been used as a punishment procedure for tasks of this nature. The first purpose of this experiment was to determine if mild shock is an effective method of reducing incorrect responding on a word learning task. A comparison with a 0 second time-out procedure was used to assess the shock's effectiveness. The second purpose of this experiment is to see if mild shock is a better method than time-out equal in length to the time the subject spends in inattentive responding for reducing wasted time.

PRELIMINARY PROCEDURES

Before investigating these questions, a number of behaviors were required which were not in the subjects' repertoires. The picture naming task required the subjects to sit quietly, attend to the experimenter and to mimic sounds. The task also required limited verbal behavior and therefore subjects had to be carefully selected. The most effective reinforcers for these subjects then had to be determined. As a token system was to be implemented, token training was also necessary.

Subject Selection

One dependent variable in this study was an incorrect to correct

response ratio. In a pilot study, conducted by the author, it was noted that subjects with an extensive vocabulary and experience in a word learning task made very few errors. This limited number of errors would render the measure insensitive. Therefore, only children with no prior experimental experience and with limited vocabularies were used. The task did require the subjects to be able to repeat a word given by the experimenter (mimic). The following procedure was used to pick subjects meeting this very limited verbal behavior requirement.

A list of twenty common objects for the children to mimic was compiled (see Table I). The children in the St. Amant Ward of the St. Vital Hospital, Winnipeg, Manitoba were potential subjects. The children, whose ages ranged from two to eight years, were retarded or autistic. Several of these children were interviewed as follows:

- (a) The experimenter pointed to the object to be named and said, "What's that?"
- (b) If the child responded correctly the word became a primary word.
- (c) If no response was emitted by the potential subject (a) was repeated.
- (d) If the object remained unnamed the experimenter said, "That's a SHOE. What's that?" (If the object wa a shoe).
- (e) (d) was also repeated if the first trial was not successful. If still unnamed the same procedure was followed on the next object.
- (f) If an incorrect response was emitted the experimenter said, "No! That's a shoe. What's that?"
- (g) If at any time a correct response was emitted the word

TABLE I

OBJECTS USED IN SUBJECT SELECTION PROCEDURE

| | |
|-----------|----------|
| finger | water |
| T. V. * o | mouth |
| cookie o | door * o |
| belt o | pen * o |
| car | thumb |
| tree * | arm * o |
| hair | pants |
| socks | comb o |
| shirt o | |
| ring * o | |
| watch | |
| ear o | |

* The objects Derrick correctly mimicked during the subject selection procedure.

o The objects Bobby correctly mimicked during the subject selection procedure.

became a primary word.

(h) The first two children who had at least five primary words but fewer than fifteen were used as the experimental subjects. The characteristics of the two retarded boys selected, Bobby and Derrick, are described on page 27.

Attention Training

This research required the subjects to sit attentively at a table. This behavior was not in the child's repertoire and had to be taught. Shaping was the technique selected to produce the desired behavior. Shaping is the process of reinforcement in which responses successively similar to the desired behavior are reinforced (See Reese, 1966). A response which the subject does emit can thus be gradually altered until a response not normally occurring is emitted.

Each subject was seated behind a card table in such a way that it was difficult for him to stand up and shaping proceeded as follows: Each time the subject's eyes met the author's, the subject was given a reinforcement. Small sugar-coated chocolate candies (M & M's) and peanuts were used for reinforcement. Two items randomly selected were given for each required response. After about twenty rewarded trials, five seconds of eye contact became the criterion for reinforcement. After one session, the five second requirement was increased to ten seconds. The shaping was considered satisfactory if the subject's eyes met the experimenter's a total of fifteen times in one session. Sessions were held three times a week in the afternoon and lasted for twenty minutes.

Derrick acquired the desired behavior by the end of the second session. He would sit quietly, eyes intent on the experimenter, for extended periods of time. By the end of the fourth session the other subject, Bobby, did not have eye contact with the experimenter for more than five seconds at a time. He would point to various objects in the room, whine, push the table, stand and was extremely hyperactive.

To eliminate this standing behavior the experimenter would, contingent on the undesirable response, say "SIT DOWN!" and force the subject down in his chair. Stimulus control was apparent after two sessions. That is, the verbal command (stimulus) alone elicited sitting behavior. While preventing the undesirable behavior of standing, the experimenter also reinforced the incompatible response of sitting. If Bobby remained seated for approximately fifteen seconds he again received the edible reinforcer.

Bobby continued to point to various objects in the room, scratch his head, try to grab objects, etc. A cardboard screen approximately 10 feet by 4 feet was constructed. This screen was placed on the table behind the experimenter, so that Bobby was unable to see other objects in the room. Simultaneous with screen placement a hand-clasping response procedure was initiated. A fading technique was employed to produce this response. Fading was originally derived from Terrace (1963) and has been used with children by Moore and Goldiamond (1964), Wolf and Risley (1967), and others. In fading, a dimension of the specific stimulus controlling the response is gradually decreased (faded-out), while some dimension of a previously neutral stimulus is slowly in-

creased (faded-in). The neutral stimulus becomes the controlling stimulus without a reduction in the response rate.

