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The structuring of procedures utilized in an adult stuttering treatment program

Sarah Jane Prichard
Portland State University

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AN ABSTRACT OF THE THESIS OF Sarah Jane Prichard for the
Master of Science in Speech: Emphasis in Speech Pathology/
Audiology presented August 13, 1971.

Title: The Structuring of Procedures for an Adult
Stuttering Treatment Program.

APPROVED BY MEMBERS OF THE THESIS COMMITTEE:

Robert L. Casteel, Chairman

Robert W. Vogelsang

Stephen C. McFarlane

In recent years, operant conditioning techniques have been effectively used to modify a variety of behaviors. For the most part, the modification of stuttering behavior has relied solely on the use of punishment. The shaping of "fluency" through differential reinforcement has been reported as a behavioral approach for the treatment of stuttering; however, the effectiveness of this technique in

combination with other "teaching" tools, such as, modeling, instruction, and explanation has not been reported in the literature.

The purpose of this study was to construct behavioral definitions of terminology utilized in a stuttering treatment program at Portland State University to produce "self-monitored normal, fluent speech" and to structure the procedures of this program with regard to baseline, conditioning, and extinction in order to provide a base for further research leading to the standardization of procedures for this program.

A 35 year old male was chosen as the subject for this study. Specific procedures were applied in three baseline sessions in order to determine the base operant level of interference responses and positive and negative language responses in reading, monologue, and dialogue settings.

The emission of interference and language responses were tracked throughout the conditioning and follow-up phases of the program by (1) random sample analysis of audio tapes by the experimenter and (2) a complete analysis of video-tapes by the experimenter and six student trackers.

The response goals of the conditioning phase included four progressive stages of motor response ("stretch and flow, " increased breathiness-reduced stretch, " "reduced breathiness, " and "normal,

fluent speech") in addition to a repertoire of positive language responses.

The self-monitoring of these responses was conditioned by using differential reinforcement supported by modeling, instruction, and explanation of responses.

Throughout the conditioning phase, varying schedules and magnitudes of different reinforcements were utilized to strengthen the subject's monitoring of the above responses in increasing intensities of environmental stimuli.

An examiner, other than the experimenter, administered the procedures for a follow-up baseline four weeks after the conditioning phase in order to determine the base operant level of interference responses and positive and negative language responses in reading, monologue, and dialogue settings after the removal of reinforcement in the clinic.

The results of the data obtained from the baseline and follow-up phases of the program revealed a reduction from 11.7 to 0.86 in the total number of interference responses per minute emitted by the subject and an increase from 29 to 83 percent of positive language responses. These results suggest the effectiveness of the procedures in this program for establishing "self-monitored normal, fluent speech" behavior.

THE STRUCTURING OF PROCEDURES UTILIZED
IN AN ADULT STUTTERING
TREATMENT PROGRAM

by

SARAH JANE PRICHARD

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requirements for the degree of

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CHAPTER I

INTRODUCTION

In the areas of psychology, education and speech pathology, principles of conditioning (classical and instrumental conditioning) have been directed toward the problem of altering behavior; this process has been designated as "behavior modification." The basis of behavior modification is a body of experimental work which focuses on the relationship between changes in the environment and changes in the responses of an individual (Ullmann and Krasner, 1965).

Watson (1962, p. 19) noted that behavior modification included many different techniques, all broadly related to the field of learning, but "learning with a particular intent, namely clinical treatment and change." Ullmann and Krasner (1965, p. 29) noted that in essence, the procedures in behavior modification consisted of "utilizing systematic environmental contingencies to alter the subject's response to stimuli."

Behavior modification focuses on overt behaviors, which were defined by Hilgard (1962, p. 614) as, "Those activities of an organism that can be observed by another organism or by an experimenter's instruments."

The moral implications of behavioral manipulation and control in treatment programs have been examined for a number of years (Rogers and Skinner, 1956; Shoben, 1963; London, 1964; Kelman, 1965; Bandura, 1969). Rogers (1956) and London (1964) charged that the use of behavioral controls were inconsistent with a humanistic approach to treatment. Kelman (1965) suggested that the most useful criterion for which to judge the ethical implications of behavioral approaches was the degree to which they promoted the subjects' freedom of choice.

Recently, studies analyzing the symbolic control of behavior have suggested that subjects do play an active role in creating their own controlling environment (Ferster, Nurnberger and Levitt, 1962; Farber, 1963; Bandura and Perloff, 1967). Behavior modification approaches have made increasing attempts to involve subjects as participants in the treatment process (Goldiamond, 1965; Stuart, 1967; Harris, 1969).

A type of self-directed behavior modification program has been developed by Casteel (1970) at Portland State University for the treatment of stuttering. Clients are asked to make contractual commitments to achieve the objectives or goals of the program. These goals include: (1) the production of a "normal, fluent, speech" pattern of response, (2) the production of a behavioral language repertoire with

regard to speech behavior, and (3) the development of "self-monitored verbal behavior" for the regulation of these responses.

The program is constructed in four stages, each stage representing a closer approximation of normal, fluent speech. The end goal responses of these stages are: (1) "stretch and flow" - the production of an entirely new speech response pattern; (2) "increased breathiness - reduced stretch"; (3) "reduced breathiness"; (4) "normal, fluent speech." Language responses are not learned in steps, but are developed in conjunction with motor response patterns. Various activities are designed in order that these responses are developed in reading, monologue and dialogue settings.

