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EFFICACY, CONTRAST EFFECT AND DIFFERENTIAL EFFECTIVENESS OF TWO TIME-OUT DURATIONS IN THE TREATMENT OF TWO AUTISTIC CHILDREN

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Abstract

A single subject simultaneous treatment design, within a multiple baseline framework, was used to test the efficacy, contrast effect and differential effectiveness of two durations of time-out (TO). With two children on the autistic ward of a residential mental hospital serving as subjects, the TO procedure was demonstrated to be effective in reducing target behavior. No statistically significant difference was found between the 2 minute and 5 minute TO's and limited support for the existence of a contrast effect was revealed. It was concluded that strategies for the facilitation of the use of the shortest TO interval possible should be adopted and the importance of rigorous research within the applied setting was discussed.

CHAPTER I

Introduction

Behavorial procedures are being used with increasing frequency to modify maladaptive behaviors. This thesis will concern itself with the use of one specific technique, time-out (TO), to decrease undesirable behavior. Time out, which is defined as a period during which reinforcers are not available, is being used with a variety of subjects, settings and behaviors.

TO has been used with subjects diagnosed as autistic to decrease behaviors which are posited to be maintained by contingent reinforcers found within the home or ward environment. Tantrums, including kicking and head banging, have often been chosen as the "target behaviors" to be reduced (Wolf, Risley & Mees, 1963: Wetzel, Baker, Roney and Martin, 1966: Jensen and Womack, 1967). A response contingent TO is typically used to decrease the inappropriate behavior. The procedure for implementing TO involves defining a target behavior (out-of-seat), choosing a TO area (small room void of toys, manipulable items, distracting noises and sights) and placing the child into TO immediately after each occurrence of the target behavior. The duration of the TO period varies from study to study with removal from TO being contingent upon quiet behavior.

Time-out procedures have been used to suppress many undesirable behaviors; assaultive acts of deliquent adolescents (Tyler, 1964); non-attending behavior in the classroom (Patterson, Ray and Shaw, 1968); undesirable eating styles of hospitalized retardates (Barton,

Guess, Garcia and Baer, 1970); stuttering (Adams and Popelka, 1971); thumbsucking (Baer, 1962: and Bishop and Stumphauzer, 1973): aggression (Brown and Elliott, 1965: Edwards, 1964; and Sloane, Johnston and Bijou 1967); and out-of-seat behavior on a school bus (Campbell, Adams and Tyabik, 1974; and Ritschl, Mongrella and Presbie, 1972). While the variety of behaviors, subjects and settings with which TO procedures have been successfully used is extensive, there exists no single general consensus regarding the most effective method of implementing the TO procedure (MacDonough and Forehand, 1973). One of the eight parameters of TO procedures, as delineated by MacDonough and Forehand, 1973, is the duration of the TO period. The ethical and practical importance of the TO duration variable is summarized by White et al. (1972):

> a) TO removed the subject from the opportunity to learn desirable behavior and increases the cost of program time: b) TO durations that are too long or too short may increase the rate of deviant behavior: and c) it is ethically questionable to subject anyone to unnecessary aversive experiences such as periods of TO in excess of effective durations.

Most investigators have obtained successful results by using TO durations ranging from 5 to 20 minutes, (Patterson and White, 1969). Some studies, however, have successfully used TO durations as brief as 2 minutes (Bostow and Bailey, 1969) and as long as 3 hours (Burchard and Tyler, 1964). Though not extensively investigated, research does exist which compares differing TO durations.

Animal studies have shown intermediate TO durations to be more effective in suppressing behavior than either very short or very long TO durations (Ferster and Appell, 1961; Zimmerman and Ferster, 1963; Kaufman and Baron, 1968). The results of studies examining differential effects of TO duration with human subjects are not as clear cut. Pendergrass (1971) used a 5 minute and a 20 minute TO with a brain damaged child to suppress hitting. Both TO durations decreased the target behavior with no significant difference between the two treatments. In contrast to this, Burchard and Barrera (1972) compared the use of 5 minute and 30 minute TO periods with a group of mildly retarded adolescents. The 30 minute TO was found to be significantly more effective in decreasing antisocial behaviors than was the 5 minute TO. A third study (White, Nielsen and Johnson, 1972) compared three values of TO duration: 1 minute, 15 minute, and 30 minute TO's were used with institutionalized retardates to decrease aggression, tantrums and self destruction. This study found that both the 15 minute, and the 30 minute TO's were more effective in decreasing deviant behavior than was the 1 minute TO. In a more recent study (Kendall, Nay and Jeffers, 1975), 5 minute and 30 minute TO durations were used. The 5 minute TO was used for the first seven days followed by the 30 minute TO for six days and a return to the 5 minute TO for the last four days. Their findings show the first use of the 5 minute TO, during the first seven days, to be more effective than the use of the 30 minute TO; while the second use of the 5 minute TO during the last four days, was less effective than the previous 5 minute TO and the 30 minute TO. These results fail to support Pendergrass' (1971) finding of no significant difference

between 5 minute and 20 minute TO durations. While Kendall et al. (1975) did find the 5 minute and the 30 minute TO to have a differential effectiveness, it was not always in the same direction and therefore cannot be interpreted as supporting Burchard and Barrera's (1972) and White et al's (1972) finding of increased effectiveness with longer TO durations.

