*FUNCTIONAL CONSIDERATIONS IN THE USE OF
PROCEDURAL TIMEOUT AND AN EFFECTIVE
ALTERNATIVE¹*

SANDI PLUMMER, DONALD M. BAER, AND JUDITH M. LEBLANC

UNIVERSITY OF KANSAS

Two single-subject experiments were conducted with students in special preschool classes. In Experiment I, the subject's disruptive, appropriate, and inappropriate play behaviors were measured as a function of three independent variables: reinforcement, a typical timeout procedure, and regularly paced teacher instructions. In an ABA reversal within a multiple baseline across two teachers, all three independent variables comprised the A conditions and procedural timeout was omitted in B. Experiment II examined a second subject's appropriate and inappropriate eating as a function of the same three variables. Two teachers conducted baseline and paced instruction-plus-reinforcement conditions in multiple baseline across teachers. Subsequently, one teacher performed a series of reversals and replications with various combinations of a typical timeout procedure and reinforcement mixed with paced instructions. The results of both experiments suggest that timeout did not produce response decrement in a punishment paradigm, but rather produced response increment in a negative reinforcement paradigm. These results prevailed, even though a reinforcer was operating in the environment before introducing timeout. Paced instructions (delivering instructions to the child at a set pace regardless of the child's behavior) appears to be an alternative when timeout is not effective and, in conjunction with reinforcement, was demonstrated to reduce inappropriate behavior to near zero.

DESCRIPTORS: autistic behavior, aversive control, punishment, lunchroom behavior, disruptive behavior, instruction following, cueing, paced instructions, autistic children

In applied research, timeout is a commonly used response-decrement procedure that refers to the contingent, relatively brief removal of an organism for a fixed time interval from contact with ongoing environmental contingencies. Timeout, as a procedure has involved restricting the subject to an isolated place devoid of people (Allison and Allison, 1971) and/or objects of interest (Bostow and Bailey, 1969), or may simply represent removal of the subject's opportunity to obtain reinforcers, *e.g.*, by the teacher or experimenter turning away from a child (McReynolds, 1969), by removing stimulus materials from a child (Barton, Guess, Garcia, and Baer, 1970), or by eliminating delivery of reinforcement for a period of time. Because a typical timeout procedure is intended to decrease or eliminate behavior, it is usually considered to mean timeout from positive reinforcement (*cf.* Sherman and Baer, 1969, for a more complete discussion).

¹This investigation was supported, in part, by HD-020528 (Preschool Component), titled "Experimental Analysis of Preschool Curriculum Procedures and Materials", funded by the National Institute of Child Health and Human Development through the Bureau of Child Research at the University of Kansas; and MH-20410, titled "Two-Environment Modification of Problem Child Behavior", funded by the National Institute of Mental Health to the Department of Human Development at the University of Kansas. This paper is based on two papers presented at the American Psychological Association, 1974 and 1975, the second of which was part of the PhD dissertation of the first author, which was directed by the third author. The authors wish to thank the staff of the Special Preschool Class of the Edna A. Hill Child Development Laboratory, head teacher, Trudylee Rowbury; and the staff of the UAF Experimental Special Education Class, head teachers Barbara Brackman and Mary Holdgrafer. Also, special thanks to those who acted as experimenters and observers for the study: Vickie Hatfield, Hilda Hursh, LeAnne McKelvey, Michelle Domash, Becky Paden, and Kathy Burkdoll. Reprints may be obtained from Sandi Plummer and Judith M. LeBlanc, Department of Human Development, University of Kansas, Lawrence, Kansas 66045.

Procedural timeout has been used, with some success, to manage a variety of behaviors in applied environments: toileting (Azrin and Fox, 1971; Giles and Wolf, 1966), assaults by delinquent youths (Burchard and Tyler, 1965; Tyler and Brown, 1967), autistic behavior (Risley and Wolf, 1967), aggression (Clark, Rowbury, Baer, and Baer, 1973; Hamilton, Stephens, and Allen, 1967; LeBlanc, Busby, and Thomson, 1973; Sloane, Johnston, and Bijou, 1967; Vukelich and Hake, 1971), inappropriate speech (Hewett, 1965; Lahey, McNees, and McNees, 1973; McReynolds, 1969), oppositional and inappropriate social behaviors (Birnbrauer, Wolf, Kidder, and Tague, 1965; Nordquist, 1971; Pendergrass, 1972; Ramp, Ulrich, and Dulaney, 1971; Sajwaj, Twardosz, and Burke, 1972; Wahler, 1969), elective mutism (Wulbert, Nyman, Snow, and Owen, 1973), and unattractive eating (Barton, Guess, Garcia, and Baer, 1970).

There are several considerations in evaluating the effectiveness of typical timeout procedures. In a teaching environment, the use of procedural timeout may be costly, in terms of program time, because it removes the child from contact with the positive contingencies designed to build desirable academic and social repertoires. In addition to decreased amounts of teaching time, there are other, possibly more crucial, problems involved in evaluating the effectiveness of timeout procedures as having a response-decrement function. First, because there is little information available on the failure of timeout procedures to reduce behavior, it is impossible to analyze what might be involved when negative results are obtained. Second, procedural timeout is often used in conjunction with other procedures whose effects on the target behaviors are not assessed (*e.g.*, increased reinforcement for positive behaviors). Third, the experimental effects accorded the timeout procedure may be due to the increased percentage of reinforcement time for an incompatible behavior, but this percentage is difficult to specify. Finally, the actual removal of the organism from the environment may involve unspecified pun-

ishment. Due to these problems, it may be difficult to evaluate what is responsible for the success of procedural timeout or response-decrement when it does succeed.

