8-1-1974

A Comparison of the Effects of Two Different Time-Out Durations on Audible Stuttering Behavior

Duane A. Dale

A COMPARISON OF THE EFFECTS OF TWO DIFFERENT TIME-OUT DURATIONS ON AUDIBLE STUTTERING BEHAVIOR

by
Duane A. Dale

Bachelor of Science, Moorhead State College, 1968

A Thesis

Submitted to the Graduate Faculty

of the

University of North Dakota

in partial fulfillment of the requirements

for the degree of

Master of Science

Grand Forks, North Dakota

August
1974

A COMPARISON OF THE EFFECTS OF TWO DIFFERENT TIME-OUT DURATIONS ON AUDIBLE STUTTERING BEHAVIOR

Duane A. Dale, Master of Science

The University of North Dakota, 1974

Faculty Advisor: Professor Dean C. Engel

The purpose of the study was to determine any differences or similarities between the effects of five-second and ten-second time-out durations on the frequency of criterion stuttering behaviors.

Four adults, who exhibited stuttering behavior, were selected as subjects. Each subject was studied individually for four sessions. Each session consisted of five ten-minute segments, including (1) baseline, (2) treatment, (3) extinction, (4) treatment, and (5) extinction. During treatment segments, time-out stimuli of either five-second or ten-second durations were delivered contingent upon the occurrence of each criterion stuttering behavior. Time-out stimuli consisted of a brief period of time during which the subject was not permitted to speak, and were signalled by a red light that was illuminated contingent upon criterion stuttering behavior.

Results indicated that neither the ten-second nor five-second stimulus was superior to the other in suppressing stuttering behavior.

Further, it was shown that recovery from the different treatment conditions did not differ significantly. Periodically, for two of the subjects, complete suppression of criterion stuttering behavior was achieved during each of the time-out contingencies.

It was concluded that clinicians utilizing time-out procedures in their treatment of individuals who stutter could use five-second time-out durations in lieu of ten-second time-out durations; with both client and clinician benefiting from the increased efficiency.

This thesis submitted by Duane A. Dale in partial fulfillment of the requirements for the Degree of Master of Science from the University of North Dakota is hereby approved by the Faculty Advisory Committee under whom the work has been done.

Dean C. Engel
(Chairman)

George W. Schubert

Milton J. Rindal

A. William Johnson
Dean of the Graduate School

Permission

Title A Comparison of the Effects of Two Different Time-Out Durations on Audible Stuttering Behavior

Department Speech Pathology and Audiology

Degree Master of Science

In presenting this thesis in partial fulfillment of the requirements for a graduate degree from the University of North Dakota, I agree that the Library of this University shall make it freely available for inspection. I further agree that permission for extensive copying for scholarly purposes may be granted by the professor who supervised my thesis work or, in his absence, by the Chairman of the Department or the Dean of the Graduate School. It is understood that any copying or publication or other use of this thesis or part thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University of North Dakota in any scholarly use which may be made of any material in my thesis.

Signature Duane A. Dale

Date July 23, 1974

ACKNOWLEDGEMENTS

I wish to thank my committee chairman, Dr. Dean C. Engel, for the many contributions he made toward the development and preparation of this thesis. I am indebted to Dr. Michael Rohrbaugh for the invaluable contributions he made to the design of the study and for the support he extended this writer throughout the entire project. For his assistance in the planning and writing of this thesis, I wish to thank Dr. George Schubert. My appreciation to Mrs. Patricia Nybo for the typing of this thesis. I greatly appreciate the services of the individuals who participated as subjects for the study. Lastly, I wish to extend a special thank you to my wife, Margaret, for the encouragement, patience, and assistance she has offered throughout the project.

TABLE OF CONTENTS

LIST OF TABLES

Table

LIST OF ILLUSTRATIONS

Figure

ABSTRACT

The purpose of this study was to determine any differences or similarities between the effects of five-second and ten-second time-out durations on the frequency of criterion stuttering behaviors.

Four adults, who exhibited stuttering behavior, were selected as subjects. Each subject was studied individually for four sessions. Each session consisted of five ten-minute segments, including (1) baseline, (2) treatment, (3) extinction, (4) treatment, and (5) extinction. During treatment segments, time-out stimuli of either five-second or ten-second durations were delivered contingent upon the occurrence of each criterion stuttering behavior. Time-out stimuli consisted of a brief period of time during which the subject was not permitted to speak, and were signalled by a red light that was illuminated contingent upon criterion stuttering behavior.

Results indicated that neither the ten-second nor five-second stimulus was superior to the other in suppressing stuttering behavior. Further, it was shown that recovery from the different treatment conditions did not differ significantly. Periodically, for two of the subjects, complete suppression of criterion stuttering behavior was achieved during each of the time-out contingencies.

It was concluded that clinicians utilizing time-out procedures in their treatment of individuals who stutter could use five-second time-out durations in lieu of ten-second time-out durations; with both client and clinician benefiting from the increased efficiency.

CHAPTER I

INTRODUCTION AND REVIEW OF THE LITERATURE

Throughout history individuals who have exhibited the disorder of stuttering have been the recipients of numerous treatment procedures. Many of the therapeutic methods of the past and those presently in use have been reviewed by Van Riper (1973). Among those described are (1) suggestion, distraction and persuasion therapies, (2) relaxation therapies, (3) rhythmic, timing and rate control therapies, (4) conditioning therapies, (5) servotherapy, (6) psychotherapies, (7) group therapies, and (8) his own particular therapeutic design.

Each of the above mentioned therapeutic modalities contains specific procedures which have yielded modifications in the speech of some of the stutterers who have been subjected to them. As yet, though, no single therapeutic procedure has proven to be more effective than all others.

Of the therapeutic categories mentioned above, some recent literature has concerned itself with the effects of conditioning therapies on stuttering behaviors. Reported experimentation with such procedures have included reinforcement paradigms, punishment paradigms, and combinations of the two. Each has demonstrated success in altering the speech patterns presented by subjects who stuttered. The focus of the present study was on a particular conditioning procedure which

involved the contingent presentation of an aversive stimulus following subjects' emission of criterion stuttering behaviors.

Numerous researchers have reported that contingent presentation of aversive stimuli have yielded decreases in the frequency of stuttering and disfluent behaviors. Among the aversive stimuli that have yielded such results have been a 105dB 6,000 Hz tone (Flanagan, Goldiamond, and Azrin, 1958), a break in a communication link with a listener (Wingate, 1959), delayed auditory feedback (Goldiamond, 1960), response cost (Weiner, 1962; Halvorson, 1971), electric shock (Martin and Siegel, 1966a) and verbal reprimand (Brookshire and Martin, 1967). More recently, contingent time-out from positive reinforcement has also been shown to be an effective stimulus for suppressing the frequency of stuttering and disfluent behaviors (Haroldson, Martin, and Starr, 1968; Martin and Berndt, 1970; Adams and Popelka, 1971; LaCroix and McLean, 1971; Martin and Haroldson, 1971; McDermott, 1971; Martin and Rangaswamy, 1972; Clausen, 1973; Hasbrouck and Martin, 1973). As defined by Sloan and MacAulay (1968), time-out is a stimulus whose contingent presentation is found to decrease the future probability of the behavior it follows due to the removal, for a period of time, of the opportunity for positive reinforcement. In some of the studies cited here (Haroldson, Martin, and Starr, 1968; Martin and Berndt, 1970; Adams and Popelka, 1971; Martin and Haroldson, 1971; Martin and Rangaswamy, 1972; Clausen, 1973; Hansbrouck and Martin, 1973), subjects were not overtly reinforced, for fluency, and yet under conditions of time-out from speaking contingent upon stuttering, their frequencies of stuttering decreased. Haroldson,

Martin, and Starr (1968) concluded that propositional speech is maintained by some type of self-reinforcement. They demonstrated that making time-out from a schedule of presumed self-reinforcement, contingent upon a subject's particular speech response, would decrease the frequency of that response.

Some researchers agree that the intensity of an aversive stimulus is an important factor contributing to its effect upon behavior (e.g., Azrin, 1960; Holz, Azrin, and Ulrich, 1963; Solomon, 1964; Appel and Peterson, 1965). Generally the greater the intensity of an aversive stimulus, the greater will be its suppression effect upon the punished response class. Most studies which have examined the effects of time-out punishment on speech behavior have utilized time-out durations of ten seconds. Only two, LaCroix and McLean (1971) and Hasbrouck and Martin (1973) have utilized time-out stimuli of shorter duration: three seconds and five seconds, respectively. In each case, response rates of the punished behaviors decreased. Such findings led to the question of whether there exist any differences or similarities in the intensity of different time-out durations when utilized for the suppression of stuttering. Another question was raised regarding any differences or similarities that may exist in the rates at which punished responses recover toward their baseline frequencies following the removal of different time-out contingencies. Finally, a question arose regarding any differences or similarities that may exist between the suppression profiles for criterion stuttering behaviors that are treated with different time-out durations.

The major impetus for the present study was information showing that the suppression effects of aversive stimuli alone are only temporary; i.e., that punished responses return to pre-punishment frequencies when the aversive contingencies are removed (Skinner, 1938; Estes, 1944; Flanagan, Goldiamond, and Azrin, 1958; Martin and Siegel, 1966a; LaCroix and McLean, 1971; Halvorson, 1971). In addition, it has been demonstrated that a greater suppression of undesired behaviors is achieved when alternative responses to those being punished are reinforced (Holz, Azrin, and Ayllon, 1963; Martin and Siegel, 1966b). It would appear that if a clinician could achieve comparable suppression effects on stuttering by the use of five-second time-out durations in lieu of ten-second time-out durations, his client would have the opportunity to emit an alternative behavior sooner; thus, resulting in (1) a more rapid suppression of the undesired behavior and (2) increased opportunities for reinforcement.

Another justification for the present study was a concern for the amount of therapy time that a clinician, or group of clinicians, may expend over a prolonged period of time in the process of administering ten-second periods of time-out when treating clients who stutter. Such a process could involve a considerable amount of therapy time. It was believed that if contingent time-out durations of less than ten seconds could suppress the frequency of stuttering commensurate with that achieved by ten-second time-out durations, a significant amount of therapy time could be saved.

The purpose of the study was to determine any differences or similarities between the suppression effects of response contingent

five-second and ten-second time-out stimuli, when such stimuli were delivered contingent upon audible stuttering behavior. It was hypothesized that contingent time-out durations of five seconds would suppress criterion stuttering behavior differently than would contingent time-out durations of ten seconds. Specific questions to be answered by the study were:

1. Do contingent time-out stimuli of five and ten seconds differ in their overall suppression of criterion stuttering behavior?
2. When the response contingency is removed, do stuttering behaviors followed by contingent ten-second time-out stimuli recover toward their baseline frequencies differently than do stuttering behaviors followed by contingent five-second time-out stimuli?
3. Within conditioning segments, do the suppression or recovery from suppression profiles differ for the five-second and ten-second time-out conditions?
4. Irrespective of the treatment conditions, does the order of treatment presentation affect the frequency of criterion behavior?