Clients are informed of the self-directed behaviors necessary for the establishment of each of the four motor response patterns in the following manner:

Instructions are directed to the client to emit one of the specific motor responses patterns (modeled by the clinician) and attend to resultant auditory, tactile, proprioceptive and kinesthetic stimuli in addition to stimuli emitted by the clinician ("listener awareness"). Explanatory statements regarding instructions are made so that clients understand the correlation of these responses with fluent responses and thus utilize consequent self-reinforcing stimuli to regulate future output.

Clients are similarly instructed to emit behavioral language

responses when discussing speech behavior (experimenter models examples) and are informed of the self-reinforcing consequences of such responses, e. g., self regulation of behavior, personal responsibility, positive listener reactions and scientific behavioral analysis.

External controls are also utilized in this program in the form of differential reinforcement for specific motor and language responses, to aid clients in producing and monitoring these behaviors. Differential reinforcement is later applied to produce a high frequency of self-directed responses in progressively more complex stimulus situations.

The types of reinforcement include positive reinforcement and punishment in the form of verbal and non-verbal stimuli. Verbal consequences are occasionally withdrawn in order to test a client's level of proficiency during certain activities. The schedule of reinforcements vary throughout the program. Positive reinforcement is initially presented on the nearly continuous schedule in order to facilitate shaping as well as to establish the role of the instructor as a discriminative stimulus for basically positive reinforcement; an intermittent schedule is gradually introduced for the purpose of strengthening established behaviors. Punishment changes from an intermittent presentation to a continuous schedule of presentation to facilitate clients' identification of improper response produced stimuli (auditory, tactile, etc.) after they have demonstrated

proficiency in monitoring appropriate feedback stimuli.

Reinforcement is also presented in varying magnitudes, which include the intensity (loudness) and semantic meaning of the consequent verbal stimuli. Initially, when clients are learning to monitor responses, the magnitude of positive reinforcement or punishment is very mild in order to aid the subject in the identification and regulation of the consequent self-reinforcing stimuli of the responses being shaped and to create a pleasant environment that promotes stimulus control. As clients learn to regulate the correct responses by developing the appropriate monitoring behavior, the magnitude of positive reinforcement or punishment increases.

Operant conditioning techniques are not utilized in this program to "control" the behavior of clients; rather, these techniques are applied in conjunction with modeling, instruction and explanation, to teach clients to produce motor and language responses necessary for the maintenance of a fluent speech response pattern and to identify and monitor the resultant stimuli of such responses in order to govern future output.

I. STATEMENT OF THE PROBLEM

The purpose of this study was to construct behavioral definitions of terminology utilized in a stuttering treatment program at Portland State University to develop "normal, fluent speech" and to structure

the procedures of this program with regard to baseline, conditioning and extinction, in order to provide a base for further research leading to the standardization of procedures for this program.

The essential questions asked were: (1) Is it possible to construct a four stage program with specific procedures which will produce a 'normal fluent speech' pattern and a repertoire of positive language responses? (2) is it possible to condition 'self-monitored verbal behavior' in the presence of an increasingly complex hierarchy of environmental stimuli? (3) Is it possible to produce responses exhibiting resistance to extinction over a period of time?

II. DEFINITION OF TERMS

The following definitions provide a complete glossary of behavioral terms utilized in discussing the procedure and results of this study. Operational definitions constructed specifically for this treatment program are preceded by asterisks.

1. Acquisition: Defined by Starkweather (1970, p. 150) as "A progressive increment in the frequency of occurrence of a response as a result of a conditioning procedure."
2. *Baseline or base operant level: The measurement of specific behavioral responses with regard to rate, frequency and quality, in the absence of response-contingent reinforcement.
3. Behavior Modification: A general term for any of a variety of

clinical techniques, based on learning theory and conditioning principles, for changing the behavior of clients either by establishing and/or strengthening desirable behaviors or by removing or reducing undesirable behaviors.

4. *Clinical Environment: The environment in which the individual receives clinical assistance for a designated period of time (one hour for conditioning sessions and one half hour for extinction sessions); this also refers to the environmental setting for all baseline sessions.
5. *Criterion of Proficiency: A predetermined frequency of occurrence of a particular response at the end of each stage of this program which allows the subject to advance to the next stage. The criterion measure was 1.0 interference responses per minute. A criterion of proficiency was not applied to positive language responses since they were not learned in specific steps.
6. Differential Reinforcement: The process by which certain variations of a response class are reinforced and thus strengthened, while other variations of the same class are not reinforced, thus extinguished (Staats and Staats, 1963).
7. Differential Relaxation: Defined by Jacobsen (1965, p. 83) as, "A minimum of tensions in the muscles requisite for an act, along with the relaxation of other muscles." In this program, differential relaxation was introduced in a sitting posture and

then a standing posture. Differential relaxation, when attained by the subject in a sitting position, was combined with the Stage I motor response pattern, "stretch and flow." The words "let go" and "letting go" were used in instructions and explanations regarding general muscular relaxation.