Although the applied literature does not usually describe failures, procedural timeout, like many behavior-modification procedures, may produce results contrary to the desired effects if environmental conditions are varied. Thus, it becomes necessary to explore parameters that influence the function of timeout procedures to be able to specify under what conditions timeout procedures will and will not produce desired results. Only then can the procedure be described accurately.

Seldom considered in applied research is that procedural timeout can be a negative reinforcement or escape procedure, *i.e.*, removal from the environment increases the inappropriate behavior it follows. When procedural timeout is used by the subject in an escape paradigm, strong aversive consequences such as shock or stimuli, discriminative for long periods of non-reinforcement, are often present in the environment. However, some research, primarily with infrahuman organisms, demonstrates maintenance of a behavior that is procedurally timed out during a schedule of presumably positive reinforcement. These positive schedules were of large fixed-ratio (Azrin, 1961; Appel, 1963; Thompson, 1964, 1965; Thomas and Sherman, 1965), fixed-interval (Brown and Flory, 1972), or progressive ratio reinforcement (Dardano, 1973, 1974; Plummer, Note 1) or were multiple and concurrent schedules with components of different reinforcement density (Daly, 1971; Carlson and Arokbaar, 1970). Additionally, if a stimulus is a cue for both reinforcement and punishment, an organism may prefer timeout from that stimulus (Hearst and Sidman, 1961).

In the basic literature, procedural timeout has been used functionally in a punishment paradigm, *i.e.*, as a response-decrement procedure, and in a negative reinforcement paradigm, *i.e.*, as a response-increment procedure. Since applied environments are complex, a reasonable

assumption is that schedules and/or relationships among stimuli presented in the basic laboratory might also be present in the applied environment. Thus, timeout procedures might also have reinforcing or aversive functions in applied environments.

The purpose of the current research was to explore some parameters influencing the effectiveness of typical timeout procedures in producing a response-decrement in an applied environment. The studies sought to demonstrate that the presence of a validated reinforcement procedure, operating in the environment from which the child was timed out, was not a sufficient condition for determining the punishing nature of the timeout procedure. In addition, another procedure, paced instructions (delivering instructions to the child at a set pace regardless of the child's behavior) was used to decrease inappropriate behavior when procedural timeout was demonstrated to be ineffective.

EXPERIMENT I

METHOD

Setting

This study was conducted four days a week for approximately 40 min each day during the play period in a preschool class for special children in the Edna A. Hill Child Development Laboratory in the Department of Human Development at the University of Kansas. The class contained eight children, ranging in age from 4 to 6 yr, who had been referred to the class because of behavior problems severe enough to prevent their enrollment in normal school settings. During the play period, at least three activities were available to the children.

Four or five teachers rotated duties daily, so that two supervising teachers were always available in the play area. These teachers instructed the children in play skills and praised the children, both verbally and physically, for appropriate play or approximations to appropriate play. Experimental Teacher A had been in the setting for nine months before the start of the study

as a part of the work experience required for a Master's degree and had experience both with the subject and the procedures. Experimental Teacher B, however, who was doing her required undergraduate practicum was unfamiliar with both this subject and setting but had previously used timeout procedures.

Subject

A 5-yr-old autistic girl exhibited echolalic speech, social skills ranging from 2 to 3 yr below her age level, and bizarre and autistic behaviors in response to teacher instructions. She was previously enrolled in a regular preschool class for two semesters and had attended the special preschool class for one semester.

The subject was chosen because she was disruptive and disturbed others in the class. Her disruptions often followed teacher instructions, especially those that encouraged the subject to engage in appropriate play with materials or to use the materials in a novel way. Disruptive behaviors continued in spite of the consequences (both turn away and isolation timeout procedures), contingent on disruptive behavior or inappropriate contact with the materials, in the classroom setting. When no teacher instructions were given to the subject, she would interact with materials in stereotypic patterns (flipping a toy dog's tail, bouncing a doll's head, *etc.*) or engage in self-stimulatory behavior. Therefore, many teacher instructions were required before the subject engaged in appropriate play with the materials.

Response Definitions

The subject's disruptive behavior and appropriate and inappropriate contact with play materials were observed, together with teacher behaviors relevant to play. Disruptive subject behavior included: (1) hoarding play materials, (2) grabbing play materials, (3) leaving activities, (4) self-instruction (usually in the form of echolalic speech), and (5) tantrums. When the subject had physical contact with a material for two consecutive 10-sec intervals, the subject's

contact with play materials was scored as either appropriate (manipulating the material according to a functional use) or inappropriate (manipulating the material in a distinctive or non-functional manner).

Teacher behaviors included: (1) instructions to engage appropriately in the use of materials when the subject was not using them appropriately (*e.g.*, "Hold the paint brush like this and stroke the paper", when the subject was flipping the brush back and forth), (2) instructions for the subject to elaborate any ongoing appropriate use of materials (*e.g.*, "Feed the doll with the spoon", when the subject was rocking the doll), (3) verbal and nonverbal approving (*e.g.*, verbal "Good, I like the way you're holding the brush.") and disapproving (*e.g.*, "No, don't pull the head off the doll.") teacher attention, and (4) walk-away timeout procedures. During procedural timeout, the teachers removed the play materials from the subject and walked away, resulting in 1 min of no teacher verbal or physical interaction with the subject. Each disruptive child behavior was divided into two categories, that which was occasioned (*i.e.*, following within 3 sec of a teacher instruction) or nonoccasioned (*i.e.*, not following within 3 sec of a teacher instruction).