Introduction To The Literature

Numerous studies have investigated the effectiveness of contingent time-out stimuli upon the response rates of specified human behaviors. The results of the studies indicate that contingent time-out is an effective aversive stimulus, in that, in each study, suppression of the punished response class was noted. Two additional

observations are noteworthy. First, contingent time-out was effective in suppressing the response rate of a variety of human behaviors. Secondly, the results already noted were produced by a variety of time-out durations.

Time-Out's Suppression of Non-speech Behaviors

Undesirable mealtime behaviors have been shown to be subject to change through the use of response-contingent time-out procedures. Barton et al. (1970) experimented with sixteen hospitalized male retardates. The following behaviors were identified as the response class to be punished: (1) stealing, (2) using fingers inappropriately, (3) messy use of utensils, (4) eating spilled food, and (5) eating directly with mouth. Time-out consisted of contingent removal of either the subject from the room or his meal tray from the table; each for a period of fifteen seconds. The study reported that in each case there was a marked and useful decrease in the frequency of the behaviors.

Haynes and Geddy (1973) demonstrated that contingent time-out could be employed as a method for suppressing psychotic hallucinatory behaviors. They defined the undesired response class as verbal responses independent of external environmental stimuli. The subject for their study was a forty-five year old chronic hospitalized female schizophrenic patient. The treatment procedure consisted of placing the patient in a bare room for a period of ten minutes upon her initiation of the undesired behavior. Although the schedule of punishment was less than one hundred percent, the frequency of the response class was greatly reduced during treatment segments of the experiment.

In some studies of time-out stimuli, alternative responses have been reinforced; the combination of punishment and reinforcement yielding decreases in the response rates of undesired behaviors. Steeves, Martin, and Pear (1970) demonstrated that an autistic child's attentiveness could be increased through a combination of contingent punishment (thirty-second time-out) and reinforcement (tokens). The subject was engaged in a timed writing task. He was allowed to voluntarily impose a thirty-second time-out from the training task contingent upon self-identification of decreased attention. He did so and was attentive throughout the remainder of the task. When the experimenter discontinued the subject's possibility for self-imposing the time-out, inattentiveness increased in frequency. Reintroduction of time-out again decreased inattentiveness.

Allison and Allison (1971) demonstrated that other aggressive behaviors were controllable through contingent presentation of time-out. The subject for the experiment was a twenty-six month old female who frequently hit, bit, shoved, kicked or took toys from her eleven month old brother. Contingent time-out consisting of five-minute periods of isolation, almost completely extinguished such behaviors. Alternative behaviors were reinforced during the experiment. Upon removal of the time-out contingency, aggressive behaviors recovered, but were again suppressed by the reintroduction of contingent time-out.

Willoughby (1969) also demonstrated that the response rates of nonverbal behaviors emitted by pre-school children could be controlled by the contingent presentation of time-out stimuli. Pre-school children were instructed to depress a specific lever. During each series of

seven consecutive responses, each of the first six consecutive responses was reinforced; while every seventh response resulted in a ten-second period of time-out. It was found that the rate of responding in that condition decreased by approximately twenty-five percent from the baseline rate of response. With an unpunished alternative response (an alternative lever to depress), the punished response was completely suppressed.

A recent study (Pendergrass, 1971) demonstrated that the schedule of the stimulus presentation rather than time-out duration may be the determining factor in the stimuli's effectiveness. The experimenter chose to punish aggressive behaviors (hitting people) that were exhibited by a five year old brain damaged girl. Five-minute and twenty-minute time-out durations were employed during separate experimental conditions. The aggressive behaviors were immediately suppressed by both stimuli. The author stated that the duration of time-out did not appear to be a significant variable in suppressing the undesired behavior, but that a very short time-out continuously applied should best meet treatment requirements.

The studies cited above demonstate the effects of time-out stimuli upon the frequency of nonverbal human behaviors. Also shown was that whether used alone or in combination with positive reinforcement of alternative behavior, the time-out stimulus was an effective punishment contingency. Of interest too, was the finding that a similar suppression effect on nonverbal behaviors was demonstrated with time-out stimuli of different durations.

Time-Out's Suppression of Specific Speech Behaviors

Bostow and Bailey (1969) demonstrated that inappropriate loud vocal behavior could be suppressed by the use of contingent time-out. Subjects for their experiment were two patients in a state hospital ward. Two-minute periods of time-out were presented contingent upon the specified response class. Loud vocal behavior was suppressed to a near zero frequency during conditioning segments, and returned to the baseline frequency upon removal of the time-out contingency.

Two studies (Peterson, 1970; Mahlum, 1970) examined the suppressive effects of time-out upon the frequency of occurrence of misarticulations in the speech of school age children. Each of the studies utilized a mask as a signal to the subjects that a period of time-out was in progress. Peterson's study (1970) involved contingent time-out of specified articulation errors during conversation. The time-out duration employed was twenty seconds. Mahlum (1970) utilized ten-second periods of contingent time-out following incorrect productions of the /s/ phoneme during reading. In each study, the researcher concluded that time-out suppressed the frequencies of the incorrect productions.

Time-out procedures were also shown to be effective in suppressing the disfluency rates of normal speakers (Martin and Rangaswamy, 1972). In their experiment, three adult subjects spoke spontaneously during experimental sessions. Contingent ten-second time-out stimuli suppressed the subjects' disfluency response rates to near zero. The frequency remained at that level throughout the experiment.

The effects of contingent time-out on the response rate of stuttering has also been investigated. In such experiments, subjects were instructed to respond to conversation stimulation cards or pictures, speak spontaneously, or engage in conversation with the experimenter (Haroldson, Martin, and Starr, 1968; Martin and Berndt, 1970; Adams and Popelka, 1971; McDermott, 1971; Clausen, 1973). Each of these experiments utilized contingent time-out durations of ten seconds. The results of each indicated that contingent ten-second time-out periods could markedly suppress the response rates of stuttering. For all subjects, frequency of stuttering was decreased.

Ten-second time-out durations are not the only durations that have proven effective in suppressing the response rate of stuttering behaviors. LaCroix and McLean (1971) employed a three-second period of time-out and found (1) a reduction in disfluencies and (2) an increase in speech output during treatment sessions.

Hasbrouck and Martin (1973) report five-second time-out durations as having been effective in suppressing stuttering behaviors. Their study found five-second time-out durations more effective when contingently presented on a one hundred percent schedule of delivery than when presented on a twenty-five percent schedule of delivery. Mowrer (1974) reported that clinicians in the Arizona State University Speech and Hearing Clinic employ five-second time-out durations in lieu of ten-second durations during their treatment of individuals who stutter.

Thus, it appears that various time-out durations can suppress a variety of human behaviors. Such information causes one to consider

the aforementioned implications of utilizing shorter periods of time-out which may be sufficient for the attainment of prescribed changes in behavior.

CHAPTER II

PROCEDURE

Subjects and Materials

The subjects for the present study were four adults: one female and three males. The subjects ranged in age from twenty-five years of age to seventy years of age. Criteria for being selected as a subject were as follows:

1. Each subject must have exhibited criterion stuttering behaviors as defined in Appendix A.
2. Each subject was known as a stutterer by laymen in his environment.
3. Subjects must have had no prior experience with time-out contingent upon their stuttering.

To obtain subjects, the experimenter questioned laymen whom he knew from several communities regarding any knowledge they had of adults within their community who stuttered. Upon receiving the names of prospective subjects from the laymen, the experimenter mailed each prospective subject a letter requesting his assistance with a project designed to investigate a recently developed procedure for the treatment of stuttering. The letter also informed the prospective subjects that they would receive three dollars per hour for their assistance. Each recipient of the letter returned it to the

experimenter, and included an indication of times that would be suitable for his participation.

Because only two of the subjects resided in the same locale, it was necessary for the experimentation to be conducted in different settings. Prior to beginning the experiment, the experimenter located rooms which could be used for the experiment, and which met the following criteria:

1. The room should be of a size which would enable it to contain the experimental equipment, two tables, two chairs, one subject, and the experimenter.
2. The room should be large enough to allow the subject and experimenter to be seated no closer than eight feet from one another.
3. The room should not be required for use by other persons during the times required for experimentation.
4. The room should be free of distracting materials and noises.

Experimental sessions with Subject A were conducted in a therapy room of the University of North Dakota Speech and Hearing Clinic. Subjects B and C were studied in a large vacant office within a quiet section of a northwestern Minnesota public school. Subject D was studied in a large classroom which was located in a northwestern Minnesota community's National Guard armory.

Equipment used during the study included a Hunter Model 116 electronic timer, a Hunter Model 141 electronic tallying device, a Gray Lab Model 300 electronic timer, a General Controls Model CM4CS454

hand counter, a Sony Model TC-105A tape recorder, a remote controlled red jewel light, one hundred 3" x 5" conversation stimuliation cards, and a specially designed holder for the conversation stimulation cards and the red jewel light. The conversation stimulation cards were designed to evoke the required subject monologue. Each of the cards contained a printed single word or phrase in one of the following categories: people, places, activities, or current news events. They were located on a small table in front of and facing the subject during experimental periods.

Situated to the left of the conversation stimulation cards and also facing the subject was a card which contained the following typed questions for various topics:

1. PEOPLE
    - A. What do the people do for a living?
    - B. What do they do on their jobs?
2. PLACES
    - A. What things do you know about the place?
    - B. What do the places look like?
    - C. What things happen at the places?
    - D. What are the places known for?
3. ACTIVITIES
    - A. How is the game played?
    - B. Who can participate in the activity?
    - C. What are some good and bad points about the activity?

4. CURRENT EVENTS

A. When did you first hear about it?

B. What is it about?

C. Who is involved in it?

Also situated on the card holder, directly above the conversation stimulation cards and facing the subject, was a one-inch red jewel light set in a gold colored 4" x 2¼" x 2½" aluminum chassis box. The light was designed such that it could be illuminated and extinguished by a remote control handswitch and timing device. The timing device was the Hunter Model 116 electronic timer with a remote handswitch control. The handswitch also controlled the Gray Lab electronic timer. The activation periods for both electronic timing devices could be manually set so as to comply with the time periods under study; the Hunter electronic timer for the five- and ten-second time-out periods and the Gray Lab timer for consecutive two-minute periods of subject monologue. The tape recorder was attached to and controlled by the performance of the Gray Lab timer. When the Gray Lab timer was operating, so too, was the tape recorder. When the Gray Lab timer was not in operation, neither was the tape recorder. The purpose of the tape recorder was twofold. First, it provided the experimenter with an audible recording of the subjects' speech behavior throughout the experiment; material which could be used in later analyses. Secondly, it provided the experimenter with the recorded samples of the subjects' speech behavior from which random samples were selected for use in the production of a reliability tape. The Hunter electronic tallying device was attached to and controlled by the Hunter electronic timer. Its operation will be described.

