THE DECREMENT OF STUTTERING AS A RESULT OF
THE APPLICATION OF THE EXPERIMENTAL
ANALYSIS OF BEHAVIOR

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This investigation is an attempt to apply the principles of the experimental analysis of behavior to the stuttering behavior of two clinical subjects. The experimental manipulations were performed in order to bring about a decrement in the stuttering rate of the two subjects.

The data were collected during the summer speech clinic at Callier Hearing and Speech Center as a result of the speech therapist's interest in a psychological approach to the remediation of stuttering in her two subjects. With the permission of the resident psychologist and the head of the Speech Clinic, the experimenter designed and implemented the program of therapeutic intervention described in this study.

Early reports of the application of laboratory defined principles to the remediation of stuttering indicated that stuttering could be regarded as operant behavior. Although autonomic components may be involved in the complex behavior of disfluent speech, it appears quite possible to analyze and deal with the problem within an operant paradigm.

Using the three-factor contingency as the framework through which to view the work of various investigators, it was found that concentration has been primarily on the careful
arrangement of the conditions of the third factor, the reinforcing consequences which follow the stuttering or fluent behaviors. Some attempts have been made to gain and perfect stimulus control by various methods, including delayed auditory feedback and the use of metronomes.

The two subjects used in the study had both been clinically treated for stuttering before they were involved in the experimental treatment here described. The subjects were males, seven and nine years old, who were evaluated as having severe stuttering difficulties. Their baseline stuttering averaged 10.86 stutters per minute in one case and 13.20 stutters per minute in the other case.

The experimental contingencies were arranged so that stuttering was punished by a time-out from reinforcement and fluent speech was reinforced. A set of guidelines was given to the subjects' parents to help them learn behaviors which would reinforce and maintain the fluent speech the subjects exhibited at home.

After thirteen forty-minute sessions, the stuttering behavior of both subjects was substantially reduced in frequency and severity. Both the formal data and the speech therapist's written reports indicated the experimental contingencies had been effective in the reduction of stuttering in both subjects. Parental reports during the latter phase of the experiment and in follow-up calls after two months indicated there was improved fluency outside the clinical setting as well.
It was concluded that there are many variables and relationships left to explore experimentally. The success of many investigators in their attempts to deal with stuttering within an operant framework should encourage further basic research in the area of verbal behavior as an operant and more refined techniques for dealing with stuttering in the clinic.
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CHAPTER I

INTRODUCTION

A review of the psychologically based literature on stuttering indicates that almost all the recent applied research and summary articles involved reports of the use of various theoretical aspects of "learning theory" and techniques of behavior modification in the treatment of this condition. This theoretical orientation in clinical work is a recent trend resulting from earlier experimental efforts to deal with speech (including stuttering) as operant or respondent behavior.

As early as 1953, Flanagan, Goldiamond, and Azrin (3, p. 176) demonstrated that stuttering could be viewed as an operant "... which occurs in the context of another operant, namely, verbal behavior ... much like limping is to walking." Continuing their research (2), they demonstrated that stuttering was not limited to certain individuals by instating stuttering in normally fluent speakers. They also found that these operantly instated disfluencies were very hard to extinguish once discriminative stimuli had good control over the disfluent responses. Even after the negative reinforcers which maintained the stuttering had been removed, the avoidance responses persisted. This continued avoidance behavior is consistent with laboratory findings with infrahuman subjects.
Shames and Sherrick (5) gave a rather detailed behavioral analysis of stuttering, pointing the way to many possible research paradigms which would provide data to aid in a complete account of the dynamics of stuttering. This analysis was done within the framework of operant research.