While a comparison of the studies using humans as subjects is hindered by the use of populations which differ in age, level of intellectual functioning, setting, problem behavior and the procedures applied to them, the contradictory nature of the results of these studies warrants further research which, with the additional information it provides, will allow conclusions to be made regarding the comparative effectiveness of differing TO durations.

The primary purpose of the present study was to investigate two durations of TO as it is used in the natural environment. The effect of TO durations of 2 minutes and 5 minutes on the disruptive behavior of two patients in a state hospital in Virginia was investigated. It was expected that the 5 minute TO would be equally as effective or more effective than the 2 minute TO in reducing disruptive behavior.

A secondary concern of the present study was an examination of the existence of a contrast effect. Specifically, the effect of the first presentation of the 2 minute TO condition was compared to successive 2 minute TO conditions and to the 5 minute TO condition. It was expected that the first presentation of the 2 minute TO would be more effective than the following 2 minute TO's and as effective as the 5 minute TO's. A demonstration of the contrast effect may be

found in the study by Kendall, Nay and Jeffers (1975).

> While the first presentation of 5 minutes of TO, during the first seven days, appeared to reduce certain behaviors, the second presentation, during the last four days, resulted in dramatic elevations of verbal aggression, physical aggression and out of area from both the first 5 minute TO and the 30 minute TO phases. . . these results may reveal the existence of contrast effects when comparing TO durations in a successive treatment time series design.

White et al. (1972) state that, "One minute of time-out was inferior to longer durations in its suppressive effect only when it followed them." Further evidence of a contrast effect is found by Burchard and Barrera (1972) who go on to state that the consistent use of one TO duration may be more important than the actual duration of that TO duration. For example, using 5 minute TO may be more effective than using TO of variable durations (10 minutes, 7 minutes, and 12 minutes) which are of a greater duration.

The third area of concern focuses on the efficacy of the use of a TO procedure in reducing inappropriate behavior. It is hypothesized that the TO procedure will reduce the frequency of inappropriate behavior.

CHAPTER II

Method

Subjects

The subjects are two small children receiving residential treatment on the children's ward at a state hospital in Virginia. Both were committed on voluntary papers signed by their respective parents. Subject one is a 10 year old female who had previously been a patient at a foundation in Texas and was described by them as having possible organic brain syndrome with associated seizure disorder. She was further diagnosed in Texas and in Virginia as a childhood schizophrenic. Upon admission to the hospital in Virginia (3/1/67), this child was described as non-communicative, irritable, lacking in eye contact and displaying inappropriate affect. A more recent (5/30/76) list of problem behaviors deficits for subject one included: preoccupation with self, fear of physical contact, mental retardation, non-communication and pulling and scratching others. Subject one stayed with her family for one week after leaving Texas and before entering the hospital in Virginia. The mother described her behavior during the week as uncontrollable, difficult to deal with and very time consuming.

Subject two is a 9 year old male who had been in several schools and centers prior to admission to the state hospital in Virginia (10/2/74). This child had been diagnosed as a childhood schizophrenic prior to admission and was described as hyperactive, screaming, shouting disoriented and exhibiting poor speech and flatness of affect upon admission. A recent description of this child from his chart

states that he is toilet trained, eats and sleeps well, is a loving child and exhibits tantrum behavior.

Aides

Data collection and implementation of experimental procedures were carried out by ward aides responsible for primary care of the children on the ward and a graduate student hired to facilitate treatment implementation. Both aides worked the seven to four o'clock shift approximately five days a week with an overlap of two to three days per week when both aides were on duty. The treatment facilitator's hours were scheduled to suit the needs of the program.

Behavior

Both children exhibited high frequency maladaptive behaviors which hindered development of more appropriate interpersonal relationships between the subjects and other patients or hospital personnel, as well as disrupting the normal routine of ward living. Subject one's target behavior was defined as pulling on any part of any other individual, either person or clothes, with enough force to necessitate that individuals responding in order not to be pulled off balance or be physically hurt. This pulling behavior occurred at least once during 75% of the 5 minute intervals during which the subject was observed (see page 12) and usually involved pulling on hospital personnel rather than other children. Subject two's target behavior was "throwing a tantrum." This was defined as rolling, head hitting, and loud verbalizations which precluded subject two performing a behavior expected of him or which interferred with the ward routine.