Observation, Recording, and Reliability

Data were recorded daily, in 10-sec intervals (Bijou, Peterson, and Ault, 1968), by a paid trained observer using a stopwatch and clipboard. Only one occurrence of each defined behavior could be recorded in each interval.

To assure a consistent rate of teachers' instructions of one per minute throughout all conditions of the study, the observer used a cueing device composed of three sets of sequenced number tabs attached to the front of the clipboard (Figure 1). The tabs on the center ring marked the elapsed session time and those of the two side rings marked the number of instructions given by each of the two supervising teachers during that time. Teachers checked the elapsed time in 1-min units (center tab) and looked at

their side tab (distinctively colored) to see how many instructions they had delivered. By comparing the two numbers, the teachers determined if they should increase, decrease, or maintain their rate of instructions for the remainder of the session. During procedural timeout periods, the time-elapsed tab (center) was not changed. Thus, the teachers were not required to give instructions to account for time that elapsed during a timeout period. During procedural timeout conditions, the observer also used a special (red) tab to signal the teachers to stop all contact with the subject when a disruptive behavior occurred. This signal was removed either 1 min after the teacher initiated a timeout procedure or 1 min after the subject's last disruptive response. In other words, if the subject was disruptive within the 1-min interval, the red tag remained to signal an additional 1 min of timeout (Plummer, Rowbury, and Baer, Note 2).

Data were simultaneously but independently recorded by a second person observing the subject and teachers. The principal investigator was neither an observer nor a teacher for Experiment I, but was the reliability observer for Experiment II. The two observers were shoulder to shoulder, and therefore the reliability observer could not see the numerals on the cueing device. Behavior occurred rapidly, and a cue was produced at least twice a minute. Because it seemed unlikely that the reliability observer could simultaneously record several cued and uncued behaviors, as well as attend to the cueing the primary observer provided for the teachers, it was assumed that data were independently recorded.

Reliability was assessed six times during each major condition for each teacher for the total session, except Session 20, Experiment I. Interval-by-interval agreement was calculated by frequency of occurrence (Bijou *et al.*, 1968), *i.e.*, by dividing the number of intervals during which both observers scored an occurrence of the behavior by the number of intervals during which either or both observers recorded an oc-

Fig. 1. Illustration of cueing device used by observer to facilitate the paced instructions and timeout.

currence of the behavior and multiplying by 100. Reliability percentages ranged from 87 to 100%, with a mean of 92%, in all combined categories of teacher and child behaviors during each condition.

Experimental Design and Procedures

In a reversal within a multiple-baseline design across two teachers, teacher behavior following the subject's disruptive behavior varied per condition as follows:

Condition 1: paced teacher instructions with procedural timeout: the teachers were signalled

to stop interaction with the subject following each occurrence of disruptive behavior, *i.e.*, the behavior was procedurally timed out. One minute after a disruptive behavior occurred, the observer signalled the teachers to interact again with the subject. Thus, all teacher interaction with the subject stopped for 1 min following disruptive behavior. Apart from the requirements of the timeout contingency, the teachers paced their instructions to the subject, so that each teacher gave one instruction every 2 min on the average. The subject thus received one instruction per minute on the average. In effect, each timeout period represented a 1-min

gap in instructional pace. Instructions that otherwise would have been delivered during this minute were withheld. The subject's appropriate contact with materials was continually consequated by approving teacher attention (approximate CRF schedule). Disapproving teacher attention occurred on only one occasion, following behavior which was destructive to materials.

Condition II: paced teacher instructions with no procedural timeout: again, each teacher paced instructions to the subject, each averaging one instruction per 2 min, for a total of one instruction per minute across the two teachers. But in this condition, the teachers continued instructing the subject, irrespective of the occurrence of disruptive behavior, maintaining a pace of one instruction per 2 min. Thus, the typical timeout procedure was never implemented. Appropriate child contact with materials was followed by approving teacher attention, and no occasions required disapproving teacher attention.

The two conditions were presented by each teacher in an ABA reversal design (paced instructions with procedural timeout, paced instructions with no procedural timeout, paced instructions with procedural timeout) with the onset of the conditions presented in a multiple-baseline across the two teachers. At the beginning of the study, both teachers were implementing the typical timeout procedure contingent on disruptive responses. Beginning in Session 8 for Teacher 1 and Session 11 for Teacher 2, procedural timeout for disruptive behavior was discontinued. In Session 15 for Teacher 1 and Session 19 for Teacher 2, timeout procedures were resumed. There was no baseline condition, because Teacher A had been trained to deliver paced instructions, and baseline measures might thus have been affected by the training. Also, the child was the subject in previous research (Plummer, Note 3) in which a baseline of the behaviors had been recorded. Furthermore, the study sought to compare the effects of a typical timeout procedure and paced instructions on this behavior, rather than to

demonstrate the overall effectiveness of either procedure (which was already well known).

RESULTS

Figure 2 shows the percentage of combined teacher instructions that were followed within 3 sec by disruptive child behavior *i.e.*, occasioned disruptive responses (number of intervals of occasioned disruptive responses/number of intervals of teacher instructions). All categories of subject disruptives and all categories of teacher instructions were combined for the reported measures. Anecdotally, teachers reported that engaging instructions resulted in more inappropriate behavior. However, the data recording method allowed no systematic analysis of the two types of instructions. The percentage maintained or increased with timeout procedures, averaging from 20 to 40% in the last sessions of the first timeout condition, and 20 to 30% during the second timeout condition, decreased to zero when procedural timeout was eliminated and only paced instructions were maintained. This was true for both teachers. Thus, procedural timeout was reliably associated with increased occurrence of disruptive child responses to teacher instructions, even when those instructions were paced fairly uniformly in time (apart from the requirements of the timeout procedure). Nonoccasioned disruptive responses occurred in only two sessions during the study, once during Session 7 and twice during Session 13.