Brutten and Shoemaker (1), working from a classical conditioning approach, have viewed stuttering as the disruption of normal fluency that results from classically conditioned negative emotion. There is no doubt that there are autonomic components involved in the behavior of many stutterers, but it is difficult at this point to disentangle the related threads of learned behaviors. Miller's recent work (4) indicated the feasibility of the operant conditioning of glandular responses, and it has long been recognized that autonomic and skeletal responses are intertwined (6). Since operantly acquired discriminative stimuli (SDs) control motor behavior, including speech, and since autonomic responses can be SDs, it is easy to see that the classical de-conditioning of autonomic responses could be an effective way of disrupting stimulus control of stuttering. In the cases where classical de-conditioning results in improvement, it may be that the predominant controlling stimuli were the conditioned emotional responses. In cases where the de-conditioning is not efficacious, other external and/or internal stimuli may be the SDs controlling the intermittently reinforced stuttering behavior.

Since the clinical successes of de-conditioning the emotional components of stuttering can be viewed within an operant
framework and most of the recent psychological research on stuttering has been done within that framework, the remainder of this paper will view stuttering within that context.


CHAPTER II

RELATED LITERATURE

As carefully elucidated by Skinner (1), operant behavior is delineated and studied in terms of a three-factor contingency. The factors are as follows:

A. The stimulus conditions which are present when behavior is emitted,

B. The response or behavior emitted by the organism,

C. The consequences of the response (which may be a direct result of the response or adventitious).

The conditions brought about as a result of the response, or those which happen to follow the response, bring about a new set of conditions under which another response may be emitted and reinforced, punished, or neutralized. Both the topographies of the responses and the links of the behavioral chain "drift" or evolve as the result of many small changes in one or more of the three factors. In some cases, the exact topography may be determined genetically; however, a high rate of random responses which could be shaped to meet a particular physical or social environment would be an evolutionary advantage since it would offer possibilities for great diversification within the species.

As applied to stuttering, along with virtually all operant behavior, this plasticity can be a two-edged sword. Disfluency
as well as fluent verbal behavior can be shaped and maintained as a child first learns to make verbal responses or later as he adds more subtle skills to his verbal behavior.

Although research to uncover the conditions that constitute the etiology of stuttering is important, it is unlikely that the particular factors which were responsible for the beginning of stuttering in any clinical subject will be uncovered. As Johnson (12) pointed out, it is difficult to draw a firm line between normal disfluencies and stuttering. Although it is easy to tell the difference between a full-blown stutterer and a normally disfluent speaker, stuttering, like all operant responses, evolves, and the point at which behavior is identified as a particular response is quite arbitrary.

Bar (2) suggested that clinicians proceed to treat stuttering by shaping fluency rather than by eliminating disfluency. This concept of the task enhances a positive viewpoint and could have therapeutic advantage at the outset for individuals for whom the acquisition of new skills has been historically reinforcing.

Whether the problem is approached as the elimination of undesirable or the instigation of desirable behavior, control may be gained behaviorally by concentrating on one of the factors of the contingency. Concentration has been primarily on the manipulation of consequences to gain control of stutterers' verbal behavior.

Despite assertions (19, 4) that "punishment" or "the presentation of a noxious stimulus" increased rather than reduced
stuttering, Siegel (16), in researching the literature, found the following:

A. The "punishing stimulus" was not applied in some cases, but threatened.

B. The "punishing stimulus" was not applied contingently to stuttering behavior.

C. Since neither of the foregoing conditions fulfilled the necessary requirements, it was impossible to tell whether or not the stimuli in question were indeed punishers in the functional sense.

Siegel's point was that non-contingent aversive stimulation might well disrupt behavior, but the same stimulus applied correctly as a punisher could indeed reduce the stuttering response.

Those who are concerned with the ill effects of noxious stimulation on stutterers generally posit "anxiety" as the theoretical basis of stuttering and claim that the increased anxiety resulting from the noxious stimulation accelerates the stuttering. Although this could be true, it might well be irrelevant to the issue of contingent punishment. Noncontingent noxious events function differently from contingent application of such events, especially when an alternative response is available and most especially when differential reinforcement is available for the alternate response.