This child's tantrum behavior occurred at least once during 90% of the 5 minute intervals during which observations took place.

Permission

Permission from the children's parents was not necessary, as use of individualized treatment programs was considered a part of treatment while at the hospital. Permission to implement the program was secured from the Director of the Children and Youth Division and hospital procedures (e.g. entry of treatment plan on child's chart) were followed.

Procedure

Time-out area. Two durations of TO were compared; condition A consisted of a 2 minute TO while condition B consisted of a 5 minute TO. The TO areas were selected prior to implementation of the program and differed only in that one was farther away from the center of the ward and was located on the opposite side of the hall. Both rooms were six by ten feet, with one window and a wooden door. The TO areas were completely void of furniture, toys, wall hangings, or any other potential reinforcers. The subjects could be observed through a peep hole, though they could not see out. The thickness of the walls and physical distance from the center of the ward was sufficient to isolate the children from the noise of the ward while in TO. Interference from passersby while the children were in TO was nil, due partially to a general understanding of TO procedures by the hospital personnel and partially to the location of the TO areas in a hall farthermost from the entrance to the ward and near rooms which were not used during the day.

Time-out instructions. The procedures for administering TO were as follows: when the target behavior was observed, the child was told in a firm, but calm manner, "No pulling, subject one go to TO" or "No, subject two, go to TO." These actual words were not always used, though the primary communication, a negative injunction followed by a directive, was always given. For example, the instructions to the subjects were often shortened to, "No, TO, subject one." When the children did not respond to the verbal command to go to TO they were physically taken to the TO room with the minimum contact necessary. Subject one typically would not respond to the verbal command, but would allow herself to be led by the arm without further resistance. It was noted that she enjoyed being walked up and down the halls by an adult. In order to minimize the reinforcing qualities of being led to TO, Subject one was held tightly with her arm uplifted and taken at a very brisk pace, the purpose being to make the walk to TO uncomfortable rather than enjoyable. The "agitated" expression on the child's face when being led to TO lent credence to the effectiveness of this technique though interpretation of mood based on facial expression is difficult when dealing with a child who exhibits inappropriate affect. Subject two never followed the verbal command to go to TO and often physically resisted being led to TO by allowing his body to go limp. At this point, the aide would drag the child to TO holding him under his arms while he was in a supine position.

The children were allowed to leave TO after the allotted time was up if they had been "quiet", not engaged in tantrum behavior,

or self stimulating behavior for one minute prior to time to leave. The use of a short (e.g. 1 minute or 2 minute) quiet criterion (Patterson and White, 1970; O'Leary, O'Leary and Becker, 1967) avoids reinforcing undesirable behavior occurring immediately prior to release and helps maintain the qualitative difference between the 2 minute and 5 minute TO by minimally extending the periods. The children were monitored visually by the use of "spot" checks at the peep hole to insure that tantrum behavior (rolling, kicking) and self-stimulating behavior were not occurring during the "quiet" minute criterion. Subject one always met this criterion and, therefore, was always allowed to leave when her allotted time was up, while subject two failed to meet this criterion, once necessitating remaining in TO another minute until criterion was met.

Training. A written explanation of the TO procedure was given to the aides with a verbal explanation being given by the Experimenter on the following day. As the aides had had past experience in the use of a TO area, the explanation of the present procedure was approached in terms of the difference between past procedure and present. Emphasis was made on consistency, maintaining a calm manner and monitoring of TO so that the children were admitted back to the ward according to criterion. The low level of intellectual functioning as well as marked decrements in receptive and expressive language skills of the children rendered a verbal explanation of the procedures meaningless. It was felt that the best way to communicate the inappropriateness of the target behaviors to the children was the actual application of the procedures (negative verbal statement coupled

with the use of TO). This training procedure was initially used with the aides implementing Phase II and later used with all aides involved in Phase III.

Data collection. Each day was subdivided into the two settings, for each child in which the target behavior occurred. Each setting was further divided into 5 intervals of 5 minutes each, during which the aides recorded a check if the target behavior occurred at least once during the time interval and a zero if the behavior did not occur at all. Space was provided on the data sheets for notation of date, phase, setting, and observer. Individual wrist watches were synchronized and used to time the 5 minute observation intervals. TO periods were timed by use of a kitchen timer which was set to go off after the appropriate time had elapsed (2 or 5 minutes). The timer was kept in the aides' office and could be easily heard in the wash room, hallway, and alcoves. Monitoring of the childrens' behavior was done by any aides present on the ward, not necessarily the aide responsible for placing the child in TO. This shared monitoring system developed as a natural outgrowth of the pre-existing cohesive working relations between the aides. It proved effective in providing visual "spot" checks with a minimum of interference of ward routine.