The cueing device maintained accurate delivery of instructions by both teachers. Teacher 1's pace was maintained per session at an average of one instruction per 2 min, with a range of 1.3 to 0.9. Teacher 2's pace was also maintained at an average of one instruction per 2 min, with a range of 1.1 to 0.8. Within-session variability was essentially the same as that across sessions. Appropriate child contact with the materials was followed by approving teacher attention approximately 80% of the time to approximate a continuous schedule of reinforcement throughout all conditions.

Fig. 2. Percentage of instructions followed by disruptive behavior for Teachers 1 and 2 across conditions of: (I) paced instructions with timeout, (II) paced instructions, and (I) paced instructions with timeout.

EXPERIMENT II

METHOD

Setting

This study was conducted five days a week during the preschool lunch period in a classroom for trainable retarded preschool children at the University of Kansas. During lunch, four or five children were seated at a small table, with teachers seated between them to direct each child's eating. The subject always sat at the same table, in the same end-of-the-table position.

During the study, one of two specified teachers was assigned per day to direct the subject's eating. Other teachers or children did not attend to the subject, who was isolated by table position. Both teachers were graduate student volunteers who agreed to have their behavior monitored. They were told that the preschool class needed people to supervise the children during lunch, and were not informed about the experimental procedures and the subject.

Subject

The subject, a 5-yr-old male, was variously diagnosed as retarded, autistic, and brain damaged and was previously institutionalized for 2 yr. He was enrolled in his third semester of the current program and did have prior exposure to all types of timeout procedures, but not to paced instructions.

The most annoying aspects of the subject's behavior were stereotypic responses to teacher instructions. For example, he responded to instructions to eat by rocking in his chair, playing with his fingers, throwing food, spitting, and/or other inappropriate behavior. However, without teacher instructions, the subject either did not eat or ate with his fingers. Thus, even though instructions evoked inappropriate behavior, they were necessary in attempts to train the subject to eat appropriately.

Response Definitions

Recorded teacher behaviors included: (a) instructions to prepare to eat (*e.g.*, "pick up your

spoon", "sit down", *etc.*); (b) instructions to eat (*e.g.*, "drink your milk", "eat your sandwich", *etc.*); (c) general comments (*e.g.*, "the food is good today", "you sure played hard today", *etc.*); (d) praise for eating (*e.g.*, "Good, you drank your milk", or a pat on the head while eating, *etc.*), or preparing to eat (*e.g.*, "Good you sat up to the table", "I like the way you picked up your spoon"); (e) reprimands (*e.g.*, "no, don't throw the food", or holding the subject in the chair, *etc.*); and (f) turning away from the subject to timeout inappropriate behavior.

Recorded child behaviors included: (a) appropriate eating (*e.g.*, putting food in the mouth, chewing the food, *etc.*); (b) approximations to eating (*e.g.*, spoon-to-mouth with no food, stirring food on the plate, holding food in the mouth, picking up the glass without drinking, *etc.*); (c) inappropriate eating (*e.g.*, spitting, throwing food, rocking in the chair, finger playing, *etc.*). Each child behavior was divided into two categories, that which was occasioned (*i.e.*, following within 3 sec of a teacher instruction to eat) or nonoccasioned (*i.e.*, not following within 3 sec of a teacher instruction to eat).

Observation, Recording, and Reliability

Data were recorded daily by a trained observer using a 15-sec interval recording system for 12 min of eating time (the timeout periods were not included in the total 12-min period). Consequently, if there were five timeout periods during the lunch period, the lunch period would be extended to 12 min and 50 sec. Recording procedures, the teacher-cueing device, and reliability procedures were the same as in Experiment I, except that reliability was assessed twice during each condition, only instructions to eat were counted by the tabs, only one teacher was cued per session, and all child behaviors could be scored more than once per 15-sec interval. Reliability calculations for teacher behaviors were the same as those reported in Experiment I, while reliability calculations for child behavior categories were based on total session reliability (smallest number of scored responses per

session/largest number of scored responses per session). This change in reliability procedures was due to the multiple scoring of child behaviors in each interval. The overall average occurrence reliability in all separate categories of teacher and child behaviors in all conditions was 92% agreement, with a range from 85 to 100%.

Experimental Design and Procedures

The general procedures included paced teacher instructions with and without procedural timeout for inappropriate behavior, and with and without teacher praise following eating. The timeout procedure consisted of the teacher turning away from the subject and stopping all interaction for 10 sec. (This turn-away timeout procedure was used to interrupt the subject's contact with the experimenter's contingencies without introducing the additional procedures involved in physically removing the child from the locale.) As in Experiment I, the materials, this time the plate and food, were removed as the teacher turned away from the subject for the 10-sec timeout.

The design consisted of a multiple baseline across two teachers to evaluate the effect of paced instructions plus reinforcement, followed by a reversal design within one component of the multiple baseline, to analyze the separate and combined effects of positive reinforcement for appropriate eating and procedural timeout for inappropriate eating.