However, Toomey and Sidman (18), in an exploration of the relationship between anxiety and stuttering, found that individual
stutterers behaved differently under experimentally induced anxiety. For one of four subjects, the stuttering rate did increase; but for two of the four subjects, the anxiety-evoking conditions produced a decrease in stuttering, and the stuttering rate of one subject was unaffected. Toomey and Sidman suggest "that unitary theories of anxiety on speech, and group statistical evaluation of speech theories are likely to hide more than they reveal" (18, p. 124).

Since anxiety-evoking situations are bound to occur in the everyday world, Johnson and Spielberger reasoned that "if fluent speech may be maintained in the face of such conditions" (11, p. 22), treatment would indeed be successful. Ingham and Andrews (10) reported a program of treatment using feedback modification techniques in which, despite a substantial decline in stuttering, there was no decline in measures of general or state anxiety.

Another type of punishing contingency, the use of a time-out (T-0) or removal of ongoing reinforcing consequences (e.g. tokens or attention) for a specified period of time, has been reported in several recent studies. Martin and Haroldson (13) tried T-0 as administered by stutterers for one another and as administered by the experimenter. They discovered that the stutterers failed to present the T-0 conditions consistently, and there was little reduction in stuttering rates. However, when the experimenter consistently presented the T-0, the stuttering rate was dramatically reduced, almost to zero. It is
possible that the experimenter's attention may have been more reinforcing than the other stutterer's so that the removal of the former would be more punishing. Certainly there is a place for further study to separate the possible importance of the deliverer as a part of the reinforcing event and his consistency in delivering.

Adams and Popelka (1) report that T-O is a difficult procedure to use with stutterers because the stuttering behavior is so closely entwined with fluent behavior that it is not easy to be certain the punishing consequences actually follow the stutter. A moment's hesitation finds the experimenter punishing a fluent word following closely on the heels of a moment of stuttering.

Egolf, Shames, and Seltzer (8) used T-O for stuttering in a group therapy context. Since stuttering prolongs the time a stutterer has the floor, the authors reversed this relationship by having a stuttered response result in the speaker's relinquishing the floor. Competition for the floor was evident and there was a marked reduction of stuttering.

All of the foregoing studies have been concentrated on the third factor of the contingency, as has most applied operant research. Although stimulus control is known to be an essential in programming appropriate behavior, the tendency has been to pile on bigger and better reinforcers which is frequently successful in more or less wrestling SD control from confused stimulus conditions. Sometimes the result of this procedure is that
stimulus control is gained in the laboratory or in the therapy session but is lost amid the complex conditions prevailing in the world outside. Sometimes this is called the "problem of generalization."

Where stuttering is concerned, a few studies have concentrated specifically on the stimulus control end of the contingency. Some have concentrated on gaining stimulus control and one or two on extending stimulus control to increasingly complex conditions. All the research done on gaining and maintaining stimulus control assumes (implicitly or explicitly) that speaking fluently is reinforcing in itself (i.e. a conditioned reinforcer) or that it will be maintained by approval, achievement, or other available social reinforcers. In many, perhaps most, cases this assumption may be valid. However, there are probably some cases where the investment in stuttering is so high that explicit reinforcing consequences must be made contingent on fluency or consistent punishment result from stuttering. In the latter case, differential reinforcement for fluency would probably be important.

Among studies which can be viewed as attempts to gain stimulus control, several have used delayed auditory feedback (DAF) manipulated in various ways to decrease stuttering in stutterers and, oddly enough, to increase stuttering in non-stutterers. This ability of DAF to work in either direction, depending on what end of the fluency continuum the speaker is operating, indicates it is disrupting the stimulus control which normally keeps the speaker "on the track."
Webster and Lubker have proposed an auditory interference theory to explain why DAF helps stutterers to more fluent speech. They believe "the stutterer's own auditory feedback provides a source of interference with his control of speech" (20, p. 755). In other words, the sound of his own voice is a disruptive stimulus that interferes with the stimulus control normally maintained. Webster and Lubker believed the different feedback rates of air conduction and bone conduction interfere with fluent speech. They pointed out the commonality in masking noise, rhythm, choral reading, and prolongation of sounds was that "the intensity of stutterers' own auditory feedback is reduced or eliminated . . . and . . . marked decreases occur in frequency of stuttering" (20, p. 757). When the disruptive feedback of his own voice is reduced and his vocal output is discriminatively controlled by another stimulus, fluency results.