8. **Discriminative Stimulus:** A stimulus preceding a response which is associated with the reinforcement of that response, thus increasing the probability of occurrence of the response. Behavior emitted in the presence of discriminative stimuli is under stimulus control (Bandura, 1969).
9. ***Environmental Stimuli:** All pertinent stimuli surrounding the subject when certain emitted responses are differentially reinforced.
10. **Extinction:** Defined by Starkweather (1970, p. 152) as, "A progressive decrement in the frequency at which a response occurs, sometimes to the point where it fails to occur again." The procedures for achieving extinction in this program consisted of withdrawing reinforcement for formerly reinforced responses; extinction procedures were utilized to test the proficiency of "self-monitored" motor and language response patterns.
11. ***Fluency:** The forward flow of speech; the motor responses conditioned in each of the four stages of this program result in fluency.

12. ***Interference Response:** A physiological response emitted by the subject which interferes with the forward flow of air due to the increased rate, tension or duration of production. This type of response interferes with the forward flow of speech. For this study, interference responses were characterized as: tonic interferences, resulting from the improper valving of the speech mechanism; clonic interferences, resulting from repeated articulatory movement on sounds or syllables; prolongation interferences, due to excessive phonation during the production of vowel-like sounds; retrial interferences, due to the repetition of a whole word; verbal junk interferences, characterized by the consistent emission of superfluous verbal stimuli ("um, " "uh, " "well-uh, " etc.); combination interferences, resulting from the emission of two or more types of interference responses on the production of a word.
13. ***Listener Awareness:** Attention to the behavioral cues or feedback stimuli of listeners, both auditory and visual; a behavior necessary for the reception of external feedback (an important factor in "self-monitored verbal behavior").
14. **Magnitude of Reinforcement:** The amount of reward or punishment presented for responses; the magnitude of reinforcement for this study included verbal intensity (loudness) and evaluative semantic stimuli.

15. *Negative Language Responses: Language responses emitted by the subject which are considered detrimental to the development and maintenance of "self-monitored" fluent motor responses. These responses reflect the following: vague descriptions of responses emitted during the production of speech; terminology such as block, stutter, stutterer, it, this thing, secondary reaction, starter, postponement and release are included in these responses ("I stuttered, " "I had a small interference, " "My jaw tensed, my tongue stayed up on the roof of my mouth, " "My voice stopped, " "I controlled it pretty well that time - the air came out," etc.); lack of "responsibility" for speech ("Once I get started, I can't stop, " "When I stutter, people will help me, " "My hectic environment is the cause of my problem, " etc.); a negative attitude with regard to speech behavior ("Sometimes I feel like interfering with my speech, " "I'll be happy if I just interfere less, " "I don't practice much, because there aren't many people I like to talk to, " etc.); lack of knowledge concerning speech behavior outside the clinic ("I was so nervous, I don't remember anything, " "I think I was too tense, " etc.).
16. *Positive Language Responses: Language responses emitted by the subject which are deemed beneficial to the development and maintenance of "self-monitored" fluent motor responses. These are language responses reflecting the following: behavioral

descriptions of responses emitted during the production of speech ("I pressed my lips together tightly and interfered with the flow of air, " "I jerked my arm and closed my eyes, " "I am letting the air flow and I am moving my tongue, lips and jaw effortlessly, " etc.); responsibility for speech ("I began to interfere on the phone, so I initiated more breath to remind myself not to interfere with the flow of air, " etc.); a positive attitude with regard to speech behavior ("I like talking to people much more than I used to, " "I am pleased with the way I'm talking, " etc.); knowledge of correct behavior outside the clinic ("I flowed the whole time I was talking to him, " etc.); knowledge of incorrect behavior outside the clinic ("I did all the wrong things when I was talking to him, " "I interfere with my speech more when I'm nervous, " etc.). These latter statements are punished when the subject is able to monitor correct motor responses and subsequently reports failing to initiate the correct behaviors.

17. Program: Defined by Starkweather (1970, p. 155) as, "A set of step-by-step procedures determined in advance for modifying behavior. . . composed of steps which progress in a specified sequence from a starting point to a pre-determined goal."
18. Response Contingent Reinforcement: A type of reinforcement presentation; the occurrence of the response causes the

occurrence of the consequent stimulus (Starkweather, 1970).

19. *Response Tracking: A procedure by which certain defined responses are counted to determine the amount of variance over time. Two measures for assessing responses were utilized in this study: (1) the number of certain responses per minute was determined by dividing the length of a setting (reading, monologue or dialogue) or session into the number of responses counted in that time; this measure was used most frequently to determine the rate of interference responses and types of interference responses; (2) percentage scores for language responses were determined by dividing the total number of language responses into the positive and negative language responses counted.
20. Schedule of Reinforcement: Defined by Starkweather (1970, p. 152) as, "The amount of responding required to achieve reinforcement, as determined by the experimenter or clinician." The schedule may be continuous (reinforcement presented for each correct response) or intermittent (reinforcement for some of the correct responses).
21. *Self-Monitored Verbal Behavior: The maintenance of fluent motor responses and positive language responses through the operations of response production, internal feedback, external feedback and possible response correction (following reception of

inappropriate feedback stimuli) without modeling or instructions from the experimenter. Procedures are utilized in this program so that "self-monitored verbal behavior" becomes automatic.