For the first eight weeks of the study, two teachers (A and B) alternated as the subject's assigned lunch-time teacher. After this, in order to complete the analysis within the remainder of the school year, Teacher B no longer served as an experimenter, so that more sessions could be obtained with Teacher A. Conditions were changed as trends stabilized in the major categories of behavior. However, because the subject and teachers were leaving at the end of the semester, lengthy conditions were not possible. The teacher behaviors varied in each condition as follows:

Baseline: Teachers A and B pressed the subject to eat as much as possible, using whatever techniques they wished, including praise, instructions, and favored food. In this condition, teachers' instructions and praise were allowed to vary. The teachers presented favored foods (cookies and ketchup) paired with the praise. These foods were available during every meal but under teacher control.

Condition I: paced teacher instructions plus reinforcement: the pace of the teachers' instructions, four per minute, was controlled by the cueing device attached to the observer's clipboard. As in the second condition in Experiment I, the timeout procedure was not used in this condition. Appropriate behavior was followed by teacher praise and bits of favored food (CRF). In this study, all conditions other than baseline involved implementation of paced instructions. Therefore, as in Experiment I, teachers continued to instruct regardless of the child's inappropriate behavior.

Condition II: paced teacher instructions plus reinforcement and procedural timeout: the teacher continued to pace instructions at an average of four per minute, and gave praise and bites of favored food for the child's appropriate behavior. However, inappropriate behavior was followed by 10 sec of the turn-away timeout procedure, during which the teacher made no contact with the subject.

Condition III: paced teacher instructions alone: Teacher A paced instructions, but appropriate behavior was not followed by teacher reinforcement nor was inappropriate behavior followed by procedural timeout. The teacher never praised the subject, nor presented bites of favored foods for any behavior.

The sequence of experimental conditions and the sessions during which each condition was in effect for each of the teachers are illustrated in Table 1.

RESULTS

Figure 3 shows the percentage of instructions to eat followed by inappropriate and ap-

Table 1

Sequence of conditions and components present in Experiment II.

<i>Condition</i>	<i>Sessions</i>	<i>Paced In- struc- tions</i>	<i>Time- out</i>	<i>Rein- force- ment</i>
TEACHER B				
Baseline	1-15			X
Condition I	16-20	X		X
TEACHER A				
Baseline	1-9			X
Condition I	10-19	X		X
Condition II	20-23	X	X	X
Condition I	24-28	X		X
Condition III	29-35	X		
Condition I	36-39	X		X
Condition II	40-42	X	X	X

propriate eating behavior (number of intervals of occasioned appropriate/number of intervals of instructions to eat or number of intervals of occasioned inappropriate/number of intervals of instructions to eat). Instructions to prepare to eat are not included because they rarely evoked inappropriate behavior and occurred rarely after baseline conditions. This figure also depicts the overall rate of both occasioned and nonoccasioned inappropriate behavior emitted by the subject for each teacher, number of occasioned or nonoccasioned inappropriate behaviors (could be recorded more than once in any interval)/number of minutes recording time. The rate of nonoccasioned inappropriate behavior remained relatively low across all sessions conducted by each teacher. During baseline, even though the subject's overall rate of occasioned inappropriate behavior decreased with both teachers, the percentage of instructions to eat that were followed by inappropriate behavior remained high (between 80 and 100% for Teachers A and B). This apparent discrepancy in the results occurred because teacher instructions to eat decreased during baseline (Table 4).

When paced instructions plus reinforcement (Condition I) was introduced, the subject's inappropriate behavior in response to both Teacher A's and Teacher B's instructions to eat

decreased sharply. Appropriate behavior following instructions to eat concurrently increased to between 70 and 90%.

When procedural timeout for inappropriate eating (Condition II) was implemented, the percentage of Teacher A's instructions to eat followed by inappropriate behavior increased from 8% at the end of Condition I to 50% during the last two sessions of Condition II. Over this period, the rate of occasioned inappropriate behavior increased by a factor of four, to approximately twice every minute. Simultaneously, the percentage of instructions to eat followed by appropriate behavior decreased. This procedural timeout condition (Condition II) was replicated in Sessions 40 to 42, and inappropriate behavior again increased and appropriate behavior decreased.

After the initial procedural timeout condition, beginning in Session 24 there was a return to paced instruction plus reinforcement (Condition I). As in all implementations of this condition, appropriate eating increased and inappropriate eating decreased to near-zero levels. The exception to this was during Session 36 when the subject's parents visited the classroom during a morning when the subject had been very disruptive. The visit may have accounted for the increase in occasioned inappropriate behavior.

To analyze the function of reinforcement in the paced instructions plus reinforcement (Condition I), paced instructions alone (Condition III) was implemented during Sessions 29 to 35. There was little change in the percentage of instructions to eat followed by appropriate or inappropriate behavior (Figure 4, top graph) from Condition I to Condition III. However, the overall rate of nonoccasioned appropriate eating responses (those not following within 3 sec of an instruction to eat) declined markedly (Figure 4, lower graph).

During the experimental conditions, as in baseline, when inappropriate eating occurred, it was occasioned by instructions from both teachers. Nonoccasioned inappropriate responses rarely occurred, and occasioned inappropriate

Fig. 3. Percentage of instructions followed by inappropriate (▲) and appropriate (△) eating, and the rate per minute of occasioned (following within 3 sec of an instruction) (●) and nonoccasioned (○) inappropriate eating for Teacher A (upper two graphs) and Teacher B (lower two graphs) across baseline and Condition I (paced instructions plus S^{r+}).

Fig. 4. Percentage of instructions followed by inappropriate (▲) and appropriate (△) eating (top graph); rate per minute of occasioned (following within 3 sec of an instruction) (●) and nonoccasioned (○) inappropriate eating (middle graph); and rate per minute of occasioned (●) and nonoccasioned (○) appropriate eating (bottom graph) for Teacher A across baseline, Condition I (paced instructions plus SR+), Condition II (paced instructions plus SR+ and timeout) and Condition III (paced instructions alone).

eating thus represented the majority of the inappropriate responses.