Stability. Baseline stability was determined according to the criterion described by Tiller (1973). Baseline data was taken for four days for each subject immediately prior to implementation of Phase II. Baseline was considered stable when an instability criterion of .20 or less was met.

Baseline stability was calculated as:

$$\frac{M_1 - M_2}{M_g} = \text{baseline stability level, where}$$

M_1 = mean of first two observation days,

M_2 = mean of final two observation days,

M_g = overall or grand mean.

Reliability. The per cent reliability was computed as follows (Tiller, 1973):

$$\frac{\text{agreements}}{\text{agreements} + \text{disagreements}} \times 100$$

Data needed to compute reliability was collected at least twice during each phase by the aides who were unaware on which of the days reliability would actually be computed. The minimum requirement of 90% reliability was set with reliability being computed prior to each phase.

Reinforcing appropriate behavior. The Experimenter recorded the frequency of reinforced appropriate behavior during all phases of the study for approximately one half of the observation days. The frequency count was taken for each child individually and for the remainder of the ward as a whole for approximately seven minutes per setting. Each time the aide delivered a reinforcer for appropriate behavior, either verbally or physically, a note was made as to whether the reinforcer was to the subject only or to someone other than the subject. Each subject's frequency of reinforced appropriate behavior was compared to the average reinforcer per child. The

computation was made as follows:

$$a \text{ compared to } \frac{b}{\#\text{ of children on ward} - \#\text{ of subjects}} \text{ where:}$$

a is reinforcers given to the subject only

b is reinforcers given to anyone other than the subject.

This computation was made for each observation day and then averaged across days. It was felt that the use of a positive reinforcement program would make interpretation of results less clear, as any improvement in behavior could be attributed to the reinforcement program, the TO technique, or some combination of the two. Hence, this information was not used to set up a positive reinforcement program. The experimenter did feel that this data would be important in defining the setting in which the study took place in case of future replications.

Experimental Design

Simultaneous treatment design. A same subject simultaneous treatment design will be used within a multiple baseline framework to test the differential effectiveness of two TO durations. The simultaneous treatment design was developed by Browning (1967) and demonstrated by McCullough, Cornell, McDaniel and Meuller (1974). Disadvantages of the ABAB design as outlined by Browning (1967) and Browning and Stover (1971); a) difficulty in reproducing baseline b) staff problems created when requested to cease using an effective treatment c) economy and d) ethical consideration, led them to suggest this simultaneous treatment design as an alternate design.

The simultaneous treatment design as proposed by Browning (1967) may be symbolized as $A - \begin{matrix} B \\ C \\ D \end{matrix} - B$ or C or D; where A represents a baseline and B, C, and D represent treatment conditions which are presented simultaneously and successively in counter-balanced order. Thus during the experimental phase each subject receives each treatment daily. Each treatment occurs an equal number of times and on an alternating schedule, as illustrated in Table 1. Kendall (1973) summarizes the advantages of the simultaneous treatment design: there is no need for a reversal with its accompanying difficulties; it allows for the comparison of several treatment conditions; appropriate statistical tests for this same subject design are available (Benjamin, 1965); and it is economical. Furthermore, the design demonstrates control when behavioral change occurs, as predicted, when experimental intervention is introduced.

The simultaneous treatment design must still cope with the problems of establishing a stable baseline (A) though the problems of returning to this baseline are avoided. It is also noted by McCullough et al. (1973) that the use of the appropriate statistical test, the special Latin square, offers many advantages: it controls for confounding of sequence effects caused by the order in which the two treatments occur (i.e. first, last) and controls for confounding due to sequence X position effects (the interaction of sequence with position). However, there remains the confounding due to one treatment following another (regardless of sequence) in which it is hypothesized that the subject already having been exposed to one treatment will react differently with another treatment because of the

Table 1

Procedures for use in Special Latin Square Design

Setting	Treatment			
	Day 1	Day 2	Day 3	Day 4
I	A(W_1)	B(W_2)	A(W_2)	B(W_1)
II	B(W_2)	A(W_1)	B(W_1)	A(W_2)

A = Condition A of treatment

B = Condition B of treatment

W_1 = Ward Aide 1

W_2 = Ward Aide 2

carry over from the intervening treatment.