22. Shaping: A procedure which utilizes differential reinforcement and successive approximations to develop new behavior (Sloane and MacAulay, 1968).
23. *Speech Activities: Response activities in reading, monologue and dialogue settings which are designed to promote the production of motor and language response patterns; in this program, simple speech activities were gradually altered toward more complex activities.
24. *Stage I - "Stretch and Flow": The end goal response of Stage I. "Stretch" is the prolongation of the vowel-like characteristics of sounds, both within and across words ("I like you"); "flow" is the continuous forward movement of air and ideas during the emission of verbal responses. These responses are combined in Stage I to establish a new response pattern in order that the subject receive the proper auditory, proprioceptive, kinesthetic and tactile feedback of each sound uttered and with this, the tactile feeling of the forward motion of air passing over the structures.
25. *Stage II- "Increased Breathiness-Reduced Stretch": The end goal

response of Stage II. The prolongation of vowels is reduced to normal and words are no longer run together; air flow is simultaneously increased. The response is perceived as a very breathy, slightly slowed response. The term "breathiness" is used to represent the acoustical phenomenon of exaggerated air "flow."

26. *Stage III - "Reduced Breathiness": The end goal response of Stage III. The amount of air flow is reduced; "stretch" responses are no longer emitted. The voice is perceived as slightly breathy with weak intensity.
27. *Stage IV - "Normal, Fluent Speech": The end goal response of Stage IV. The behavior emitted is a normal speech pattern of response. The voice is produced with the proper amount of intensity and no breathy quality.
28. Stimulus Control: Defined by Bandura (1969, p. 63) as, "Behavior. . . regulated by environmental stimuli that by virtue of their association with different contingencies of reinforcement, signify the consequences that are likely to accompany certain courses of action." The stimulus control of operant behaviors is established and maintained by differential reinforcement.
29. Stimulus Generalization: The process by which a response is emitted in the presence of a stimulus, similar to the stimulus presented during conditioning (Starkweather, 1970).

30. *Stimulus Situation: All pertinent stimuli surrounding the subject in a particular clinical environment (see Environmental Stimuli and Clinical Environment).
31. Successive Approximation: The gradual change in reinforcement criteria, as differential reinforcement is repeated (Sloane and MacAulay, 1968).

CHAPTER II

REVIEW OF THE LITERATURE

The concern with stimuli and responses in behaviorism has given rise to the term S-R Psychology, which, in turn, has become the matrix of behavioral science (Staats and Staats, 1963). The principles of S-R Psychology, located within the scope of learning theory, are accounted for in two basic types of conditioning, classical and instrumental conditioning.

The following review of the literature summarizes the basic principles of these types of conditioning developed by Pavlov and Skinner. Because of the use of instrumental (operant) conditioning techniques in this study, literature is reviewed pertaining to the implementation of these techniques in areas of psychology and education for the modification of various behaviors. Additional literature is reviewed concerning the application and evaluation of operant methods in the area of speech pathology for the treatment of stuttering.

I. THEORETICAL FOUNDATIONS

Pavlov's research with dogs in 1927 represented the first experiments in classical (respondent or Type S) conditioning (Staats

and Staats, 1963; Rachman and Teasdale, 1969; Bandura, 1969).

Generally, his work involved pairing a stimulus that evoked the reflex of salivation in dogs with one that did not. Pavlov used meat powder to elicit the natural (or conditioned) response of salivation and a tone was used as the neutral stimulus. The presentation of these two stimuli was paired together a number of times, and eventually the tone elicited the salivary response (Staats and Staats, 1963).

J. A. McGeoth (1952, p. 64) described the essential features of classical conditioning in the following manner:

a) an originally neutral stimulus is called a conditioned stimulus; b) a stimulus which has the characteristics of evoking one of the natural reflex responses of the learner is termed an unconditioned stimulus; c) the reflex response to this unconditioned stimulus is known as an unconditioned response; d) the pairing together in time of the conditioned and unconditioned stimuli, and e) the eventual occurrence of a response which closely resembles the unconditioned response, but made in response to the conditioned stimulus, is known as a conditioned response.

The paradigm used to schematize the work of Pavlov is illustrated below. A shows the neutral stimulus and the unconditioned stimulus being paired to elicit the response while B shows the conditioned stimulus eliciting the response.

There have been impressive attempts to account for all behavior of organisms through classical conditioning, on the basis that once a certain stimulus has been paired with an unconditioned stimulus, the resultant stimulus-response unit (CS-----CR) may serve as a foundation for the introduction of a new stimulus to be conditioned

Figure 1. The process of classical conditioning.

(Hull, 1943; Osgood, 1953). This has been called second-order or higher-order conditioning (Staats and Staats, 1963; Schaeffer and Martin, 1969). McGeoth (1952), however, felt that the types of responses that could learned by this method were limited by the reflex repertoire of the learner.

The second type of conditioning, instrumental conditioning, was referred to originally by Edward L. Thorndike (1933), who called it the "Law of Effect." In essence, this law stated that an act may be altered in its strength by its consequences. B. F. Skinner (1953), who termed this type of learning "operant conditioning," has been most influential in making applications of his findings to complex human behavior.

The stimuli (consequences) following a response are categorized depending on what happens to the response and how the stimuli are presented (Staats and Staats, 1963). A stimulus closely following a certain response and increasing the probability of that behavior occurring again, is termed a positive reinforcer (symbolized S^R+). If a

response leads to the removal of a consequent stimulus and the probability of the response increases, the consequent stimulus is termed a negative reinforcer ($S^R -$). A stimulus, following a response, which decreases the frequency of that response, is termed punishment. Staats and Staats (1963) have noted that negative reinforcers and punishers can be the same type of stimuli, the only difference being in whether the stimuli are presented or withdrawn. Stimuli following a response, which do not increase or decrease the probability of that response, are termed neutral stimuli. Bandura (1969) has noted that the effects of punishment are temporary, while the effects of non-reinforcing stimuli in extinction are permanent.