During all conditions except Condition III, the paced instructions alone condition, 92% of all appropriate eating responses were followed by teacher praise (number of intervals of appropriate eating and praise/number of intervals of appropriate eating). Thus, praise for responding approximated a continuous reinforcement schedule.

The mean number of instructions by thirds of conditions for baseline and Condition I for each teacher is shown in Table 2. The conditions are divided into thirds so that the trends of instructions can be analyzed. The instructions are categorized into instructions to eat and instructions to prepare to eat. In addition, the table displays the percentage of each type of instruction that evoked inappropriate behavior. Inappropriate behavior rarely followed instructions to prepare to eat; it more often followed direct instructions to eat. Further, the overall number of instructions to eat decreased across baseline from 20-40 to 2-3 instructions per session for Teacher A, and from 20-40 to 10-12 instructions per session for Teacher B.

Approximations to eating followed an average of 16% of Teacher A's and 22% of Teacher B's instructions to eat during baseline conditions. Approximations followed fewer instructions to eat during paced instructions plus reinforcement, decreasing to 10% for Teacher A and 9% for Teacher B. In subsequent conditions, approximations to eating remained low, never following more than 10% of the instructions to eat.

DISCUSSION

The present studies sought to explore the parameters influencing the effectiveness of procedural timeout in response-decrement functioning. In these studies, procedural timeout did not decrease the inappropriate behavior it followed. In fact, this procedure functioned as a reinforcer, in a negative reinforcement paradigm, *i.e.*, re-

Table 2

Average number of teacher instructions per session and the percentage of those instructions that evoked inappropriate eating (average instructions to eat and instructions to prepare to eat) for thirds of conditions for Teachers A and B.

<i>Number of Instructions to Eat</i>	<i>% Evoke In- appropriate</i>	<i>Number of Instructions to Prepare to Eat</i>	<i>% Evoke In- appropriate</i>
TEACHER A			
<i>Baseline</i>			
29	91	11	0
9	71	28	7
3	92	19	2
<i>Condition I</i>			
48	37	0.3	0
48	10	1	0
48	7	0.25	0
TEACHER B			
<i>Baseline</i>			
28	82	18	0
22	88	19	1
10	88	14	0.2
<i>Condition I</i>			
48	19	3	0
48	7	0	—
48	7	0.5	0

moval from the environment increased the inappropriate behavior it followed. For purposes of determining if the measurement of a reinforcer in the environment was sufficient to predict the success of a typical timeout procedure, it was also demonstrated that such a timeout procedure was ineffective as a response-decrement procedure, even though a reinforcer maintained a behavior in the environment from which the subject was removed before introduction of procedural timeout (but not while the timeout procedure was in effect) (Experiment II). Finally, an alternative procedure of paced instructions plus reinforcement was demonstrated to be sufficient to eliminate inappropriate behavior and paced instructions alone to maintain the low level of inappropriate behavior after procedural timeout was demonstrated as not effective. In fact, such pacing could be conceptualized as extinction of the negative reinforcement or escape procedures inadvertently created by timeout.

The results of this research indicate the necessity for observing the function of a procedure on the behavior it follows, for example, when a typical timeout procedure may operate in a negative reinforcement paradigm even when a validated reinforcement process is known to be operating in the environment from which the subject is timed out. If teachers measure an available reinforcer in the environment and assume that removing a child from contact with that reinforcer will be sufficient to reduce the behavior, they may find that the timeout procedure does not always operate as predicted. This phenomenon was demonstrated in the second study. This study showed that discontinuation of a praise-and-food consequence produced a decrease in nonoccasioned appropriate eating, demonstrating that praise and food was indeed reinforcing. However, timeout from the opportunity to perform behavior that led to this reinforcer did not decrease the inappropriate behavior on which it was contingent.

Procedural timeout is typically recommended for use in the applied environment to produce response-decrement because of certain advantages over other forms of punishment, such as ease of application, reduced severity, and public acceptability. However, since specifying a reinforcing or an aversive stimulus in the environment before using procedural timeout does not permit a prediction of the effects of timeout from that environment, it is difficult to recommend the general use of procedural timeout without carefully monitoring the procedure.

The present studies provided an alternative to the use of procedural timeout when it is not effective, *i.e.*, the use of paced teacher instructions plus reinforcement, instead of a typical timeout procedure for disruptive behavior. Many times when behavior analysis procedures are implemented, disruptive behavior is ignored or followed by withdrawal of teacher attention. The present studies demonstrated that such typical timeout procedures were maintaining disruptive behavior that followed (and/or were elicited by) instructions, possibly because timeout procedures

allowed escape from the instructions. Thus, when termination of instructions did not follow disruptive behavior, the disruptive behavior was, in effect, on extinction. The pacing procedure had the advantage of allowing (even requiring) teachers to continue the teaching process during the entire session, rather than lose valuable teaching time through the implementation of timeout.

In Experiment II, during baseline, response requirements of the child were lowered by decreasing instruction to eat. Perhaps the inappropriate child behavior evoked by a large number of these instructions served to punish the teachers, resulting in a decrease in the rate of their instructions. When instructions to eat decreased, the rate of occasioned inappropriate eating concurrently decreased, which may have influenced the teachers to reduce their instructions further. However, even though the rate of inappropriate behavior decreased, fewer appropriate responses were required of the child! Furthermore, when eating was required, the child was more apt to be disruptive. Further support for the teachers' avoidance of the child following disruptive behavior was provided in anecdotal reports by the teachers, who stated they would wait the maximum time between instructions if the child had been disruptive but would instruct more rapidly if the child's behavior was appropriate. The averaging system used for pacing instructions would allow such variations in intersession instruction latencies.