Zelniker (21) reversed the process by showing that DAF, which normally causes involuntary stuttering in fluent speakers, can lose control as a disruptive stimulus if firm stimulus control can be gained and maintained by teaching selective attention to other stimuli. Selective attention results in attenuation to irrelevant input.

Brady (3), in a well designed and highly successful clinical study, used a metronome as a controlling discriminative stimulus for stutterers. Then he faded out this artificial stimulus control very slowly. At the same time, he faded in
new stimulus conditions along a hierarchy of least difficult to most stressful. He devised a miniaturized metronome used like a hearing aid which could be set at different paces and different volumes. As the metronome was faded out, the various environmental circumstances were faded in. If stuttering recurred, a step backward was taken and control regained.

In the single study demonstrating the relationship between covert behavior and stuttering, Curlee and Perkins (6) showed that if stutterers were punished when they expected to stutter, both the rate of expectancy and the rate of stuttering decreased. For many stutterers, the expectancy of stuttering may become an $S^D$ for stuttering in a typical chain of behaviors, and operant control of expectancy could be an effective form of breaking up the chain at one of its earliest links.

There have been a few efforts to investigate the effects of combining various schedules of reinforcement. For example, Halvorson (9) showed that if punishment and reinforcement were used in such a way that the reinforcement was contingent on the punishment, the punished stuttering response would increase in rate, functioning as an $S^D$ signalling the availability of the reinforcing contingency. This report is an excellent example of the changes brought about in behavior as a result of combining schedules which, when applied alone, result in entirely different behaviors.

Cooper made attempts to integrate "behavior therapy and traditional insight treatment procedures with stutterers" (5, p. 33).
He reported success in attacking the stuttering frontally while at the same time administering supportive therapy, reinforcing the patient's descriptions of the relationship between the changed interaction with the environment and his changed feelings.

Rhodes, Shames, and Egolf (14) demonstrated the relationship between language themes of stutterers during therapy and their stuttering rate. When the verbal content about their stuttering was altered through contingent reinforcement, the stuttering rate decreased. However, those subjects who were aware (informed) of the contingencies did not get a stuttering decrement. Oddly enough, the verbal content was changed, however, in accordance with the applied contingencies.

Dinnan, McGuiness, and Perrin, on the basis of the different responses of stutterers and non-stutterers to auditory feedback, say they "believe that there is a physiological difference between stutterers and non-stutterers, and it must be taken into consideration before any treatment can be taken for correcting stuttering" (7, p. 40). There may well be such a physiological difference, but the difficulty is in defining who is a stutterer and who is not since "stutterers" frequently become "non-stutterers" by spontaneous remission (15) and almost all stutterers were at some point non-stutterers. At this time, it is difficult to state categorically that physiological changes occur in non-stutterers to make stutterers of them and vice versa. If and when such physiological changes are observed, it will then be necessary to determine the conditions which bring them about.
Although genetically controlled conditions may be among those responsible for stuttering, these would seem to act as setting factors and actual stuttering behavior may never occur, or may occur and disappear, if appropriate environmental factors are present or not at the moment of importance.

Most assuredly, physiological factors are involved since speech, like all other behavior, is a physical act. Psychological factors, however, continue to be investigated and manipulated to tease out the relationships between stuttering and its controlling (psychological) variables.
CHAPTER BIBLIOGRAPHY


CHAPTER III

THE TWO CLINICAL CASES EMPLOYED IN THE STUDY

The subjects in this study were two boys who had been referred to Callier Hearing and Speech Center as a result of their stuttering. They were assigned to a speech therapist who was interested in an experimental approach to the boys' stuttering because earlier traditional speech therapy had not brought relief. The experimenter's services were engaged to design and implement the experimental therapy.