During the treatment segments of the experimental sessions, the experimenter's depression of the handswitch yielded the following four simultaneous events:

1. The Hunter electronic timer was activated for its preset time period.
2. The red light was illuminated.
3. The Gray Lab electronic timer was deactivated.
4. The tape recorder was deactivated.

Upon completion of the preset time-out period, the following electronic responses occurred simultaneously:

1. The Hunter electronic timer was deactivated.
2. The red light was extinguished.
3. The Gray Lab electronic timer was activated.
4. The tape recorder was activated.
5. The Hunter electronic tallying device displayed the next consecutive number which followed that previously displayed.

During all experimental sessions, the participants and materials were arranged in the following manner: The subject and experimenter were seated facing each other, approximately nine feet apart. In front of the subject was a small table which supported the card and light holder, the conversation stimulation cards, the red light, the question card, and a microphone for the tape recorder. On a table approximately eighteen inches to the right of the experimenter was the Hunter electronic timer, the Hunter electronic tallying device, and the Gray Lab electronic timer. A cardboard screen was attached

to the instruments to block them from the view of the subject. The Sony tape recorder was situated on the floor, directly to the right of the experimenter's chair. The handswitch and hand counter were alternately held in the experimenter's left hand and on his lap. Also resting on his lap was a Data Collection Form (see Appendix B) on which he was able to periodically record the numbers displayed by either the hand counter or Hunter electronic tallying device.

Throughout all experimental segments the Gray Lab timer was used to accurately measure two-minute periods of subject monologue. Upon the subject's completion of each two-minute period of talking, the experimenter performed two tasks. First, he recorded on the Data Collection Form the number displayed on the tallying device being used for the particular segment of the experiment. Secondly, he manually reset the Gray Lab timer. This entire process consumed approximately three-and-a-half seconds of time during thirty pre-experimental trials. When, between utterances, subjects exhibited periods of silence that extended to five seconds, the experimenter manually deactivated the Gray Lab timer. He immediately reactivated the timer when the subject resumed the monologue. This process limited the silent periods that were included as part of the recorded monologue.

Experimental Design

The subjects were studied individually using a single-case experimental design. Each subject was seen for four experimental sessions, involving a two-week period of time. The sessions were scheduled to occur on either Monday and Thursday or Tuesday and Friday

on each of two weeks. Experimental sessions consisted of the following five consecutive segments: baseline, treatment, extinction, treatment, and extinction. Experimental segments were defined as consecutive ten-minute periods of subject monologue.

The time-out stimuli were presented in a counterbalanced order between subjects. The order of stimulus presentation is shown in Table 1.

TABLE 1

ORDER OF PRESENTATION OF FIVE- AND TEN-SECOND TIME-OUT STIMULI

Session:	I		II		III		IV	
Segment:	2	4	2	4	2	4	2	4
Subject								
A	10	5	5	10	10	5	5	10
B	5	10	10	5	5	10	10	5
C	10	5	5	10	10	5	5	10
D	5	10	10	5	5	10	10	5

At the beginning of the initial session, the subject was thanked for his willingness to participate in the experiment, and told that the experiment was designed to study part of a recently developed method for the treatment of stuttering. The experimenter then read the following instructions to the subject:

> In front of you are many 3" x 5" cards; each of them containing the names of persons, places, activities, or current events in the news. Above the cards is a gold box with a light mounted in it. To the left of the cards and the light is a

single card with several questions printed on it. When I say "Begin," you are to begin discussing the topics printed on the cards. Please discuss each one until you can think of absolutely nothing more to say about the topic. If you should have any difficulty thinking of something to say about a particular topic, please look at the question card. Some of its questions may help you think of something to say. When you have finished talking about a topic, remove its card, place it to the right and begin talking about the next topic. Should you be unable to think of anything to say about a topic, or if you do not wish to discuss one, just remove it and place it on top of those already discussed.

At times the red light may come on like this (experimenter illuminated the red light). When it does, stop talking and remain silent until the light goes off. Then continue talking about the topic. We will continue this procedure for approximately an hour. Do you have any questions? All right, let's begin.

Segment 1 (baseline) of each experimental session was designed to allow the experimenter to quantify the subject's baseline frequency of stuttering for each experimental day. Baseline was identified in terms of the number of audible stuttering behaviors emitted by the subject during each two-minute period of subject monologue. At no time during the baseline segment were contingent time-out periods presented. During the baseline segment, the Gray Lab timer was manually set for periods of two minutes. Throughout the segment the experimenter tallied, on the hand counter, each audible stuttering behavior that was emitted by the subject. When the Gray Lab timer indicated that a two-minute period had elapsed, the experimenter performed the operations described earlier: recording on the Data Collection Form the number shown on the hand counter, and resetting the Gray Lab timer for another two-minute period. At the conclusion of Segment 1, the experimenter set the Hunter timing device for the time-out period which was designated for the first Treatment segment

of that experimental session. The session's first conditioning segment was then begun.

Segment 2 (Treatment) consisted of the contingent presentation of a time-out stimulus, the duration of which is shown in Table 1. The time-out stimulus, was delivered on a one hundred percent schedule of punishment, contingent upon the subject's production of criterion stuttering behaviors. Upon his identification of the subject's production of criterion stuttering behavior, the experimenter depressed the handswitch which activated the Hunter timing device, illuminated the red light, and deactivated the Gray Lab timer and tape recorder. The Hunter timing device extinguished the red light at the completion of a five-second or ten-second period of time and allowed the Gray Lab timer and tape recorder to reactivate. The subject, as previously instructed, then resumed speaking. Again, at the completion of each two-minute period of monologue, the experimenter recorded the number shown on the Hunter tallying device and reset the Gray Lab timer for another two-minute period. This procedure was continued until the subject had produced ten minutes of monologue. An extinction segment was then begun.

Segment 3 (Extinction) was then conducted in a manner identical to the design of Segment 1. At the conclusion of ten minutes of subject monologue, the experimenter set the Hunter timing device for a time-out duration appropriate for the upcoming Treatment segment of the session.

During Segment 4 (Treatment), the subject was presented with predetermined contingent time-out durations (see Table 1). As in

previous segments, Segment 4 continued until the subject, had produced ten minutes of monologue. The final extinction segment was then begun.

Segment 5 (Extinction) was conducted in a manner identical to the procedure described for the previous baseline and extinction segments.

Data Collection During Experimental Sessions

As mentioned earlier, at the completion of each two minutes of subject monologue, throughout each segment of the experiment, the experimenter recorded on a Data Collection Form the number displayed on the counting device being used. Thus, the Data Collection Form provided a cumulative frequency distribution of stuttering occurrences for two-minute intervals throughout all experimental sessions. The form was later completed so as to show a frequency distribution of stuttering occurrences for each two-minute interval of the experimental sessions.

Reliability

To determine the experimenter's reliability as a judge of the occurrence of criterion stuttering behavior, the following procedures were employed. A two-minute interval of monologue from the tape recording of each subject's initial baseline segment was randomly selected and transferred to another recording tape. The random selection of two-minute samples was accomplished in the following manner. The experimenter numbered consecutively, five separate pieces of paper. Each number represented a respective two-minute interval of the initial baseline segments. The five pieces of paper were then placed in a hat

for random selection. The first number drawn indicated which two-minute interval sample should be drawn from Subject A's initial baseline segment. That sample was transferred from the original tape recording to another tape. The numbered piece of paper was returned to the hat, and the procedure was repeated for each of the remaining three subjects. The resulting eight-minute sample of the subjects' speech behavior was later evaluated by the experimenter and two independent judges.

Immediately prior to that evaluation, the judges had the opportunity to listen to one playback of another eight-minute composite sample of the subjects' speech behavior. This sample was produced on a separate tape, and included two-minute samples also from each subject's initial baseline segment. The samples for this tape were purposely selected by the experimenter, so that neither would be a duplicate of the samples recorded on the reliability tape. The pre-reliability listening experience was presented so that each judge would have an opportunity to hear the types of speech behaviors he would later be judging, just as the experimenter had listened to a few minutes of each subject's speech prior to beginning the initial baseline segment.

The independent judges involved in the reliability tape evaluation were two public school speech clinicians, each with previous experience in evaluating and treating individuals who stutter. Each was given printed instructions regarding their tasks as a judge (see Appendix C). They were also given a typed transcript of the entire eight-minute reliability tape recording. The transcript contained 705 items (subject utterances). After reading their instructions, the

judges were allowed to question the experimenter regarding the instructions. Judges then listened individually to the reliability tape. They were allowed to play the tape only one time. While listening to the tape, each judge placed a slash mark, with a pen or pencil, above the appropriate words each time he identified the occurrence of stuttering behavior. Interjudge reliability was shown to be greater than ninety-five percent (see Table 2).

TABLE 2

AGREEMENT BETWEEN JUDGES IN RESPONSE TO RELIABILITY TAPE

Judges*	Total Items Agreed	Total Items Disagreed	Percent Agreement
A:B	683	22	96.88
A:C	678	27	96.18
B:C	670	35	95.03

*Letter A refers to the experimenter.

CHAPTER III

RESULTS AND DISCUSSION

Analysis of Data

Stuttering frequencies from each subject's Data Collection Forms were plotted graphically. Figures 1, 2, 3, and 4 represent, for the respective subjects, the frequency of occurrence of criterion stuttering behaviors for each two minutes of subject monologue throughout all segments of the experiment. Figures 5, 6, 7, and 8 display the subjects' median frequencies of occurrence of criterion stuttering behaviors for all experimental segments. Figures 7 and 8 suggest that for Subjects C and D, respectively, the frequency of stuttering was either maintained at baseline frequencies or suppressed during the treatment segments. Figure 6 suggests that the contingent time-out stimuli suppressed Subject B's stuttering frequency during all but one of the treatment segments. Figure 5 suggests suppression of stuttering frequency during only two treatment segments for Subject A. The noted increases in frequency of stuttering shown by Subject A during some treatment segments will be discussed later.