Sailor, Guess, Rutherford, and Baer (1968) also demonstrated that contingent decreases in response requirements for inappropriate responding were sufficient to maintain or increase inappropriate responding. Similarly, removing response requirements, through timeout or decreased instructions, might also be expected to increase the behavior it consequences. Therefore, it appears that although paced instructions may have been aversive to the children, they were nevertheless an effective teaching procedure. Instructions were necessary for children to learn more appropriate responses, and the potential

aversiveness of such increased instructions or nagging seems minimal when compared to other response-decrement procedures, such as shock or physical restraint. Also, after several sessions of paced instructions without timeout procedures, the children appeared more receptive to teacher praise. Perhaps, having forced the teachers to stay with the children regardless of the child's behavior allowed the teachers the opportunity to observe and reinforce more positive child behaviors. When paced instructions were not required, teachers spent little time interacting with the two children.

Since nonoccasioned inappropriate or disruptive behavior rarely occurred, the function of teacher instructions was obviously a discriminative stimulus, *i.e.*, it was only if responses were required (through instruction) from the subjects, that there was anything aversive in the environment from which the children would work to escape. But, as mentioned previously, the instructional environment was important for the children's development, and thus escape could not be allowed.

Most environments include a variety of both positive and aversive stimuli. Demonstrating the presence of reinforcing stimuli in the environment does not eliminate the possibility that the total environment may be more aversive than reinforcing. Thus, describing a procedure of timeout from an environment that contains positive reinforcement does not necessarily mean describing a response decrement function for that procedure. Procedural timeout from an environment that contains positive reinforcement can potentially function as negative reinforcement dependent on the presence of positive or negative consequences in the environment and thus produce results contrary to those desired. Nevertheless, by analyzing functions of typical timeout procedures, it is possible to nominate and validate a more useful procedure; *i.e.*, one that is designed to provide extinction of responses inadvertently controlled through negative reinforcement, as provided by procedural timeout.

Herbert, Pinkston, Hayden, Sajwaj, Pinkston, Cordua, and Jackson (1973) also documented that not all established behavioral techniques lead to the hypothesized results. In their study, differential parental attention (a procedure similar to procedural timeout but different because there is no set time element involved (Plummer, Note 4)) did not always decrease the frequency of consequated behaviors. It would be interesting to determine if the application of procedures similar to paced instructions would be successful when differential attention, like procedural timeout, does not lead to the desired results.

REFERENCE NOTES

1. Plummer, S. *Functional considerations in the use of time out from schedule of positive reinforcement with preschool children: a basic and applied analysis*. Unpublished Doctoral Dissertation, University of Kansas, 1976a.
2. Plummer, S., Rowbury, T., and Baer, D. M. *Successful adaptation of a preschool girl's disruptive responses to verbal and physical teacher instructions*. Paper presented at 81st Annual Convention of the American Psychological Association, August, 1973, Montreal, Canada.
3. Plummer, S. *Extinction of a preschool girl's disruptive responses to teacher instructions by maintaining a constant rate of such instructions*. Unpublished Master's Thesis, University of Kansas, 1974.
4. Plummer, S. *Time out from a schedule of positive reinforcement: procedures and parameters of use*. Unpublished Review Paper, University of Kansas, 1976.

REFERENCES

- Allison, T. S. and Allison, S. L. Time out from reinforcement: effect on sibling aggression. *Psychological Record*, 1971, **21**, 81-86.
- Appel, J. B. Aversive aspects of a schedule of positive reinforcement. *Journal of the Experimental Analysis of Behavior*, 1963, **6**, 423-428.
- Azrin, N. H. Time out from positive reinforcement. *Science*, 1961, **133**, 382-383.
- Azrin, N. H. and Foxx, R. M. A rapid method of training the institutionalized retarded. *Journal of Applied Behavior Analysis*, 1971, **4**, 89-99.
- Barton, E. S., Guess, D., Garcia, E., and Baer, D. M. Improvement of retardates mealtime behaviors by timeout using multiple baseline techniques. *Journal of Applied Behavior Analysis*, 1970, **3**, 77-84.