Subject One, age seven, was referred to Callier by his first grade teacher. She had become concerned when he began stuttering as he read aloud in class during the days following the Christmas break. The teacher had not noticed any such behavior in the weeks preceding the holidays. She said that he was in speech therapy at the public school to correct articulation errors, but she thought his stuttering was becoming worse as a result.

The boy's medical history was uneventful, and his developmental history was within normal limits. His first grade teacher reported him as being in her top reading group, and his mother said that he did well in school, had several good friends, and was seemingly well liked by his classmates.
The mother reported that the subject's older brothers (ages thirteen and fifteen) had always teased him a lot. She also said that the older boys resented the extra attention lavished on the baby of the family. The parents stated that they had always protected the subject and were extra-solicitous of him because of his stuttering problem. The mother noted that the boy's stuttering was at its worst when he was trying to get the attention of the family members in order to tell them something. When asked if she could recall when the subject's stuttering began, she said they had "always noticed" that he stuttered. The fact that the parents had "always" noticed stuttering and his first grade teacher did not notice stuttering for four months might have resulted from the boy's typical reticence until increasing demands for longer speech made it obvious as first grade progressed. The subject's referral to Callier had resulted in several weeks of speech therapy, with the recommendation that he enroll in the summer speech clinic to continue therapy after school was ended.

At the beginning of the summer speech clinic, the speech therapist's report of the subject's speaking behavior reads:

John has a slow "robot" kind of talk, blocking on words and showing secondary of opening his mouth inappropriately wide. . . . John "clams up" a lot in class when talked to directly.

Subject Two, age nine, was referred to Callier by a physician. He had a history of allergies, asthma episodes, and upper respiratory infections with ear infections. The subject has quite often complained about stopped-up ears.
The developmental milestones were within normal limits, and his academic behavior was good. He was considered by his mother as achievement-oriented. His peer interactions appeared adequate, but his mother reported that he was "hard to get along with sometimes" at home. She reported a "clash of wills" and said that he argues a lot with her.

The stuttering was reported to have begun when the subject was four years old. It varies in intensity and disappears altogether under a few specified conditions. The subject's mother reported, "his grandparents don't even know he stutters."

The parents said that they were worried about the boy's speech and that his father occasionally asks him to stop and start over. The boy has had three years of speech therapy at school, including both group and individual therapy.

At the opening of the summer speech clinic, the speech therapist reported on the subject as follows: "He is a talkative, tense boy; shows a lot of anxiousness in his speech." Although the therapist did not comment specifically in her report about the frequency of the boy's stuttering, her verbal reports indicated she considered him a rather severe case, and the baseline data supported that observation.
CHAPTER IV

THE EXPERIMENTAL THERAPY

If stuttering is viewed as operant behavior, the assumption must be made that it has come under some kind of stimulus control and is being maintained by reinforcement of some nature, probably intermittent and social. The attempt to reduce the stuttering behavior in this study was centered primarily on the reinforcement end of the contingency.

In order to improve the chances that the hoped-for decrease in stuttering would generalize to situations outside the speech clinic, an effort was made to vary the conditions of the baseline and experimental sessions. This was done in order to attempt to keep the speech therapist from becoming the discriminated stimulus that controlled fluent speech.

The target response was reduced stuttering per minute of vocalization and, implicitly, longer periods of fluency, hopefully approaching normal speaking behavior. The dependent variable was the number of words stuttered per minute of vocal behavior. Any primary or secondary characteristic of stuttering was counted as one stutter. However, once a stutter began, it was counted as only one stutter regardless of the number of attempts made to say the word. Therefore, the following chain of behavior would contain two stutters: "s-s-s (pause) (grimace) St-Steve (hiss) (inhalation) s-s-said . . . ."
Time was recorded by stopwatch, and only the target speaker's vocal time was counted. The speaker's vocal time consisted of the lapse of time between his first indication that he was speaking (usually a word or an audible intake of breath) and the moment when he had completed his sentence(s) or when someone else broke in. Since the more severe the stuttering was, the fewer words could be counted as "stutters" per minute, it was apparent that improved speech might not be accurately reflected by the data. A boy could conceivably end the experimental period with the same number of stutters per minute on record but at the same time be speaking a great deal more fluently, having reduced the length of each stutter or having eliminated some altogether, thereby emitting far more fluent words per minute. To count the words emitted in spontaneous speech, however, was technically inconceivable. Because any error resulting from data taking procedures would be in favor of the null hypothesis, the procedure described above was employed.