To evaluate the process of suppression as it occurred within each treatment segment, and to determine which treatment segments yielded significant suppression of stuttering, the Mann-Whitney U Test (Kolstoe, 1973) was performed. The raw data collected from each

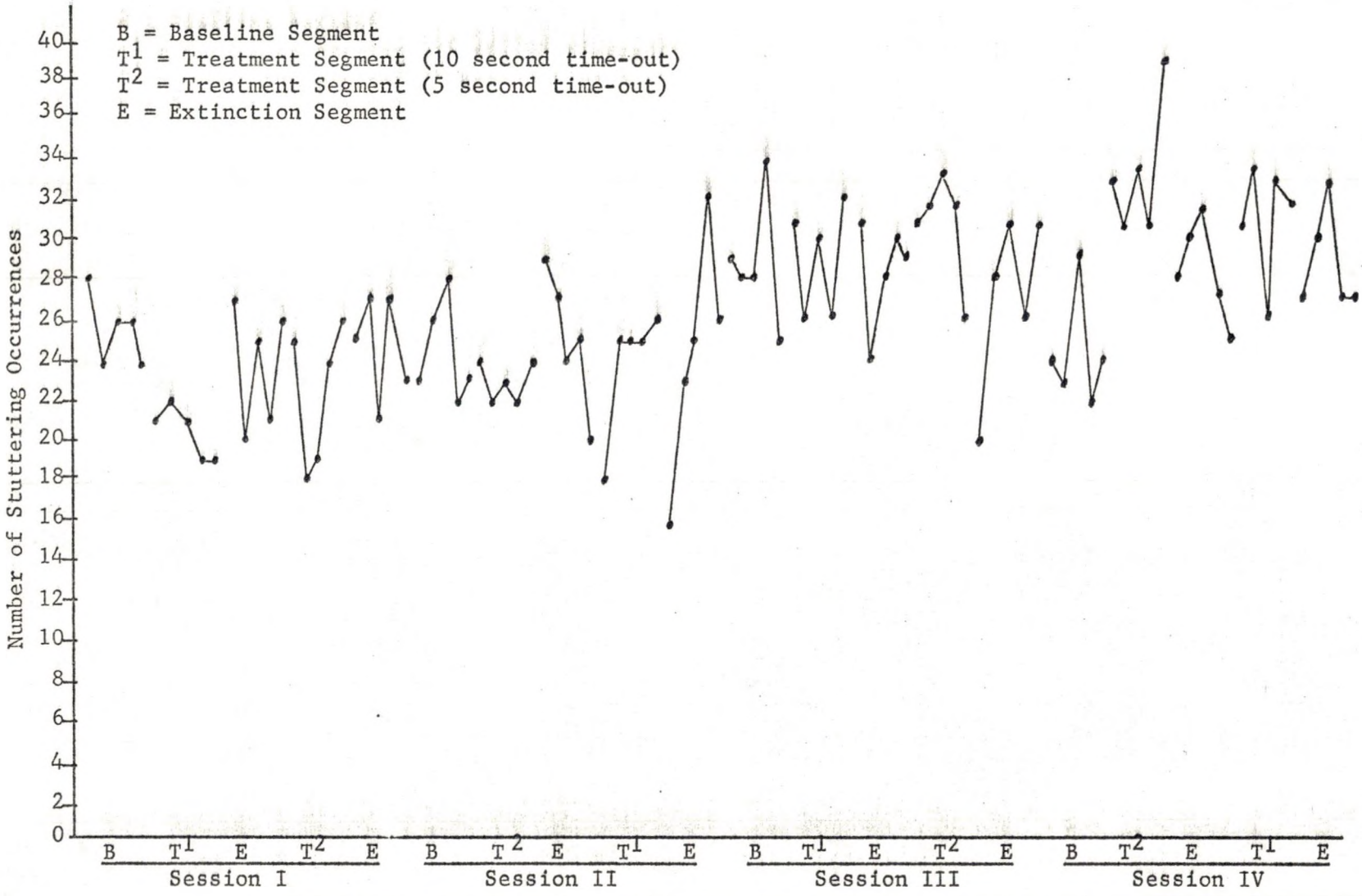

Fig. 1. Subject A's Frequency of Stuttering Per Two-Minute Period of Monologue

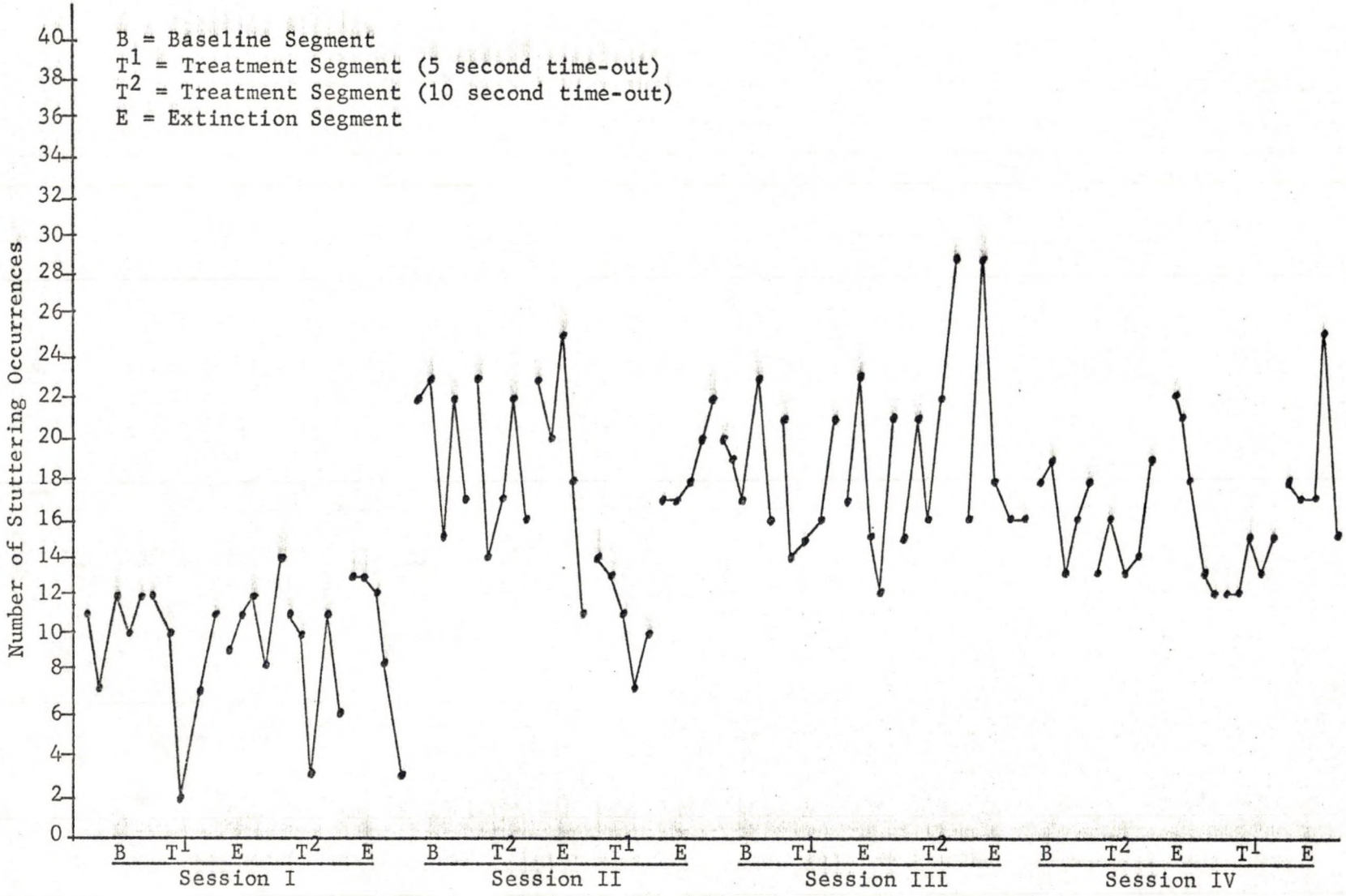

Fig. 2. Subject B's Frequency of Stuttering Per Two-Minute Period of Monologue

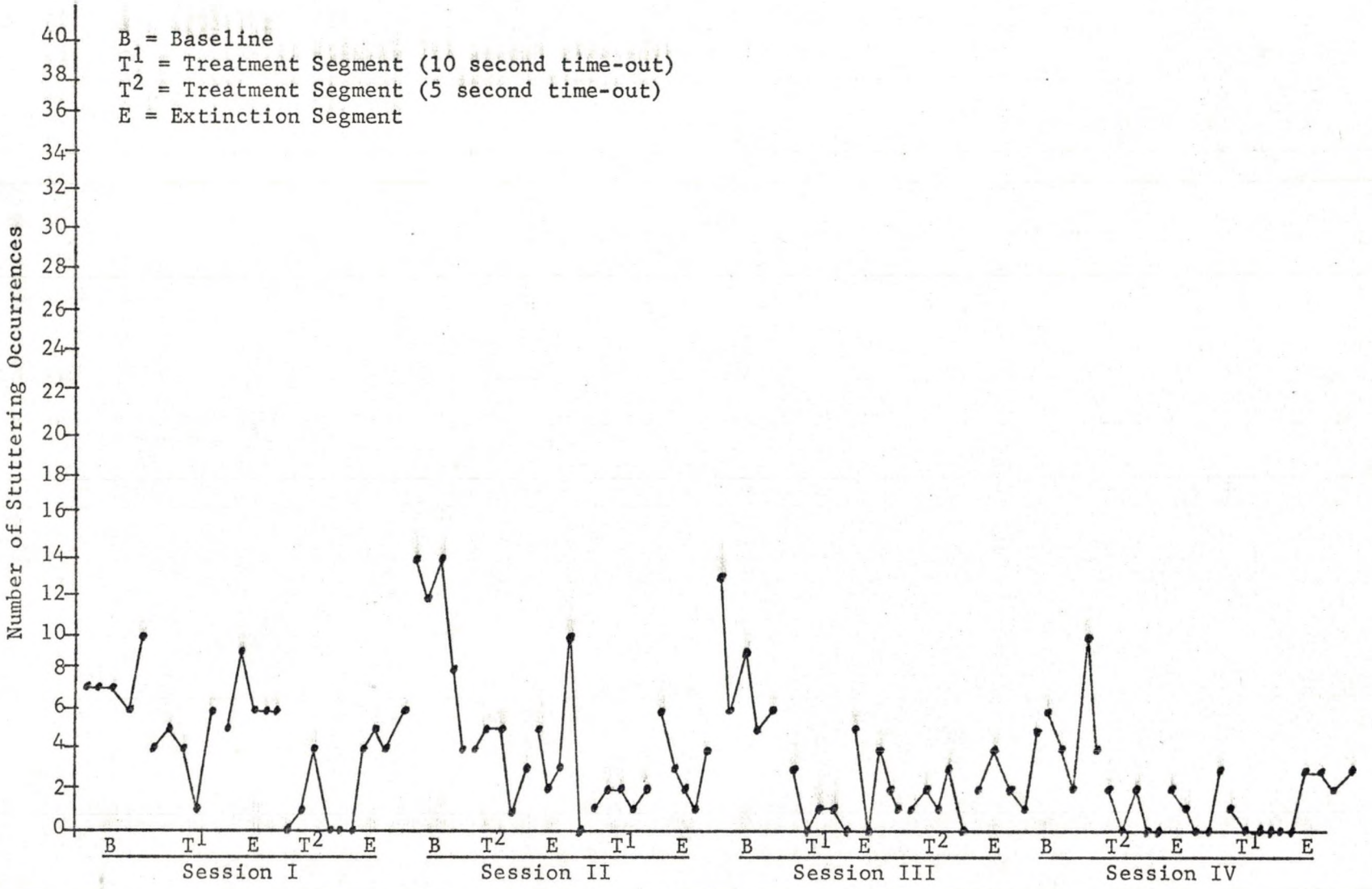

Fig 3. Subject C's Frequency of Stuttering Per Two-Minute Period of Monologue

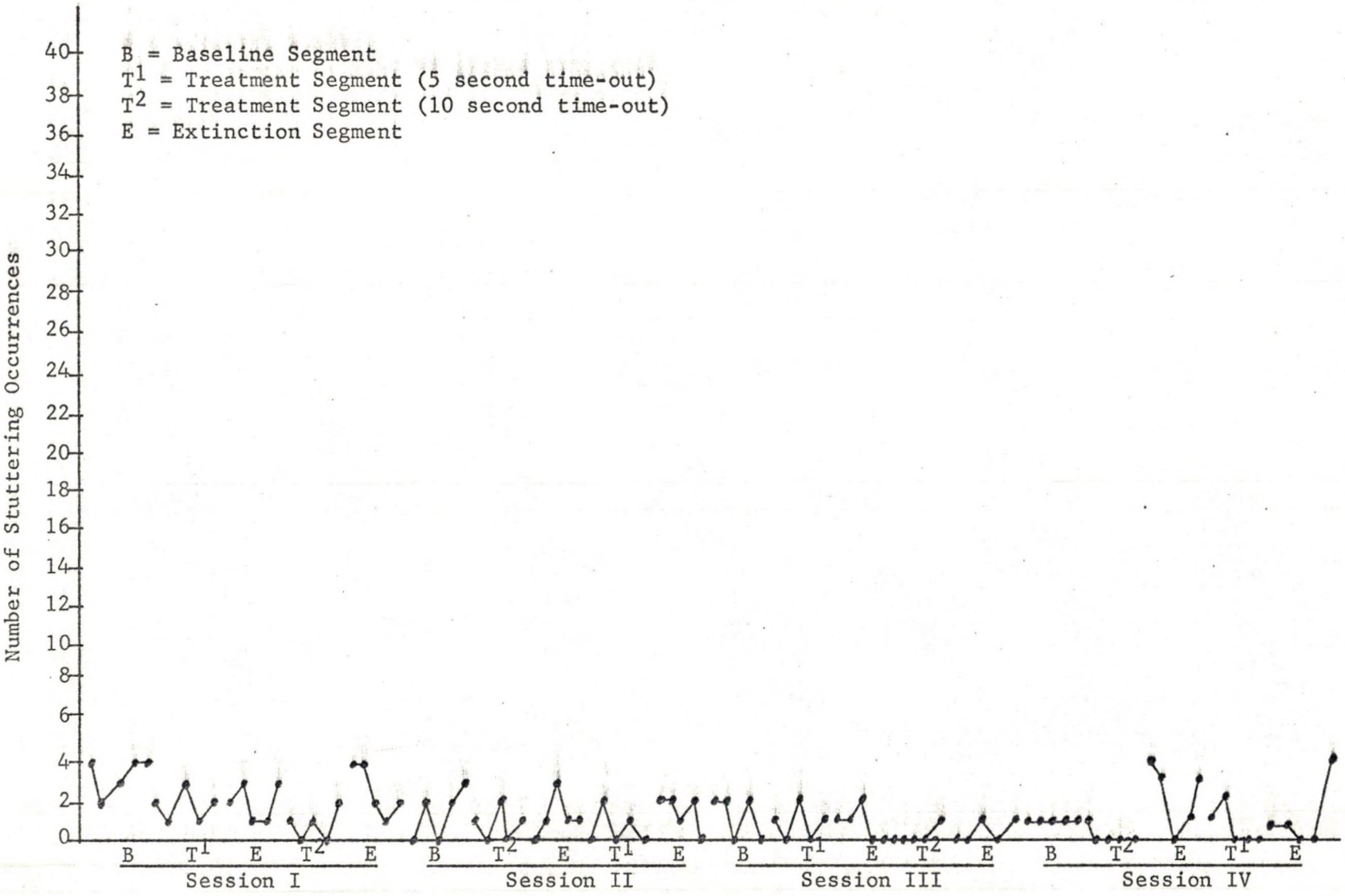

Fig. 4. Subject D's Frequency of Stuttering Per Two-Minute Period of Monologue