- Bijou, S. W., Peterson, R. F., and Ault, M. H. A method to integrate descriptive and experimental studies at the level of data and empirical concepts. *Journal of Applied Behavior Analysis*, 1968, 1, 175-191.
- Birnbrauer, J. S., Wolf, M. M., Kidder, J. D., and Tague, C. E. Classroom behavior of retarded pupils with token reinforcement. *Journal of Experimental Child Psychology*, 1965, 2, 19-39.
- Bostow, D. E. and Bailey, J. B. Modification of severe disruptive and aggressive behavior using brief timeout and reinforcement procedures. *Journal of Applied Behavior Analysis*, 1969, 2, 31-37.
- Brown, T. G. and Flory, R. K. Schedule-induced escape from fixed-interval reinforcement. *Journal of Experimental Analysis of Behavior*, 1972, 17, 395-403.
- Burchard, J. D. and Tyler, V., Jr. The modification of delinquent behavior through operant conditioning. *Behaviour Research and Therapy*, 1965, 2, 245-250.
- Carlson, J. G. and Aroksaar, R. E. Effects of timeout upon concurrent operant responding. *Psychological Record*, 1970, 20, 365-371.
- Clark, H. B., Rowbury, T., Baer, A. M., and Baer, D. M. Timeout as a punishing stimulus in continuous and intermittent schedules. *Journal of Applied Behavior Analysis*, 1973, 6, 443-455.
- Daly, H. B. Evidence for frustration during discrimination learning. *Journal of Experimental Psychology*, 1971, 88, 205-215.
- Dardano, J. F. Response produced timeouts under a progressive-ratio schedule with a punished reset option. *Journal of the Experimental Analysis of Behavior*, 1974, 22, 103-113.
- Dardano, J. F. Self-imposed timeouts under increasing response requirements. *Journal of the Experimental Analysis of Behavior*, 1973, 19, 269-287.
- Giles, D. K. and Wolf, M. M. Toilet training institutionalized, severe retardates: an application of operant behavior modification techniques. *American Journal of Mental Deficiency*, 1966, 70, 766-780.
- Hamilton, J., Stephens, J. A., and Allen, P. Controlling aggressive and destructive behavior in severely retarded institutionalized residents. *American Journal of Mental Deficiency*, 1967, 7, 852-856.
- Hearst, E. and Sidman, M. Some behavioral effects of a concurrently positive and negative stimulus. *Journal of Experimental Analysis of Behavior*, 1961, 4, 251-256.
- Hewett, F. M. Teaching speech to an autistic child through operant conditioning. *American Journal of Orthopsychiatry*, 1965, 35, 927-936.
- Herbert, E. W., Pinkston, E. M., Hayden, M. L., Sajwaj, T. E., Pinkston, S., Cordua, G., and Jackson, C. Adverse effects of differential parental attention. *Journal of Applied Behavior Analysis*, 1973, 6, 15-30.
- Lahey, B. B., McNeas, M. P., and McNeas, M. C. Control of an obscene "verbal tic" through timeout in an elementary school classroom. *Journal of Applied Behavior Analysis*, 1973, 6, 101-104.
- LeBlanc, J. M., Busby, K. H., and Thomson, C. Functions of time out for changing aggressive behavior of a preschool child. In R. E. Ulrich, T. S. Stachnik, and J. E. Mabry (Eds), *Control of human behavior: In education*, Volume III. Glenview, Illinois: Scott, Foresman, 1973. Pp. 349-364.
- McReynolds, L. V. Application of timeout from positive reinforcement for increasing the efficiency of speech training. *Journal of Applied Behavior Analysis*, 1969, 2, 199-205.
- Nordquist, V. M. The modification of a child's enuresis: some response-response relationships. *Journal of Applied Behavior Analysis*, 1971, 4, 241-247.
- Pendergrass, V. E. Timeout from positive reinforcement following persistent, high-rate behavior in retardates. *Journal of Applied Behavior Analysis*, 1972, 5, 85-91.
- Ramp, E., Ulrich, R., and Dulaney, S. Delayed timeout as a procedure for reducing disruptive classroom behavior: a case study. *Journal of Applied Behavior Analysis*, 1971, 4, 235-239.
- Risley, T. and Wolf, M. M. Establishing functional speech in echolalic children. *Behaviour Research and Therapy*, 1967, 5, 73-88.
- Sailor, W., Guess, D., Rutherford, G., and Baer, D. M. Control of tantrum behavior by operant techniques during experimental verbal training. *Journal of Applied Behavior Analysis*, 1968, 1, 237-243.
- Sajwaj, T., Twardosz, S., and Burke, M. Side effects of extinction procedures in a remedial preschool. *Journal of Applied Behavior Analysis*, 1972, 5, 163-175.
- Sherman, J. A. and Baer, D. M. Appraisal of operant therapy techniques with children and adults. In C. Franks (Ed), *Behavior therapy: appraisal and status*. New York: McGraw-Hill, 1969. Pp. 312-313.
- Sloane, H. N., Johnston, M. K., and Bijou, S. W. Successive modification of aggressive fantasy play by management of contingencies. *Journal of Child Psychology and Psychiatry*, 1967, 8, 217-226.
- Thomas, J. R. and Sherman, J. A. Timeout from a fixed ratio schedule. *Psychonomic Science*, 1965, 3, 489-490.
- Thompson, D. M. Escape from S^D associated with fixed-ratio reinforcement. *Journal of the Experimental Analysis of Behavior*, 1964, 7, 1-8.
- Thompson, D. M. Timeout from fixed-ratio reinforcements: a systemic replication. *Psychonomic Science*, 1965, 2, 109-110.
- Tyler, V. O. and Brown, G. D. The use of swift, brief isolation as a group control device for in-

- stitutionalized delinquents. *Behaviour Research and Therapy*, 1967, 5, 1-9.
- Vukelich, R. and Hake, D. F. Reduction of dangerously aggressive behavior in a severely retarded resident through a combination of positive reinforcement procedures. *Journal of Applied Behavior Analysis*, 1971, 4, 215-225.
- Wahler, R. G. Setting generality: some specific and general effects of child behavior therapy. *Journal of Applied Behavior Analysis*, 1969, 2, 239-246.
- Wulbert, M., Nyman, B. A., Snow, D., and Owen, Y. The efficacy of stimulus fading and contingency management in the treatment of elective mutism: a case study. *Journal of Applied Behavior Analysis*, 1973, 6, 435-441.
- Zeilberger, J., Sampan, S., and Sloane, H. N. Modification of a child's problem behaviors in the home with the mother as therapist. *Journal of Applied Behavior Analysis*, 1968, 1, 47.

Received 4 December 1975.

(Final acceptance 14 December 1976.)