The processes of differentiation and successive approximation account for the development of new responses from a "response class" (Staats and Staats, 1963). Certain responses in a class of responses are reinforced and thus strengthened; those reinforced responses are said to be differentiated out of the class. By successively differentiating out the "extreme" members of a response class, a new response class, markedly different from the previous one, is obtained.

Skinner (1953) considered the schedule of reinforcement in a learning situation an important factor in maintaining response strength. Fixed-ratio, fixed-interval, variable-ratio and variable-interval are terms assigned to types of reinforcement schedules, the latter two schedules producing behavior highly resistant to extinction.

Skinner (1953) also took into account the stimuli preceding a response, or antecedent stimuli. The term discriminative stimuli (symbolized S^D) pertains to those stimuli preceding a response which are associated with the reinforcement of that response. S^A symbolizes stimuli preceding a response which do not lead to reinforcement. S^P symbolizes stimuli preceding a response that lead to punishment. Bandura (1969), however, has stated that the stimulus control of operant behaviors is maintained by differential reinforcement, rather than through temporal association of sets of stimulus events.

Staats and Staats (1963) have noted that when a stimulus, through respondent or operant conditioning, comes to elicit a response, this response will be elicited by other stimuli to the degree that they are similar to the original stimulus. This process is called stimulus generalization.

Both classical and operant conditioning explain behavior in terms of S-R learning principles. The classical approach accounts for the development of behavior primarily through reflexive conditioning. The operant approach emphasizes variables of consequent stimuli as the principle determinants of behavior. The principles of classical conditioning have contributed to an understanding of the development of language, communication and attitudinal behavior (Mowrer, 1960; Staats and Staats, 1963). It has been shown that operant conditioning can be applied to trial and error learning, verbal

conditioning, motor learning, problem solving and concept formation (Skinner, 1953; Green, 1963).

II. RELEVANT RESEARCH

Operant Conditioning in Education and Clinical Psychology

The extensive growth of programs utilizing response-contingent reinforcement in one form or another precludes a complete review of the countless clinical, remedial and developmental applications of reinforcement principles.

Acknowledging that many studies have employed a combination of positive reinforcement, extinction, modeling and punishment to modify behavior, Bandura (1969) has noted that the major type of reinforcement utilized in behavioral approaches depends on overall behavioral objectives to establish, increase, decrease, or eliminate a specific behavior.

Bandura (1969) states that the use of positive reinforcers are best suited for the purposes of modifying behavioral deficits, developing complex repertoires of behavior and strengthening and maintaining existing responses. Behavioral control through the use of positive reinforcement has been achieved with such diverse clinical problems as autistic behavior (Lovaas, 1968), severe anorexia (Bachrach, Erwin and Mohr, 1965), socially disruptive behaviors in the classroom

(O'Leary and Becker, 1967), self destructive behavior (Allen and Harris, 1966), anti-social behavior (Colman and Baker, 1968; Cohen, 1968), psychogenic seizures (Gardener, 1967), mutism (Sherman, 1965; Straughan, 1968) and gross behavioral disorders in adult psychotics (Ayllon and Azrin, 1965, 1968; Brawley et al., 1969).

Positive reinforcement has also been widely applied in studies of verbal conditioning (Salzinger, 1959; Krasner, 1962; Kanfer, 1968) and has proven effective for establishing social and self-help skills in profoundly retarded children (Giles and Wolf, 1966; Minge and Ball, 1967). Positive reinforcement techniques have been used in conjunction with programmed instructional materials to establish a variety of complex behaviors (Skinner, 1961; Sloane and MacAulay, 1968).

Bandura (1969) noted that aversive forms of control (response-contingent punishment) have been primarily employed to eliminate undesirable behaviors which appear to be self-reinforcing, or for which maintaining positive consequences cannot be readily identified or eliminated. Rachman and Teasdale (1969) report general use of aversive stimuli to eliminate behavior considered injurious to the individual or others.

Punishment has been successful in modifying alcoholism (Blake, 1967; Marks and Gelder, 1967), deviant patterns of sexual behavior (McGuire and Vallance, 1964; Feldman and McCulloch, 1965), compulsive eating (Meyers and Crisp, 1966), chronic self destructive

behavior (Wolf, Risely and Mees, 1964; Bucher and Lovaas, 1969) and anti-social behavior (Tyler and Brown, 1967).

Use of extinction procedures in operant conditioning has varied widely, according to the presumed nature of the maintaining consequences (Bandura, 1969; Brutten, 1970). Removal of positive reinforcement has succeeded in modifying psychotic behavior (Ayllon and Michael, 1959), aberrant verbal repertoires in schizophrenics (Ayllon and Haughton, 1964), crying behavior (Etzel and Gewirtz, 1967) and physically destructive behavior (Brown and Elliot, 1965; Sloane, Johnston and Bijou, 1968).