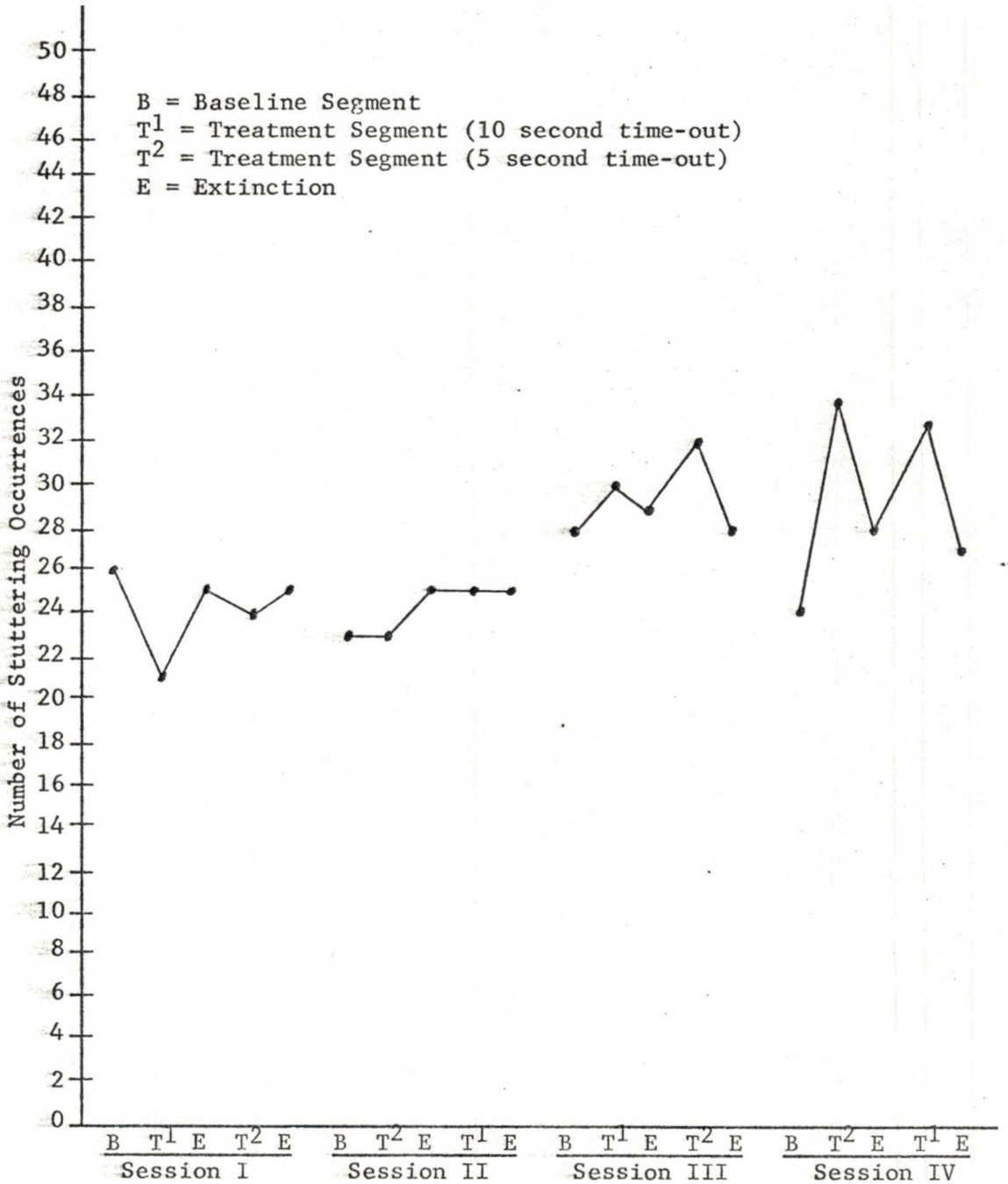

Fig. 5. Subject A's Median Rate of Stuttering During Experimental Segments

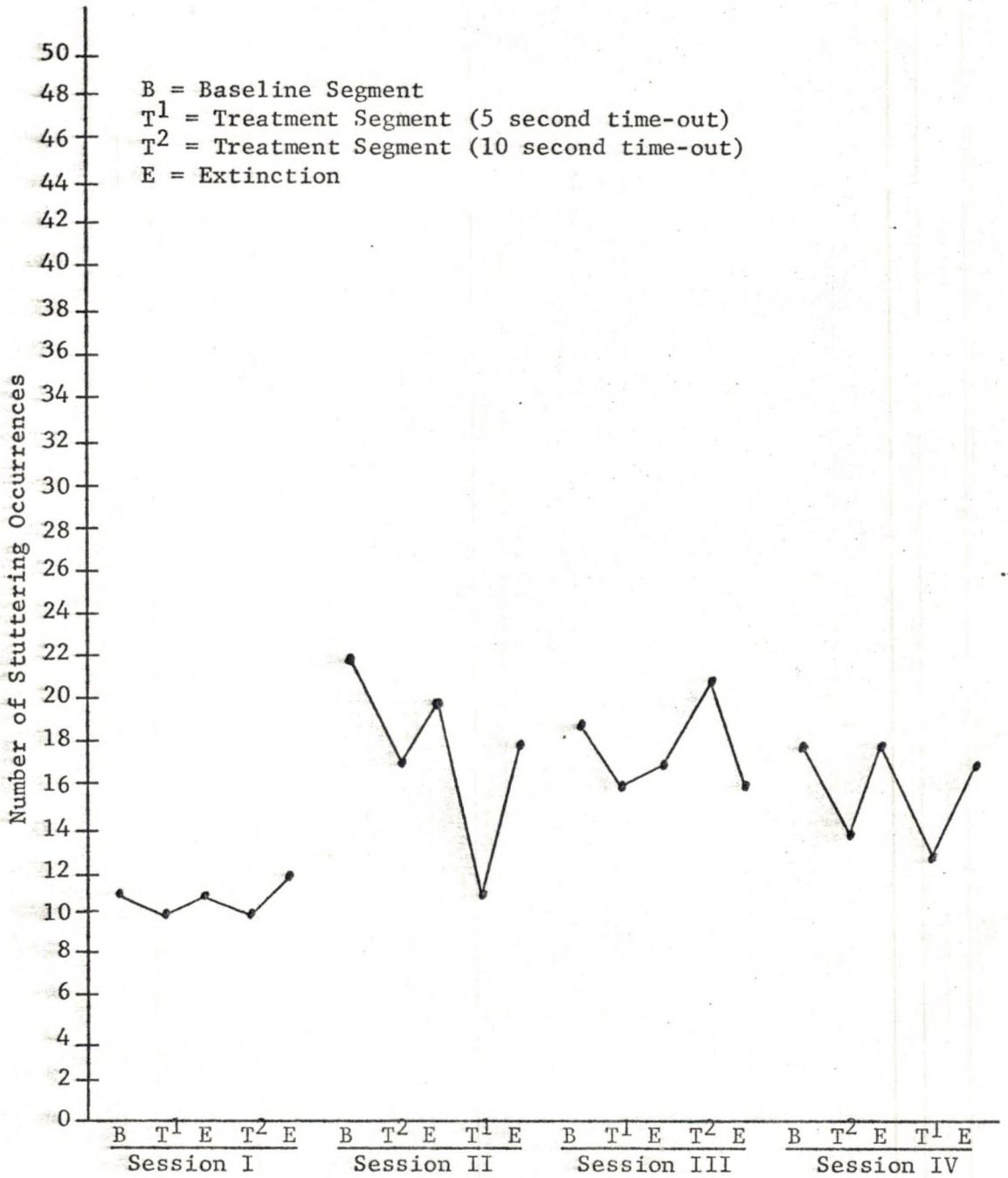

Fig. 6. Subject B's Median Rate of Stuttering During Experimental Segments

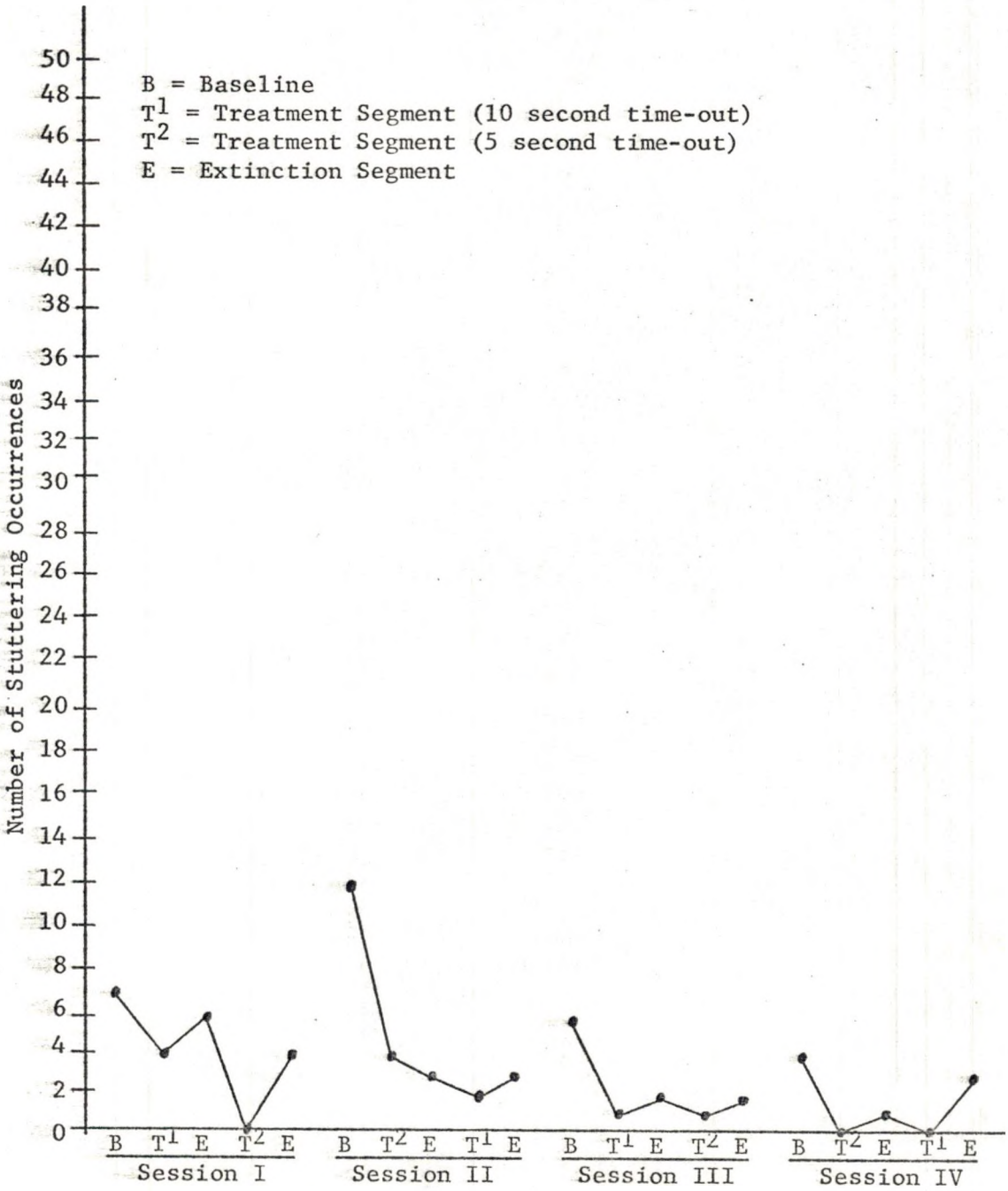

Fig. 7. Subject C's Median Rate of Stuttering During Experimental Segments

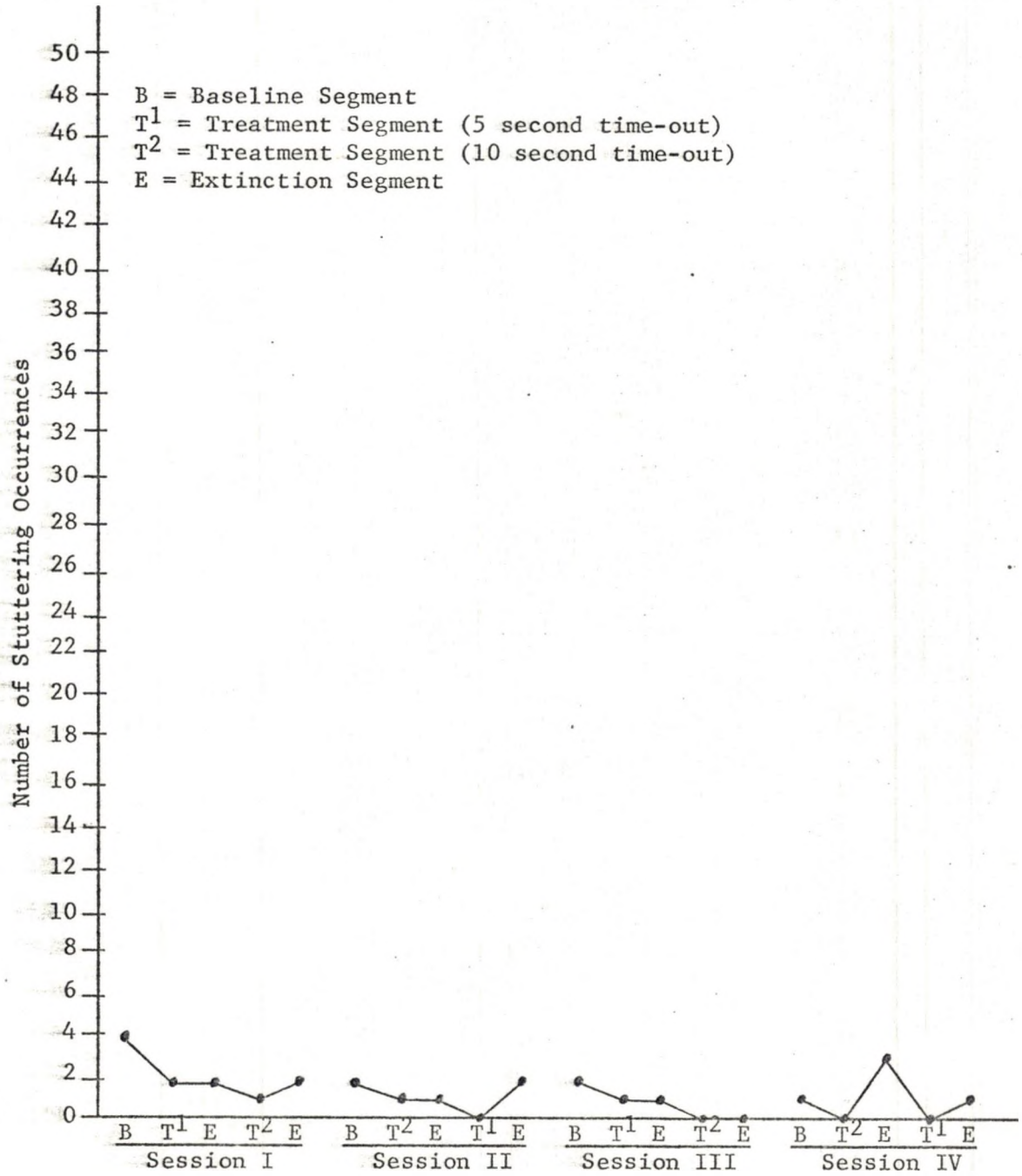

Fig. 8. Subject D's Median Rate of Stuttering During Experimental Segments

treatment segment were ranked with that from the preceding baseline segment. Treatment segments which showed the treatment stimulus to be exerting a significant influence upon the frequency of stuttering are designated within Table 3.

TABLE 3

SUPPRESSION RATIOS

Subject	5 Second Time-out Condition		10 Second Time-out Condition	
	Order 1	Order 2	Order 1	Order 2
A	.500	.520	.553	.477
	.414	.466	.483	.421
B	.524	.666	.564	.524
	.543	.581	.562	.475
C	.750[b]	1.000[b]	.642[b]	.868[a]
	1.000[b]	.857[a]	.857[a]	.842[a]
D	.666	1.000	.666	.800[b]
	.643	1.000	1.000	1.000

[a]Mann-Whitney U ($p < .005$)
[b]Mann-Whitney U ($p < .030$)

To determine whether any significant differences existed between the suppression effects of the different treatments, suppression ratios were computed for each segment in which the subjects received contingent time-out. Suppression ratios were derived by use of the following formula:

$Bs \div (Ts + Bs)$, where

Bs = median frequency of stuttering during baseline, and

Ts = median frequency of stuttering during treatment.