Settings

The settings during which the children's target behavior occurred were defined according to time of occurrence, on going activity on the ward and behavior expectations for the children. Setting one for subject one occurred in the morning prior to her leaving for school. During this time period (8:15 to 8:45 a.m.) all the children were given baths and dressed. Subject one was expected to cooperate in bathing and dressing herself. Setting two for subject one occurred immediately after school (approximately 2:30 to 3:00 p.m.). During this time hospital personnel (charge aide, nurse, counselors) were sporadically coming and going; thus increasing the opportunity for "pulling behavior" to occur. During setting two the only behavioral expectations for the child were to refrain from disruptive behavior such as pulling. The actual rooms in which the child was observed included two alcoves, the hallway and the bathroom.

Both setting one and two occurred in the morning before school (approximately 8:00 to 8:45 a.m.) for subject two. Setting two immediately followed setting one and was differentiated by the child's behavior expectations. During setting one the child was expected to amuse himself while the other children were being bathed and dressed. In setting two subject two was expected to allow himself to be bathed and to dress himself. The actual rooms in which observations took place were the same for subject two as for subject one.

	Setting One		Setting Two	
	Time	Behavior	Time	Behavior
Subject one	8:15-8:45 a.m.	Bath and dress	2:30-3:00 p.m.	Refrain from target behavior
Subject Two	8:00-8:20	Refrain from target behavior	8:20-8:45 a.m.	Bath and dress

Phases

Phase I Baseline. During Phase I data was collected on the frequency of the occurrence of the target behavior. Aides were instructed to handle the target behavior in their usual manner with the exception of placing either subject on the "day porch" for extended periods of time, as this precludes interacting of the subject with ward personnel. Data was taken for four days.

Phase II Intervention. During Phase II the two treatment variables were compared. The aides alternated daily between Setting I and II for the first two days as $Aide_1$ administered Condition A (2 min. TO) and $Aide_2$ administered Condition B (5 min. TO). The same procedure was followed for days three and four with $Aide_1$ administering Condition B and $Aide_2$ administering Condition A as illustrated in Table 1. A special Latin Square design was used to test for a significant difference between time-out durations (i.e., did they differ significantly in the degree to which they reduced the target behavior). The Experimenter decided, a priori, to repeat the treatment cycle if no significant difference was found between treatment variables. This a priori criterion for differential effectiveness was not met for either subject, thus calling for a repetition of the whole four

day treatment cycle. For subject one this proved impractical due to the unexpected two week absence of one of the aides implementing treatment. Thus, for subject one Phase II lasted four days. For subject two the treatment cycle was repeated with Phase II lasting eight days. Each subject received both treatments, in both settings, by both aides in a counter-balanced order.

Phase III. Continuation of Most Effective Treatment Variables. During Phase III the treatment variable which was found to be more effective, according to the computations in Phase II, was to be used by both aides. As no significant difference was found between treatment variables in this study the choice of which variable to use in Phase III was made based on practical considerations. Though the use of the shortest TO possible is preferred, the longer TO was used to lessen the demands on staff.

Multiple Baseline

A multiple baseline across the two subjects was used to increase the generalizability of the study's results by providing a single systematic replication and to strengthen the internal validity of the study by controlling for historical confounds. Phase I Baseline data was taken on subject two while subject one was in Phase II. However, the aforementioned absence of an aide precluded the implementing of Phase II for subject two while subject one went on to Phase III. The Experimentor decided that Phase I should be repeated for subject two after the two week delay; hence, subject two went through Phases I, II and III after subject one had completed all phases.

CHAPTER III

Results

The instability criterion of .20 or less was met by both subjects, subject one's behavior having an instability computation of .06 and subject two's behavior of .11. Both subjects had reliability coefficients of 100% throughout the study with computations being made at least twice during each Phase and with one of these two computations immediately prior to beginning the next Phase.

The frequency of occurrence of target behavior for both children is presented in Figures 1 and 2. Target behavior in percentages was for subject one: Phase I, 77.5; Phase II, 77.5; Phase III, 50. The frequency of occurrence for Subject two was: Phase I, 90; Phase II, 21.31; Phase III, 7.5. Benjamin's (1975) Latin Square for same subject design was used to test the differential effectiveness of the treatment conditions (see Tables 2 and 3). Treatment conditions were not significantly different for either child. The effectiveness of different experimentors (aides) and effect of different days was also not significantly different for either child. A comparison of the per cent occurrence of target behavior in Phases I and III show subject one decreasing in target behavior from 77.5% to 50%, a change of 27.5% and subject two decreasing from 90% to 7.5% a change of 82.5% as illustrated in Table 4. Data was collapsed across subjects to test for a possible contrast effect. A comparison of the per cent target behavior during the first presentation of treatment Condition A (2 min. TO) to