Extinction of avoidance behavior has been accomplished through: (1) massive exposure to subjectively threatening stimuli without aversive consequences (Kirschner and Hogan, 1966), (2) exposure to graduated intensities of aversive stimuli in the absence of aversive consequences (Walton and Mather, 1963), (3) massed performance of the avoidance response followed by non-reinforcement (Clark, 1966), and (4) presentation of aversive stimuli following avoidance responses (Barret, 1962).

The Modification of Stuttering with Operant Conditioning

The majority of experimental studies assessing the effects of operant conditioning for the modification of adult stuttering behavior

have relied heavily on the use of punishment paradigms (Siegel, 1970).

In an early study by Sheehan (1951), conditions were arranged so that the production of fluent words were rewarded by allowing the subject to produce the next word. The subjects themselves punished stuttered words by repeating them until they were spoken fluently (termed "cancellation"). The results of this study showed that stuttering was substantially reduced and remained significantly lower when it produced negative consequences. This experimental study was never extended by Sheehan, beyond being mentioned briefly among a variety of therapeutic techniques (Sheehan, 1970).

The first reported study to modify stuttering with strict operant procedures appears to have been a study by Flanagan, Goldiamond and Azrin (1958). They reported that reduction in stuttering responses was best achieved when a one second blast of a 105 dB tone was presented immediately following each stuttering response. Reduction of stuttering responses was achieved in all subjects. Upon removal of the tone, stuttering responses returned to baseline. This study was based on a previous experiment by Azrin (1958), where presentation of auditory stimuli suppressed human motor responses.

More recently, Goldiamond (1960, 1962) found that when a brief period of delayed auditory feedback (DAF) was made contingent on stuttering responses, stuttering increased; however, when DAF was

presented as negative reinforcement, stuttering not only decreased, but the resultant responses were prolonged. On the basis of these latter findings, Goldiamond (1965) has constructed an operant program to shape prolonged responses toward normal speech responses.

Experimental studies carried on at the University of Minnesota have substantiated the results of Flanagan, Goldiamond and Azrin (1958). Presentation of response-contingent electric shock, the verbal stimulus "wrong," and time-out from speaking, are reported to be effective in the modification of stuttering behavior (Siegel and Martin, 1966a; Quist and Martin, 1967; Haroldson, Martin and Starr, 1968).

The results from the study by Haroldson, Martin and Starr (1968) indicate that time-out from speaking produces a reduction in stuttering equivalent to that produced by shock or a loud tone and somewhat greater than that produced by the verbal stimulus "wrong." The authors also suggest that the effects of time-out from speaking do not extinguish as rapidly as the effects of the other aversive stimuli, using the same schedule and delivery of reinforcement and extinction procedures. Curlee and Perkins (1968) have presented shock contingent on signaled expectations to stutter; results show that both the frequency of expectation and stuttering decrease.

A dual-reinforcement paradigm has been used experimentally to modify stuttering behavior (Siegel and Martin, 1966b); fluent responses

are rewarded along with simultaneous punishment for disfluent responses. The investigators report that the use of response-contingent "good" and "not good, " results in a substantial decrease in stuttering, similar to results they have obtained from the use of aversive stimuli alone.

Assuming that presentation of positive reinforcement for fluent responses will increase fluency and, thus, decrease stuttering responses, Martin (1968) has used the verbal stimulus "good" following fluent responses lasting 15 seconds. Results of his case study indicate that positive reinforcement for fluent responses produces little change in stuttering frequency.

Stuttering Treatment Programs Utilizing Operant Techniques.

Experimental studies have shown that stuttering behavior can be controlled through operant approaches and have contributed to the development of operant programs for the clinical treatment of stuttering.

Goldiamond (1965) has developed an operant program which establishes an entirely new response pattern (prolongation) and utilizes differential reinforcement to shape the response to normal speech. The program includes four steps: (1) establishment of a new response pattern; (2) altering the stimulus control of the new pattern; (3) shaping the response pattern to normal speech; (4) self-control procedures. Delayed auditory feedback (DAF) is introduced into the

subject's earphones while reading in order to establish a prolongation of speech responses. The amount of DAF necessary to elicit this response is gradually faded until the subject emits the correct response without instruction. Reading rate is then speeded up by machine control of the presentations, through programmed steps, to normal and beyond normal rates. Self control procedures are later incorporated; the subject is instructed to analyze the conditions under which his stuttering behaviors occur and change his environment to secure optimal success with his new behavior. For each of the subjects carried through this program, Goldiamond has reported a significant reduction in the frequency of stuttering and the emission of normal speech behavior.

Ryan (1966) has constructed an operant program for stuttering which differs from Goldiamond's (1965) in that it incorporates a traditional design to modify stuttered words, rather than initiating and shaping a new response pattern. Utilizing negative reinforcement, (reading aloud in front of an audience) the emission of correct behaviors results in early dismissal from this environment. The modification of stuttered words is accomplished in eight steps: (1) experimenter identification of stuttered words; (2) experimenter-subject identification of stuttered words; (3) cancellation¹-repetition of the stuttered word; (4) cancellation²-repetition of the stuttered word, prolonging the word; (5) cancellation³-repetition of the stuttered word,

prolonging the first sound in the word; (6) pullout¹-interrupting the stuttering behavior and substituting a prolongation of the initial sound; (7) pullout²-interrupting the stuttered word immediately by prolonging the initial sound of the word; (8) prolongation of the initial sound of a word where stuttering is anticipated.