The ratio derived from the above formula allowed the experimenter to accomplish several analyses. First, he was able to evaluate stuttering frequency during each treatment segment relative to the preceding baseline frequency. Suppression ratios approximating .500 indicate no suppressive effects of the time-out stimulus. Ratios from 0 to .500 indicate an increase in stuttering over baserate. As ratios increase from .500 to 1.000, the greater is the indication of suppression. A ratio of 1.000 resulted from no stuttering during a treatment segment. Suppression ratios are shown in Table 3 for each treatment and for the order in which it was presented.

Suppression ratios were then employed for two procedures involving the Wilcoxon matched-pairs sign-ranks test (Kolstoe, 1973). The Wilcoxon was first run to determine any significant differences between the two treatment conditions. For the test, the suppression ratios of the five-second and ten-second time-out conditions were matched for each of the sixteen experimental sessions (four sessions or pairs per subject). Results of the test suggest that the suppressive effects of the two conditions did not differ significantly ($T = 37.5$, $p > .10$). The suppression ratios from each session were then matched according to the order in which contingent time-out stimuli were presented to the subjects. Again, the Wilcoxon matched-pairs sign-ranks test failed to demonstrate any differential effects on stuttering of the five-second and ten-second treatment presentations within each session ($T = 21$, $p > .10$).

Pooling each subject's suppression ratios, and again employing the Wilcoxon, revealed no significant differences in the suppression

effects found for either (1) treatment condition or (2) order of stimulus presentation.

To determine each treatment condition's effect on recovery during all extinction segments of the experiment, recovery ratios were computed. Segmental median scores were again used to compare the subjects' performance during extinction segments to that during treatment conditions. Recovery ratios were derived by use of the following formula:

$Rs \div (Ts + Rs)$, where

Rs = median frequency of stuttering during extinction, and

Ts = median frequency of stuttering during treatment.

Recovery ratios allowed the experimenter to evaluate stuttering frequency during each extinction segment relative to the preceding treatment segment. Ratios approximating .500 indicated little change in subject performance. As the ratios increased from .500 to 1.000, the greater is the indication of recovery from the time-out treatment. Recovery ratios are displayed in Table 4.

The recovery ratios were grouped according to their respective treatment conditions, and were analyzed by means of the Wilcoxon matched-pairs sign-ranks test. The test failed to show any significant difference between the two different conditions' effect on recovery ($T = 26.6$, $p > .05$).

As a final means of analysis, Figures 1, 2, 3, and 4 were inspected visually to determine if, intrasegmentally, there appeared to be any differences in suppression or recovery effects between the two stimuli under study. Neither of the two conditions yielded a

consistent pattern of effect for respective two-minute periods during treatment and recovery segments.

TABLE 4

RECOVERY RATIOS

Subject	Following 5 Second Time-out Condition		Following 10 Second Time-out Condition	
	Order 1	Order 2	Order 1	Order 2
A	.521	.510	.543	.498
	.452	.467	.492	.450
B	.524	.620	.540	.545
	.515	.567	.562	.432
C	.428	1.000	.607	.621
	1.000	.666	.666	.789
D	.526	1.000	.500	.666
	.500	1.000	1.000	. . .[a]

[a]Median scores for extinction and treatment segments were zero

Discussion

During some segments of the experiment, each of the contingent time-out durations under study yielded a decrease in the frequency of occurrence of stuttering behavior for each subject. Neither time-out duration was shown to be more or less effective than the other, nor did treatment order within sessions appear to be important. Figures 5, 6, 7, and 8 illustrate the effectiveness of both time-out conditions; the general pattern of which appears to be (1) baseline frequency, (2) suppression of stuttering frequency during Segment 2, (3) recovery toward baseline frequency of stuttering during Segment 3, (4) suppression

of stuttering frequency during Segment 4, and (5) recovery toward baseline frequency of stuttering during Segment 5.

Exceptions to the general pattern of subject behavior were noted for each subject. As mentioned earlier, Figure 5 suggests that Subject A exhibited an increased frequency of stuttering during several treatment segments. The subject was a twenty-five year old female whose stuttering behaviors included phoneme prolongations, interjections, and repetitions of phonemes, syllables and words. During all baseline and extinction segments, the subject frequently exhibited more than one of the above mentioned behaviors in her attempts to produce individual words. In addition, it was noted that she frequently continued individual stuttering behaviors for durations longer than the time periods under investigation. Consideration was given to the proposition that since treatment segments did not include extended stuttering behaviors, because starting to stutter was the occasion for instituting time-out and time-out periods stopped the timer and tape recorder as well as the subject's speech, the subject may have had the opportunity to exhibit a higher frequency of stuttering during treatment than during either baseline or extinction segments. To investigate this possibility, the experimenter reviewed the tape recordings of the subject's four sessions. While listening to the tapes, he counted each word the subject spoke during baseline and extinction segments, and each time she completed or attempted a word during treatment segments. Ratios comparing the number of words completed or attempted to the number of criterion stuttering behaviors emitted were then computed for each segment (see Table 5).

TABLE 5

RATIO OF STUTTERING OCCURRENCES TO UTTERANCES ATTEMPTED OR COMPLETED BY SUBJECT A

Session	Segments				
	1	2	3	4	5
I	.674	.470	.672	.526	.600
II	.619	.446	.654	.526	.654
III	.707	.613	.713	.513	.669
IV	.633	.586	.693	.626	.729

The data indicated that (1) the subject either completed or attempted more spoken words during treatment than during baseline or extinction, and (2) the ratio of stuttering occurrences to words attempted or completed was consistently smaller during treatment. Therefore, it was noted that because of the subject's type of stuttering behavior, the treatment contingencies allowed her more opportunities to emit stuttering behavior than did noncontingent segments. The actual effect of time-out on Subject A's stuttering as compared to her non-contingent segments is more accurately represented by Figure 9.

Subject B, a thirty-one year old male, during one segment of the experiment, exhibited a frequency of stuttering which was unexpected. The deviation from the general pattern occurred during Segment 4 of Session III (see Figure 6). During that segment, the subject's median frequency of stuttering was 21.00. Examination of Figure 2 reveals the inconsistency of Subject B's performance throughout

each segment of the experiment. Review of the tape recorded segment in question revealed no explanation for the frequency of stuttering that occurred.

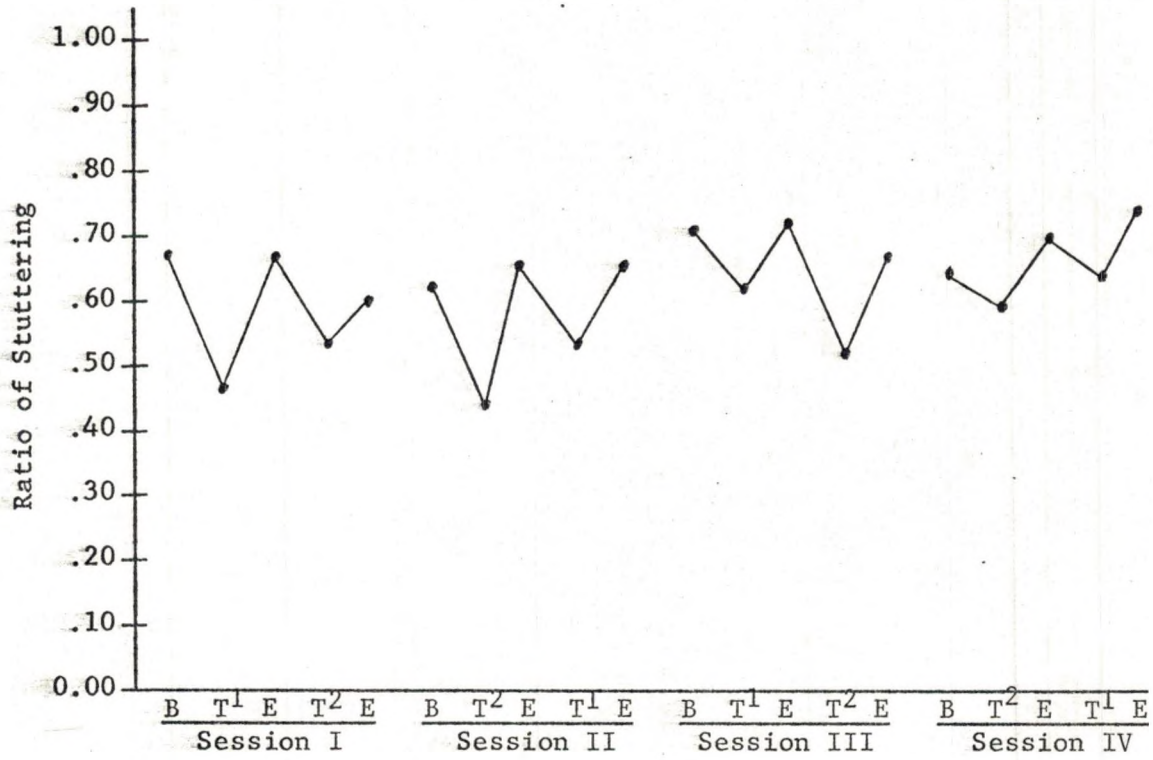

Fig. 9. Ratio of Stuttering Occurrences to Words Attempted or Completed by Subject A

Subject C, a fifty-three year old male, exhibited only one deviation from the expected pattern of behavior. During Segment 3 of Session II, the frequency of stuttering continued to decrease from that observed during the preceding treatment segment (see Figure 7). Since the subject's verbal output during the segment remained consistent with that of previous segments, and since his frequency of stuttering continued to decrease during the following treatment segment, it appeared that the effects of the previous conditioning segment continued to effect the subject's performance even when removed.

Subject D, a seventy year old male, also exhibited some frequency deviations from the expected pattern. Each of the deviations appeared during extinction segments. As described earlier, subjects' frequencies of stuttering were generally seen to increase toward baseline levels following the removal of the time-out contingency. It was noted that during four of the eight extinction segments experienced by Subject D, his median frequency of stuttering remained identical to that of the preceding treatment segment.

It was noted that for Subjects C and D, the absolute frequency of stuttering was completely suppressed during some of the treatment segments (see Figures 3 and 4).

CHAPTER IV

SUMMARY AND CONCLUSIONS

An experiment was conducted to investigate the suppression effects of five-second and ten-second time-out stimuli upon the frequency of stuttering. Four single-case experimental studies were performed. The subjects for the studies were four adults who were identified as individuals who stutter. Each subject was exposed to four experimental sessions, each including five-second and ten-second time-out conditions.

During conditioning segments, subjects were exposed to time-out stimuli of either five or ten seconds in duration. The order of stimulus presentation was counterbalanced, in order that the subjects' frequency of stuttering could be examined as a dependent variable of (1) the varying time-out durations and (2) the order of presentation of the contingent stimulus.

The following conclusions resulted from examination of the data:

1. Both five-second and ten-second time-out stimuli suppressed stuttering at some points during the experiment.
2. Neither of the time-out durations significantly suppressed stuttering behavior more or less than the other.