Figure 1

Frequency of Target Behavior for S_1 During Phases I, II and III

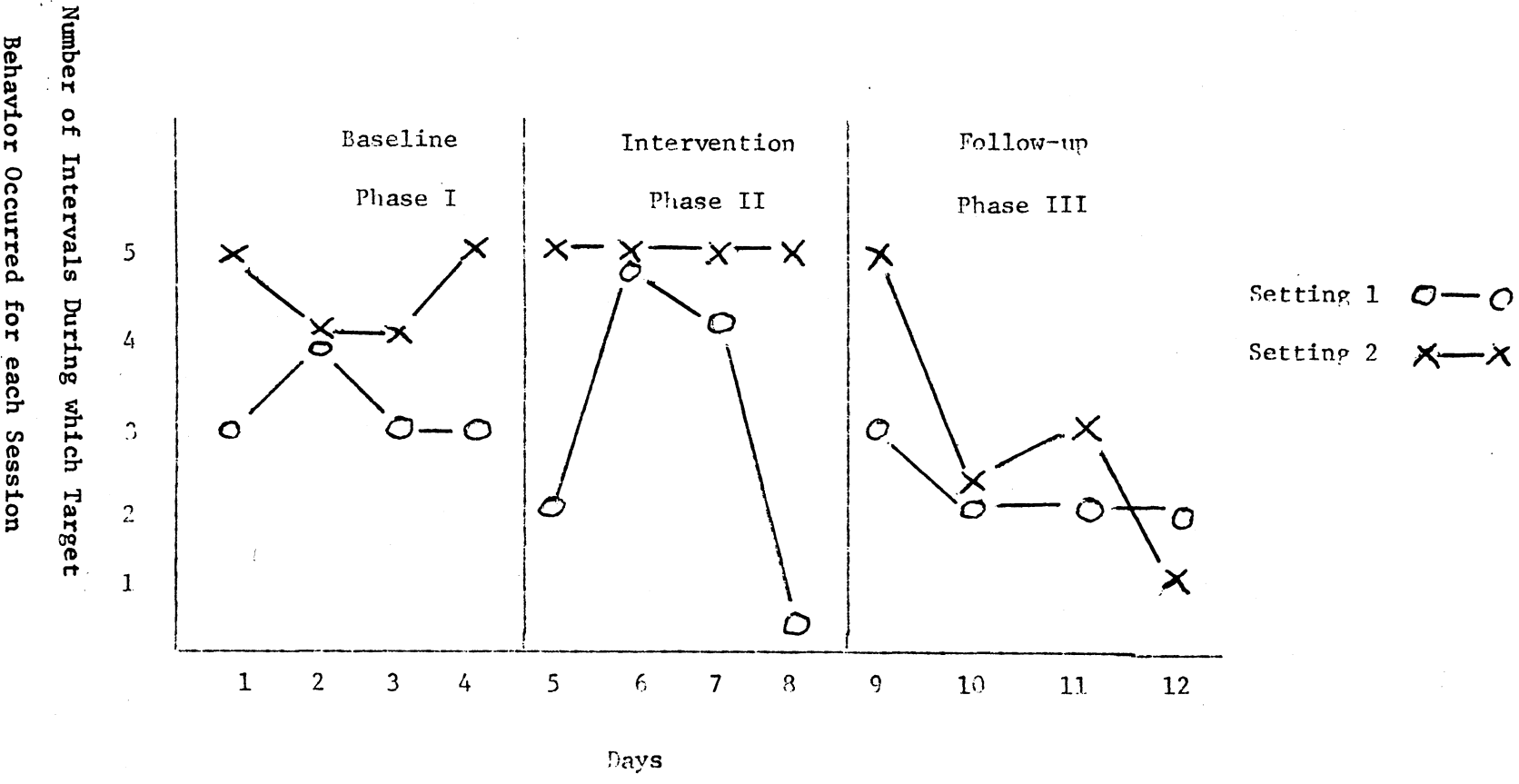

Figure 2

Frequency of Target Behavior for S_2 During Phases I, II and III

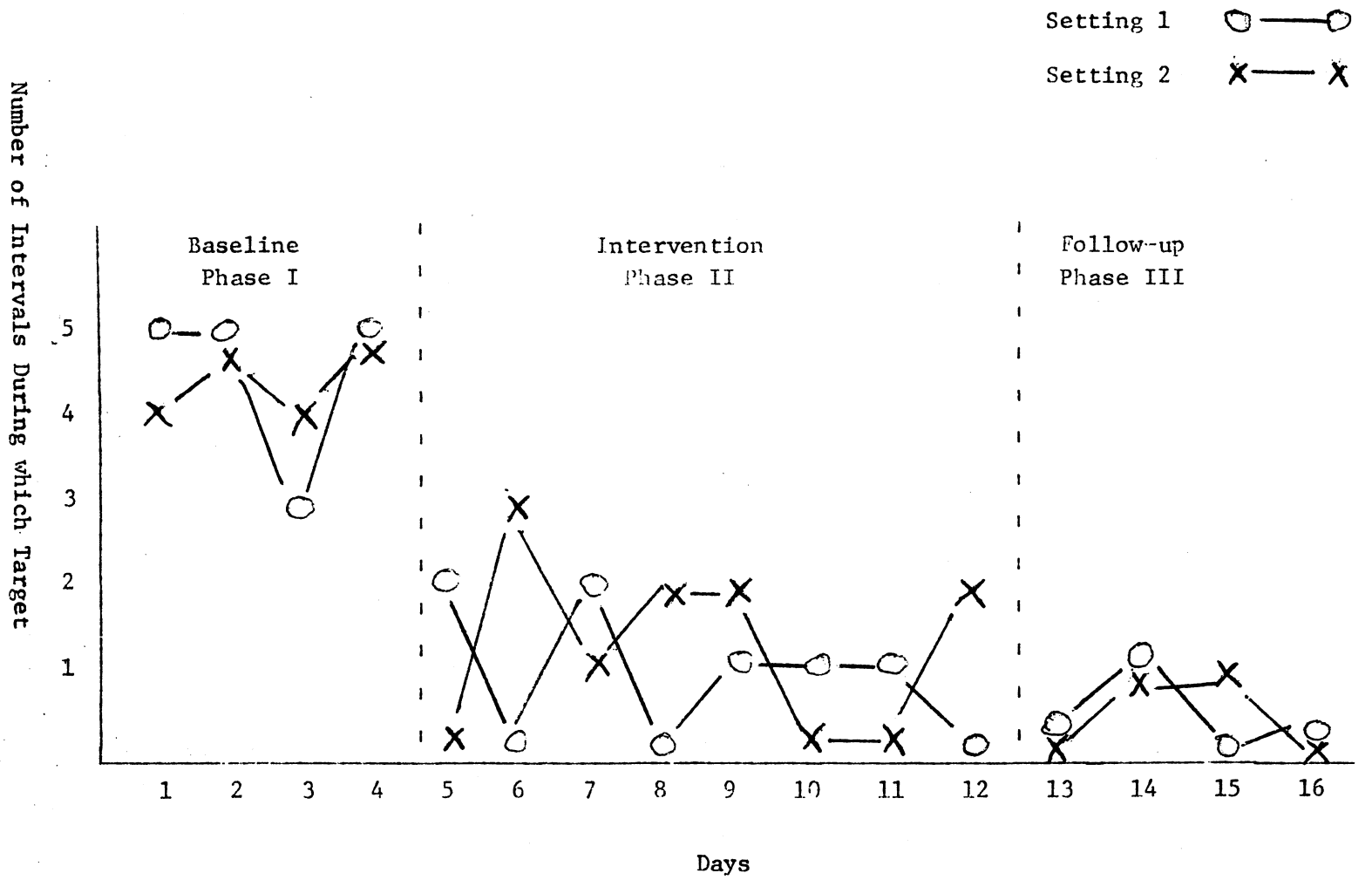

Table 2

Latin Square Analysis for Differential Effectiveness of Time-Out Duration on Target Behavior of Subject One

Source	SS	df	MS	F
Experimenter	6	1	6	12
$Error_1$	1	2	.5	
Treatments	6	1	6	2
Days	1	1	1	.33
$Error_2$	6	2	3	

p .05

Table 3

Latin Square Analyses for Differential Effectiveness of Time-Out Duration on Target Behavior of Subject Two

Source	SS	df	MS	F
Experimenter	.5	1	.5	.15
$Error_1$	18.9	6	3.15	
Treatments	5	1	5	.16
Days	0	1	0	
$Error_2$	13.2	6	2.2	

p .05

Table 4

Decrease in Per Cent Frequency of Target Behavior in Phase III as Compared to Phase I for Subjects 1 and 2

	Per Cent Occurrence		Decrease
	Phase I	Phase III	
Subject One	78	50	28
Subject Two	90	8	82

successive presentations of treatment Condition A showed a 40% occurrence of target behavior on the first presentation and a 50% occurrence of target behavior on successive presentations at treatment Condition A. The first presentation of treatment Condition A (2 min. TO) was also compared to Condition B (5 min. TO) with a 40% and 35% occurrence of target behavior respectively. Neither comparison met the criterion of a 20% difference in order to demonstrate a differential effectiveness.