A significant decrease in stuttering behavior while reading has been reported by Ryan for the three subjects who have been involved. Ryan (1966) has noted that in his program as well as Goldiamond's (1965), the generalization of fluent reading to conversational speaking has not been demonstrated.

Shames, Egolf and Rhodes (1969) have utilized explicit instructions and differential reinforcement (positive reinforcement and punishment) to shape stuttering responses toward normal speech responses in a four step experimental program (a modification of Ryan's program, 1966). The steps of the program instruct the subject to: (1) pause, following the stuttered word and reiterate the word; (2) reiterate the stuttered word, prolonging the initial sound of the word; (3) interrupt stuttering on a word and prolong the initial sound of the stuttered word; (4) prolong the first sound of each stuttered word. Positive reinforcement ("good, " "fine, " "that's good, " head nod, etc.) immediately follows correct responses. Punishment for failure to complete the task is in the form of verbal re-instruction. The criterion for advancing to the next step in the program is 90 per

cent correct response rate. A dialogue situation between the experimenter and the subject is designed as the speech setting.

Ryan (1971) has reported the results of five case studies (children) for which he has developed operant programs. The programs consist of a series of steps or tasks which the children perform, receiving positive reinforcement for correct responses. When a response rate of 0.5 stuttered words per minute or less is demonstrated on a response task, the children advance to the next step. The programs vary in length from 15 to 73.3 hours. The goal of each program is the establishment, transfer and maintenance of fluent speech.

Ryan reports that all of the five programs are effective in establishing fluent conversational speech. Spontaneous transfer has been demonstrated by four out of the five children. Speech has remained fluent throughout the maintenance program. These operant programs contrast with Ryan's earlier program (1966) in that the program for children utilizes positive reinforcement for fluent responses in conversation, while the earlier program applies negative reinforcement to stuttered words in reading.

Evaluation of Operant Techniques in Stuttering Treatment. The selection of an appropriate response-contingent reinforcer in stuttering treatment has been questioned. Brutten and Shoemaker (1967) state that the use of aversive stimuli to control stuttering and disfluent

responses is often ineffective. They cite a number of experiments in support of this assumption (Van Riper, 1937; Frick, 1951; Hill, 1954; Savoye, 1959; Stassi, 1961; and Stevens, 1963), all of which have reported that the presentation of punishment has resulted in no effect or an increase of fluency disruptions. As an alternative, Brutten and Shoemaker (1967) advocate: (1) non-reinforcement of instrumental "mal-adaptive" responses repeated in a massed performance and (2) positive reinforcement contingent upon the absence of these responses, as well as the presence of "adaptive" responses.

Siegel (1970) refutes the assumption drawn by Brutten and Shoemaker regarding the use of punishment, by noting that the studies mentioned did not maintain a contingent relationship between the punisher and the response. Siegel cites the Goldiamond (1965) and Minnesota studies (Siegel and Martin, 1965a, b, 1966a, b, 1969; Quist and Martin, 1967; Haroldson, Martin and Starr, 1968) where stuttering and normal disfluencies have been consistently decreased when aversive stimuli have been made contingent on responses.

Ryan (1966) has noted that while his study utilizes a continuous negative reinforcement schedule, better results might be achieved by changing the reinforcement to positive on an intermittent schedule.

The short term effects of operant conditioning on stuttering, demonstrated by the "recovery" of stuttering rate and the lack of response generalization outside the clinic, have been noted by many

experimenters (Flanagan, Goldiamond and Azrin, 1958; Goldiamond, 1965; Ryan, 1966; Siegel and Martin, 1966a; Quist and Martin, 1967; Martin, 1968; Haroldson, Martin and Starr, 1968; Curlee and Perkins, 1968; Ryan, 1971). An exception to this finding has been reported in a study by Siegel and Martin (1966b) where the use of extinction procedures throughout the conditioning phase, resulted in a slower "recovery" rate than that found in other studies. Ryan (1971) states that conditioning fluent responses in a variety of environmental stimulus situations contributes to the maintenance of fluent speech in his programs for children.

In comparing the short term effects of operant techniques on stuttering behavior to the results of studies using similar punishment paradigms to modify the disfluencies of normal speakers (Siegel and Martin, 1965a, b, 1968, 1969; Brookshire and Martin, 1967; Brookshire, 1969), Siegel (1970) states that once disfluencies are significantly reduced they seldom "recover" during extinction. Siegel notes that in each of these studies, reinforcement procedures have been paired with explicit instructions indicating to the subject the desired behavior. Adding an explanation of the contingency to the instructions has achieved even further response reduction with the same results during extinction (Siegel and Martin, 1968). Siegel (1970) suggests that subjects' attention to disfluent responses and "awareness of contingencies" be considered in operant programs for stuttering treatment.

The lack of instruction or modeling behavior in operant conditioning approaches to stuttering has been questioned (Ryan, 1966; Shames, Egolf and Rhodes, 1969). Ryan (1966) has noted that although the use of instructions are not utilized in strict operant procedures, careful application of instructions often results in more rapid response modification. Shames, Egolf and Rhodes (1969) report that a successful combination for behavior change is the use of instruction with positive reinforcement for correct responses or instruction and re-instruction for incorrect responses.