3. Following their removal, neither of the time-out durations impeded return of stuttering toward baseline frequencies significantly more than the other.
4. The order in which the treatments were presented within each session exerted no significant effect upon the stimuli's ability to suppress stuttering.
5. Within treatment conditions, neither of the stimuli under study appeared to exert an identifiable pattern of suppression.
6. Clinicians employing time-out procedures in their treatment of individuals who stutter can expect similar suppressive effects from either of the two time-out contingencies studied here.

Suggestions for Further Research

1. A similar study should be conducted in which all segments are extended to longer periods of time.
2. A study should be undertaken to determine the optimum duration of time-out which will reduce the frequency of stuttering without absorbing an undue amount of therapy time.
3. A study should be undertaken to determine if subjects' ages contribute to their response to time-out stimuli of different durations.

APPENDICES

APPENDIX A

GLOSSARY

GLOSSARY

Aversive Stimulus: A stimulus whose contingent presentation is found to decrease the future probability of the behavior it follows (Sloan and MacAulay, 1968).

Criterion Stuttering Behavior: Audible repetitions, prolongations, or interrputions in the utterance of sounds, syllables, or words.

Disfluency: Interrputions in the forward flow of speech . . . that do not seem to play an important role in the diagnosis of stuttering (Van Riper, 1971).

Positive Reinforcement: The response-contingent presentation of a stimulus which increases the future probability of that response (Sloan and MacAulay, 1968).

Punishment: The response-contingent presentation or removal of a stimulus, the result of which is a decrease in the future probability of the behavior it follows (Sloan and MacAulay, 1968).

Response Rate/Frequency: The number of occurrences of a specified behavior during a specified amount of time.

Stuttering: I. (a) Disruption in the fluency of verbal expression, which is (b) characterized by involuntary, audible or silent, repetitions or prolongations in the utterance of short speech elements, namely: sounds, syllables, and words of one syllable. These disruptions (c) usually occur frequently or are marked in character and (d) are not readily controllable. II. Sometimes the disruptions are (e) accompanied by accessary activities involving the speech apparatus, related or unrelated body structures, or stereotyped speech utterances. These activities give the appearance of being speech-related struggle . . . (Wingate, 1964).

Time-Out: A stimulus whose contingent presentation is found to decrease the future probability of the behavior it follows due to the removal, for a period of time, of the opportunity for positive reinforcement (Sloan and MacAulay, 1968). In the present study the time-out stimulus was defined as time-out from speaking contingent upon stuttering.

APPENDIX B

DATA COLLECTION FORM

DATA COLLECTION FORM

Session No. _____
Subject ID _____
Date _____

Segment 1

Min.	Cum. St.[a]	Freq./2 min.[b]
2		
4		
6		
8		
10		

Segment 2

Min.	Cum. St.	Freq./2 min.
2		
4		
6		
8		
10		

Segment 3

Min.	Cum. St.	Freq./2 min.
2		
4		
6		
8		
10		

Segment 4

Min.	Cum. St.	Freq./2 min.
2		
4		
6		
8		
10		

Segment 5

Min.	Cum. St.	Freq./2 min.
2		
4		
6		
8		
10		

[a]Cumulative frequency distribution of occurrences of stuttering
[b]Frequency distribution of occurrences of stuttering

APPENDIX C

INSTRUCTIONS TO JUDGES

INSTRUCTIONS TO JUDGES

Attached to these instructions are transcripts of two-minute speech samples collected from four persons identified as individuals who stutter. Soon you will be listening to a tape recording of the speech samples. At the top of each transcript is the identification of the subject from whom the sample was collected. Your task is to listen to the tape recorded samples one time and identify each word on which you hear the subjects produce stuttering behavior.

Stuttering behaviors included in the samples are phoneme prolongations, interjections preceding or within words, the exploded phoneme productions often heard following an individual's experiencing of a block, and repetitions of phonemes, syllables, words and phrases. Some of the subjects you will hear will produce more than one of the described behaviors when attempting to produce individual words. You are to identify each word on which you hear the individual produce stuttering behavior.

When you identify stuttering behavior as having occurred during the production of an utterance, make a small slash (/) above the appropriate word on the transcript.

REFERENCES CITED

Allison, T. S., and Allison, S. L. "Time-Out From Reinforcement: Effect on Sibling Aggression," The Psychological Record, 21 81-86, 1971.

Adams, M. R., and Popelka, G. "The Influence of 'Time-Out' on Stutterers and Their Dysfluency," Behavior Therapy, 2, 334-339, 1971.

Appel, J. B., and Peterson, N. J. "Punishment: Effects of Shock Intensity on Response Suppression," Psychological Report, 16, 721-730, 1965.

Azrin, N. H. "Effects of Punishment Intensity During Variable-Interval Reinforcement," Journal of the Experimental Analysis of Behavior, 3, 123-142, 1960.

Barton, E. S.; Guess, D.; Garcia, E.; and Baer, D. M. "Improvement of Retardates' Mealtime Behaviors By Time-Out Procedures Using Multiple Baseline Techniques," Journal of Applied Behavior Analysis, 3, 77-84, 1970.

Bostow, D. E., and Bailey, J. B. "Modification of Severe Disruptive and Aggressive Behavior Using Brief Time-Out and Reinforcement," Journal of Applied Behavior Analysis, 2, 31-37, 1969.

Brookshire, R. H., and Martin, R. R. "The Differential Effects of Three Verbal Punishers on the Disfluency of Normal Speakers," Journal of Speech and Hearing Research, 10, 496-505, 1967.

Clausen, J. E. "A Study to Test the Effectiveness of Time-out in the Decrease of Moderate Stuttering." Master's thesis, University of North Dakota, 1973.

Estes, W. K. "An Experimental Study of Punishment," Psychological Monographs, 57, 1-40, 1944.

Flanagan, B.; Goldiamond, I.; and Azrin, N. H. "Operant Stuttering: The Control of Stuttering Behavior Through Response-Contingent Consequences," Journal of the Experimental Analysis of Behavior, 1, 173-177, 1958.

Goldiamond, I. "The Temporal Development of Fluent and Blocked Speech Communication," Air Force Communication Control and Development Division, T.R. 60-38, 1960.

Halvorson, J. A. "The Effects on Stuttering Frequency of Pairing Punishment (Response Cost) With Reinforcement," Journal of Speech and Hearing Research, 14, 356-364, 1971.

Haroldson, S. K.; Martin, R. R.; and Starr, C. D. "Time-Out as a Punishment for Stuttering," Journal of Speech and Hearing Research, 11, 560-566, 1968.

Hasbrouck, J. M., and Martin, R. R. "A Comparison of Two Different Schedules of Time-Out for Disfluency." Paper presented at the Annual Convention of the American Speech and Hearing Association, Detroit, Michigan, 1973.

Haynes, S. N., and Geddy, P. "Suppression of Psychotic Hallucinations Through Time-Out," Behavior Therapy, 4, 123-127, 1973.

Holz, W. C.; Azrin, N. H.; and Ayllon, T. "Elimination of Behavior of Mental Patients by Response-Produced Extinction," Journal of the Experimental Analysis of Behavior, 6, 407-414, 1963.

Holz, W. C.; Azrin, N. H.; and Ulrich, R. F. "Punishment of Temporally Spaced Responding," Journal of the Experimental Analysis of Behavior, 6, 115-122, 1963.

Kolstoe, R. H. Introduction to statistics for the behavioral sciences. Homewood, Illinois: The Dorsey Press, 1973.

LaCroix, Z. E., and McLean, J. "Reduction of Dysfluencies Through Response Contingent Time-Out Procedures." Paper presented at the Annual Convention of the American Speech and Hearing Association, Chicago, Illinois, 1971.

Mahlum, N. L. "A Study to Test the Effectiveness of a Time-out Mask in Controlling Misarticulation in Reading." Master's thesis, University of North Dakota, 1970

Martin, R. R., and Berndt, L. A. "The Effects of Time-Out on Stuttering in a 12 Year Old Boy," Exceptional Children, 37, 303-304, 1970.

Martin, R. R., and Haroldson, S. K. "Time Out as a Punishment for Stuttering During Conversation," Journal of Communication Disorders, 4, 15-19, 1971.

Martin, R. R., and Rangaswamy, K. "The Effects of Time-Out from Speaking on the Disfluency Rates of Normal Speakers," Language and Speech, 15, 358-363, 1972.

Martin, R. R., and Siegel, G. M. "The Effects of Response Contingent Shock on Stuttering," Journal of Speech and Hearing Research, 9, 340-352, 1966a.

Martin, R. R., and Siegel, G. M. "The Effects of Simultaneously Punishing Stuttering and Rewarding Fluency," Journal of Speech and Hearing Research, 9, 466-475, 1966b.

McDermott, L. D. "Clinical Management of Stuttering Behavior: Case Study." Paper presented at the Annual Convention of the Minnesota Speech and Hearing Association, Duluth, Minnesota, 1971.

Mowrer, D. E. Personal communication. Tempe, Arizona, 1 April 1974.

Pendergrass, V. E. "Effects of Length of Time-Out From Positive Reinforcement and Schedule of Application in Suppression of Aggressive Behavior," The Psychological Record, 21, 75-80, 1971.

Peterson, D. A. "A Comparison Study of Traditional Speech Correction and Operant Conditioning Procedures as Applied to Speech Correction in Public Schools." Master's thesis, University of North Dakota, 1970.

Sloan, H. N. Jr., and MacAulay, B. D. "Teaching and Environmental Control of Verbal Behavior," in Sloan, H. N. Jr., and MacAulay, B. D., (eds.), Operant Procedures in Remedial Speech and Language Training. Boston: Houghton Mifflin Company, 1968.

Skinner, B. F. The Behavior of Organisms. New York: Appleton-Century-Crofts, 1938.

Solomon, R. L. "Punishment," American Psychology, 19, 239-253, 1964.

Steeves, J. M.; Martin, G. L.; and Pear, J. J. "Self-Imposed Time-Out by Autistic Children During an Operant Training Program," Behavior Therapy, 1, 371-381, 1970.

Van Riper, C. The Nature of Stuttering. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971.

Van Riper, C. The Treatment of Stuttering. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1973.

Weiner, H. "Some Effects of Response Cost Upon Human Operant Behavior," Journal of The Experimental Analysis of Behavior, 1, 121-125, 1962.

Willoughby, R. H. "The Effects of Time-Out from Positive Reinforcement on the Operant Behavior of Preschool Children," Journal of Experimental Child Psychology, 7, 299-313, 1969.

Wingate, M. E. "Calling Attention to Stuttering," Journal of Speech and Hearing Research, 4, 326-355, 1959.

Wingate, M. E. "A Standard Definition of Stuttering," Journal of Speech and Hearing Research, 29, 484-489, 1964.