Prior to the use of fading, the subject's hands were placed together in a clasped position on the table by the experimenter. The experimenter then placed his hand on top of the subject's hands to prevent movement and then reinforced the subject after each twenty-second period. Within one session the stimulus (experimenter's hand) elicited the desired response (clasped hands without escape responses). The pressure exerted by the experimenter's hand was then faded-out. The hand was lightly placed on top, then near-by and finally removed from the table. However, this response did not reliably occur. To increase the probability of this response, a cue stimulus was used. The experimenter would fold his own hands and tap the table lightly as the cue. When the subject mimicked the handclasp, he received the edible reinforcer. By the end of the second session when the experimenter tapped the table, both subjects folded their own hands, placed them on the table and waited for the reinforcement. When the undesirable response was eliminated, attention training was completed in two more sessions. It is interesting to note that when the experimenter deliberately ignored Bobby during the experimental task, Bobby would mimic this behavior by folding his hands and pounding on the table.

Derrick, although satisfying the original attention requirements, had some behavior to be eliminated. When having eye contact with the experimenter, he would tilt his head back as if peering under glasses. It was noted that Derrick's eyes would follow the reinforcers.

Therefore, the experimenter held the M & M on the table and reinforced the subject for ten seconds of eye contact with it. Upward head movements were then shaped by gradually raising the M & M to the experimenter's eye level. When the M & M was held at this height, Derrick's head and eyes were aimed at the experimenter's. The M & M was then faded-out by covering it with the hand. Then the hand without the M & M was used and finally the experimenter's hand was faded-out, while reinforcing eye contact with the correct head position.

Misbehavior

A number of responses were emitted by the subjects which were undesirable only because they competed with attention responses. This was called inattentive behavior. Crying, pointing, turning in the seat, etc. were all inattentive responses. In addition to the reinforcement for incompatible behavior (attention responses), a punishment procedure was utilized. A punisher according to Azrin and Holz (1966), is a stimulus which, when presented contingent upon some response, decreases the probability of that response occurring again. Time out (TO) was the punishment selected. TO, as used in this study, refers to the removing of the opportunity for the subject to receive reinforcement, immediately following an undesired response.

During the preliminary procedures inattentive behavior was dealt with as follows:

(a) Each and every time an inattentive response occurred the experimenter turned his head sharply to the left and ignored the subject.

(b) The opportunity for reinforcement was eliminated while the subject was emitting inattentive responses.

(c) The TO continued until the inattentive response of the subject ceased. When the subject emitted an attention response the experimenter resumed the preliminary training.

In addition to the inattentive responses, the subjects emitted behavior which was potentially harmful to the equipment, subjects or the experimenter. These responses were collectively called disruptive behavior and included grabbing the microphone, throwing objects, banging their heads against the wall, kicking the experimenter, and so on. The TO punishment requires a number of trials to reduce undesired responses and it was necessary to eliminate the disruptive behavior immediately. Therefore, a more severe punishment procedure was used.

(a) The experimenter said, "No!" immediately after each and every disruptive response, and slapped the child's hand sharply.

(b) If an object was held, the experimenter took it away forcefully and then slapped the child's hand sharply.

(c) If crying behavior was emitted consequently, the TO procedure was used to eliminate it.

(d) The experimenter was prepared to initiate the interrupted reinforcing procedure contingent on an attentive response.

(e) This procedure was repeated if the disruptive responses were not immediately suppressed.

Picture Naming Task

The subjects were trained to name objects and pictures of objects to acquaint them with the experimental task and to control mimicking behavior. The primary words (words which the subject had previously mimicked) were the verbal responses over which the experimenter needed to get stimulus control. For example, if one primary word for a subject was "shoe", this meant that during the subject selection procedure he emitted the response "shoe" while the experimenter pointed to and possibly named the object, shoe. In this case the stimulus which controlled the desired response was the object itself. The following procedure was used to get a picture of the object to elicit the desired verbal response.

(a) The subjects were shown an object and the experimenter said, "What's that, that's a ____ (name of object). What's that?"

(b) If the subject responded "shoe", the experimenter said, "Good boy" and delivered the selected reinforcer.

(c) If the child did not respond in five seconds, (a) was repeated.

(d) If the subject still did not respond the experimenter said, "Say SHOE". This was repeated once more and if still no response was emitted the experimenter proceeded with the next object.

(e) If the subject made a wrong response the author said "No", turned his head away and ignored him for ten seconds (T0).

(f) If the child misbehaved the experimenter said, "No" and slapped the child's hand.

(g) If the subject was inattentive, the author turned his head to one side and did not administer the reinforcer normally re-