The therapy sessions were tape-recorded and the data was taken from the tapes. In recording both the time spent in vocal behavior and the number of stutters, an informal reliability check was made to determine inter-rater reliability. The speech therapist recorded vocal time by stopwatch, and the experimenter recorded instances of stuttering. The tape was then replayed and the data taking roles were reversed. Three such reliability checks resulted in a maximum difference of ten seconds over
three minutes of vocal time. There was a maximum difference of two in a count of thirty to forty stutters. No further reliability checks were made. However, in an attempt to avoid systematic error, the experimenter and speech therapist alternated recording the two measures throughout the data taking procedure.

During the therapy sessions, each boy sometimes talked to the therapist alone, sometimes the boys and the therapist engaged in a three-way conversation, sometimes a stranger came in and talked to the boys, and sometimes the therapist excluded herself from the conversation so that the boys alone were conversing. After a baseline under those various conditions was obtained, the experimental sessions began.

During the experimental phase, the therapy sessions continued exactly as they had before, with the various conditions randomly alternated. However, during these thirteen forty-minute periods, a soft "ding" was sounded by the experimenter when fluent speech was heard. A specified number of "dings", which were made by striking middle C on a xylophone, resulted in a token being earned. The number of "dings" required to obtain a token varied from five to ten; the boys took turns daily drawing from a hat a number which specified the number of "dings" to be required that day.

The "dings" were used as the immediate reinforcer for two reasons. First, they could be sounded without disrupting the ongoing vocalization and could be administered quickly. Speed
of delivery is extremely important in reinforcing fluent speech because the speech can become disfluent so rapidly. Because the dispensing of tokens requires more time, the subject might actually have received the reinforcer at a moment of disfluency. Second, it was desirable to reinforce almost every fluent phrase at the beginning and fade into more widely intermittent reinforcement as fluency increased. If tokens had been used for every reinforcement, an enormous number of tokens would have been required to buy the items for which the boys were working.

The subjects' parents had agreed to buy what the boys wanted if and when they earned a prescribed number of tokens. At the beginning of the experimental phase, Subject Two decided to work for shoe skates and Subject One for a bicycle. Pictures of the desired objects were cut out of a catalog and hung on the wall of the therapy room. Beneath the pictures each boy had a paper pocket in which to keep his tokens (coupons made of construction paper). The boys counted their tokens every day and frequently prophesied that they would be getting their skates or bike soon.

Because a four week limitation was imposed on the project, it was thought advisable to take active steps to decrease stuttering directly as well as implicitly by increasing fluency. Therefore, both punishing and reinforcing contingencies were arranged. A small red light was used as a signal to stop speaking. It flashed on when a stutter was emitted and presumably acted as a punisher for the following reasons:
A. It was, in effect, a T-0 from the availability of reinforcement since reinforcement was contingent on fluent speech.

B. It prevented any reinforcement inherent in speaking itself.

It may also have been effective in breaking up chains of stuttering responses by stopping them at the beginning.

The speech therapist sat at a child-sized oblong table with the two subjects. She engaged them in conversation, sometimes asking questions which required "correct" answers and sometimes simply guiding the conversation and keeping it going. Whenever the boys took over the conversation, they were allowed to do so. The red light was in the center of the table and was operated via remote control by the therapist. The therapist made every attempt to punish 100 per cent of the stuttering responses in keeping with the finding (1) that such a 100 per cent schedule of punishing was most effective in decreasing the response. The experimenter sat off to one side and did not participate in the conversation, being fully involved listening for increasingly lengthy periods of fluency, and "dinging" away at the xylophone.