Data on the number of reinforcers administered shows that subject one received an average of 2.5 and 4.5 and 2 reinforcers per observation period in Phases I, II and III respectively, while the other children received an average of 3.1, 4.1 and 2.2 reinforcers during the same observation periods. Subject two received an average of 4.5, 5.3, and 5.5 reinforcers per observation period in Phases I, II and III respectively while the other children on the ward received an average of 3.0, 2.4 and 3.6 reinforcers during the same observation periods.

CHAPTER IV

Discussion

The present results add to the already extensive literature demonstrating the efficacy of the use of TO procedures in reducing target behavior. They also help clarify the question of what length TO period should be used. The lack of a significant difference between the effectiveness of the 2 min. and 5 min. TO supports the hypothesis that the 5 min. TO will be equally or more effective than the 2 min. TO. More importantly, the lack of differential effectiveness supports similar findings by Pendergrass (1971) and White et al. (1972) while failing to support the findings of Burchard and Barrera (1972) and White et al. (1972) which indicate longer TO periods are more effective. While the actual length of TO must be to some degree determined by the type of subjects and practical considerations, the practical import of the present findings lies in the admonition to the experimentor and/or clinician to use shorter TO periods, thereby achieving equally effective results while avoiding the ethical problems encountered when unnecessarily long TO periods are used.

Support was found for the hypothesis that the first presentation of the 2 min. TO was as effective as the 5 min. TO; and, although there was no significant difference between the first presentation of the 2 min. TO and later presentation of the 2 min. TO's the difference in the raw data was in the expected direction. The Experimenter takes this as an indication that further research is warranted in the area

of contrast effect as described by White et al. (1972) and Kendall et al. (1975) wherein the use of a longer TO period (e.g. 5 min.) may render less effective the use of later shorter TO periods (e.g. 2 min.). The existence of a trend toward a contrast effect suggests that the clinician, when deciding what length TO period to use, will have to consider what length TO periods the child has previously been exposed to. It would also be advisable for the clinician to adopt the strategy of using very short TO intervals initially and changing to longer intervals if necessary to insure that the shortest effective TO interval was used for each behavior.

In examining the comparison of frequency of target behavior on Figures 1 and 2, Phases I and II, it is interesting to note that the child with the highest frequency of behavior in Phase I (Subject two) showed the greatest decrease of behavior in Phase III. Recent descriptions of subject two show him as having learned some skills at the Virginia hospital, thus indicating an amenability to training procedures, and as being a "loving" child, thus indicating an enjoyment, on the child's part, of affection from others which would be "missed" while in TO. Recent descriptions of subject one describe her in terms which indicate a lack of "enjoyment" of affection from others, though limited forms of attention are sought, as well as showing a weaker history of amenability to training procedures. These differences may account for the differential effectiveness of the TO procedures for the two children.

Examination of Figures 1 and 2 also indicate that the TO procedure tended to be more effective in Phase III than in Phase II for subject one. The Experimenter feels that the effectiveness of the

TO procedure may increase with repeated trials with a child who is not accustomed to consistent use of TO procedures. While this same effect is not evident in subject two, it should be noted that this child's Phase II was eight days as compared to subject one's four days, and within those eight days there is a slight decrease in frequency of target behavior in the last four days as compared to the first four days.

The extremely high reliability scores are felt to be attributable partially to the method of data collection which is easier to carry out than some more complicated methods, as well as to the high frequency of behavior which combined with this method of data collection makes agreement between observers more probable.

Data on the number of reinforcers given for appropriate behavior showed no great discrepancies between the average number of reinforcers given to the subjects as compared to non-subjects. It is interesting to note, however, that subject one who was described as "irritable and non-communicative" generally received fewer reinforcers than subject two who was described as "loving." It is also worth mentioning that both children received more reinforcers during Phase II - Intervention than during Phase I - Baseline, even though intervention consisted of a punishment technique. This may be due to the focusing of the aides attention on the children because of the use of the TO technique.

The present study not only contributes to the clarification of the question of TO duration, but also demonstrates the use of a single subject design which controls possible confounding variables such as sequence effects and sequence X position effects, makes use of appropriate inferential statistics to test for significance and

is practical in its implementation; thus, providing a study which is more rigorous than most single subject studies done in the applied setting in its control over possible confounding variables and in its evaluation of data.

The increase of research within the natural environment performed by the researcher/clinician is viewed by the author as a necessary, if not inevitable, step in bridging the gap between the experimental and applied area of psychology. It is felt that this study's primary contribution lies in the more rigorous model it supplies for single subject research in an applied setting.

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