Before the experimental therapy was begun, the subjects' parents consented to the use of an experimental procedure and agreed to supply the items for which the subjects earned tokens. After increasing fluency was established in the experimental phase, the experimenter and the speech therapist met with each set of parents to discuss what they might do at home to maintain
the improved fluency. All the parents were cooperative and stated that they would be very glad to try anything that was suggested. A set of guidelines (see Appendix) was given to the parents. When contacted at periodic intervals during the remainder of the experimental phase, the parents claimed they were following the guidelines in dealing with the subjects. The same report was given in a follow-up contact two months after the therapy ended.
CHAPTER BIBLIOGRAPHY

As can be seen in Figure 1, on the following page, the frequency of stuttering per minute decreased dramatically in both cases during the experimental phase, shown in the Figure to the right of the double line. Subject One stuttered an average of half as many times in experimental sessions as he did during the baseline phase, which is shown to the left of the double line. Subject Two stuttered less than one-third as many times, on the average, during the experimental phase as during baseline. The ratio between number of times stuttered and number of words spoken would be even greater because of the necessarily inverted relationship between time spent in stuttering and in fluent words per minute of vocalization.

The therapist's written reports as the experimental sessions progressed were as follows for Subject Two:

July 12: Troy's blocks and extreme intake of breath seem to be lessening.

July 18: Troy has been pretty fluent all week—has earned seventeen coupons; mother says stuttering was less this week.

July 26: Troy's speech is so much improved, and now that he doesn't block and tensely inhale air so much he is adopting a rather playful personality.

July 29: Troy's stuttering significantly decreased— from a great deal of blocking to easy, mostly fluent speech. Breath inhalation was eliminated.
Fig. 1—Stuttering responses per minute during baseline and experimental phases for two subjects.
The speech therapist's entries concerning the speech of Subject One are as follows:

July 12: John's rate of stuttering seems to be lessening. . . . he is talking more and not in as slow or "robot-like" fashion as before.

July 19: John is speaking faster and with fewer blocks . . . parents are noticing improvement.

July 26: John's parents are to begin the program in the home. Speech is still improving.

July 29: John's stuttering significantly decreased in the six-week period. On the 26th, his pattern was about three blocks per one minute where it had been about forty blocks per minute when baseline data was obtained.

Interestingly, neither boy perceived his own drastically reduced stuttering rate when asked toward the end of the experimental phase if he was stuttering less. Each noticed the other was more fluent. A random section of the baseline tape was played for them and they counted the frequency of stuttering. Then the boys listened to some of the experimental session just taped, again counting the disfluencies. They listened attentively to the difference in their own speech and also enjoyed "seeing it on paper."

The parents of both boys reported noticing an improvement in their fluency at home. They were interested in having the guidelines set forth to help them maintain the fluency at home. Both the boys and parents were enthusiastic about carrying the token program into the homes when the summer session was over. Since Subject One did not have quite enough tokens to get his bicycle at the end of the summer session, it was considered important that he have the opportunity to earn them. When the
session ended, both subjects and parents declared their intentions to continue the program.

In a follow-up conversation with the parents in November, it was learned that the token programs had been discontinued in both homes; however, Subject One had earned his bicycle. The parents reported that they were still following the guidelines given them as to how they could help maintain the fluency.

Subject One is reported by his mother as speaking fluently at this time. She said that people often comment on the change, and she "can't believe now (she) was ever so worried about it."

The mother of Subject Two reported in a follow-up call that his fluency varies but it has never been as bad as it was before the experimental treatment. She stated that the boy's teacher commented that "he was a different boy" during the first several weeks at school in the fall. However, the mother indicated that she had resigned herself to accepting that he will probably never be entirely fluent.
CHAPTER VI

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

In an attempt to gain control of the stuttering behavior of two male children, a program based on stuttering viewed as operant behavior was initiated. Both punishment for stuttering (T-0) and reinforcement for fluency were used.

For one stutterer, there was an immediate and dramatic drop in frequency of stuttering per minute of vocal behavior. The frequency was variable during the experimental period but always remained below baseline level.

The other child showed an immediate but less dramatic reduction in stuttering after the experimental phase began. There was increasing improvement as the experimental phase progressed.

Although no attempt was made to separate the effects of the time-out from the effects of the positive reinforcement for fluency, it appeared that the two used together hastened the behavioral change. Speaking itself appeared to be at least as reinforcing to Subject Two as the shoe skates for which he was working. The initial low rate of vocal behavior in Subject One changed to competitive efforts to gain the floor after the tokens became contingent on fluent speech. At the beginning of the summer speech clinic, he answered questions in monosyllables and he frequently stated he "didn't know" rather than attempt an answer to the therapist's efforts to engage him in conversation.
This behavior pattern continued throughout baseline, so that sometimes fifteen minutes of conversation with the speech therapist was necessary to get ninety seconds of vocal behavior from the subject. By the end of the experimental phase, he was demanding time from the talkative Subject Two. The tempo of Subject One's speech also increased, which reduced the mechanical "robot-like" sound he emitted at the beginning of the summer session.

Wahler et al. (4) found that when contingency management was applied to mildly deviant behavior problems, both these secondary problems and stuttering behavior were reduced. This study, which examines the functional relationship between stuttering and non-speech deviant behaviors, indicates some response-response relationships may be involved in stuttering.

The mother of Subject Two commented toward the end of the experimental sessions that he was "easier to handle." Whether this was a reflection of a response-response relationship, or whether his mother was directly modifying his non-speech behaviors at home by applying some of the guidelines given her for dealing with his stuttering, there is no way of knowing at present. Some of the guidelines were designed to improve the general relationship in any case, and the reduction of stuttering at home and the maintained improvement may have resulted from response-response interrelationships generated by the changing behavior of the parents toward the boy's behavior in general.
In other words, the experimental conditions in the therapy could have accounted for the improved fluency in the therapy sessions, but the change in fluency at home could have resulted from and been maintained by one or a combination of the following:

A. The increased fluency in the therapy sessions generalized to other situations.

B. The parents' new way of dealing with stuttering changed its rate of occurrence in the home.

C. The parents' dealt with other behavior differently and the stuttering was affected through a response-response interrelationship.

In light of the clinical deadline, the primary goal of the program was to bring therapeutic relief to the subjects while at the same time imposing as much rigor on the attempt as possible. A better understanding of the relationships between variables that control stuttering would be scientifically and therapeutically valuable.

In viewing stuttering as an operant behavior under the control of and controlling the environment, there is no attempt here to undermine the possible physiological differences in those individuals who are likely to stutter and those who are not. It is also apparent, however, that speech, as a motor behavior, has a great deal in common with other such behavior. In a recent article (2), Silverman and Silverman supported Bloodstein's hypothesis (1) that stuttering is not a phenomenon unique to speech
but one member of a class of behavioral phenomena character-
ized by a fragmentation of serially ordered activities. Al-
though Skinner's far-reaching and careful analysis of verbal
behavior (3) as a form of behavior similar in genesis and
maintenance to other motor responses is not specifically
being tested, the behavioral research on stuttering supports
that thesis, though not to the exclusion of other theories.
CHAPTER BIBLIOGRAPHY


APPENDIX

GUIDELINES FOR PARENTS OF TWO STUTTERERS

1. Do not discuss within his hearing his progress or lack of progress.

2. Do not respond angrily to the child when he stutters.

3. When he is doing well, smile at him, touch him, wink at him, or show approval in any other non-verbal way.

4. Do not let his stuttering get him "off the hook" in any situation.

5. When discussion is to be allowed, it should occur before the parent's decision. Further discussion on the part of the child, especially when he is stuttering, should not result in a change of decision.

6. Notice and respond favorably to as many of the child's appropriate behaviors as possible. Ignore and do not respond in any way to as many of his inappropriate behaviors as possible.
BIBLIOGRAPHY

Books


Articles