Prins (1970) states that the direction of operant programs for stuttering is uni-dimensional, attending to the modification of certain motor behaviors only, while research indicates that stuttering encompasses many areas of behavior (Cooper, 1966; Sheehan and Martyn, 1966; Sheehan, 1970). Brutton and Shoemaker (1967), Luper (1968), Gregory (1968) and Sheehan (1970) support a two-factor approach to stuttering, based on their belief that stuttering behavior includes emotional as well as motor responses. Goldiamond (1965) has attempted to account for the emotional aspect of stuttering in his operant program, by using "self-control" procedures, whereby the subject is reinforced for recognizing and verbalizing about the conditions under which his stuttering occurs in order that he change the environmental consequences maintaining his stuttering behavior.

Shames, Egolf and Rhodes (1969) note that the emotional

mechanisms of the stutterer can be observed for the most part by certain properties of his speech (loudness, rate, inflection) and language (content and themes). Williams (1968) states that the subject's beliefs and expectations influence his behavior. He notes that the majority of clinicians who incorporate a learning theory approach to stuttering treatment (including classical and/or operant conditioning) utilize terminology, reflecting a neurological basis for stuttering (block, secondary reaction, stutter, "it happened, " etc.) and suggests that clinicians model and reinforce language characteristic of what the person is doing, rather than what is happening to him. Sanders (1970) has constructed a behavioral language for clinicians to model; he stressed the importance of language training in order that clinicians model the proper language responses.

Shames, Egolf and Rhodes (1969) have tested the effects of verbal conditioning on language behavior and its relationship to stuttering responses. In their program, two broad response categories have been categorized: (1) positive language responses, or positive target responses (TR+), which are those utterances deemed beneficial to therapeutic progress (statements reflecting overt behaviors, awareness of concurrent or controlling variables, positive affect, approach to or participation in speaking situations); and (2) negative language responses (TR-), which are those utterances considered incompatible with improvement, because of their thematic

content (statements reflecting non-awareness of concurrent or controlling variables, negative affect, helplessness, vague references to speech containing the key words "it, " "this, " "this thing").

The program is carried on in an interview situation. TR+ statements are followed by verbal approval from the clinician and TR- statements result in verbal disapproval from the clinician. Instructions are not utilized; depending on the amount of verbalizing from clients, the clinician will consistently (1) respond to non-contingent responses to maintain conversation, as well as contingent responses, or (2) respond only to contingent responses.

Both procedures used in this program have increased positive statements and reduced negative statements in subjects, demonstrating the control of specified language responses by operant methods. The authors, however, state that the effect of language modification on stuttering behavior is difficult to judge, because the subjects involved in the program thus far have emitted such low stuttering rates initially. The authors suggest further investigation to study the effects of various schedules of reinforcement on language responses, as well as introducing specific stimuli, such as questions, to evoke a higher language response rate.

The approach to behavior characterized by a majority of experiments utilizing operant methods in stuttering treatment has been questioned by Williams (1968), Johnson (1969) and Bar (1971).

These authors have observed that operant conditioning procedures applied to stuttering are, in general, directed toward the modification of a negative or undesirable behavior (stuttering), rather than the strengthening of a positive behavior (fluency). It has been suggested that since fluent responses predominate in the speech of stutterers, "natural fluency" should be emphasized more than "abnormal non-fluency" as the focus of therapy (Bar, 1971, p. 1).

Summary

The principles of two types of conditioning (classical and operant), which account for the development of behavior as reflected by learning theory, have been summarized in this chapter. Studies reviewed, which have utilized various types of response-contingent reinforcement, indicate the effectiveness of operant techniques in the treatment of behavior.

Specific attention has been directed to studies utilizing operant conditioning approaches for the modification of stuttering behavior. Evaluations of these approaches considered significant for this study are: (1) that positive reinforcement should be used solely, or in conjunction with punishment in stuttering treatment programs (Ryan, 1966; Shames, Egolf and Rhodes, 1969); (2) that emphasis should be placed on the strengthening of a normal, positive response, rather than on the modification of an "abnormal" negative response

(Williams, 1969; Bar, 1971); (3) that adding an explanation of the contingency in the instructions, combined with reinforcement procedures, yield a significant response reduction (Siegel and Martin, 1968); (4) that extinction procedures throughout conditioning result in a slower "recovery" rate than when used at the end of conditioning only (Siegel and Martin, 1966b); (5) that the individual's beliefs and feelings are revealed in part through language responses, which influence his behavior (Williams, 1968; Shames, Egolf and Rhodes, 1969).

CHAPTER III

METHODS AND PROCEDURES

I. DESIGN

Program Length

The program for this study was designed to total 24 hours, including baseline, conditioning, extinction and follow-up. Three baseline sessions totalled ninety minutes. Each stage of the conditioning program included five one-hour conditioning sessions and one 30 minute extinction session; thus, the conditioning phase totalled 22 hours and lasted for a period of eight weeks (three sessions a week). A 30 minute follow-up baseline was taken four weeks after the completion of the conditioning phase. The experimental program began January 6, 1971 and ended April 2, 1971.

Program Objectives

The overall objectives of this program were:

1. To obtain the base operant level of interference responses and positive and negative language responses (see Chapter I-Definition of Terms);

2. To reduce the rate and frequency of interference responses by developing a consistently "self-monitored normal, fluent speech" pattern of response in reading, monologue and dialogue settings;
3. To reduce the percentage of negative language responses and increase the percentage of "self-monitored" positive language responses;
4. To produce the appropriate "self-monitored verbal behaviors" in the presence of a hierarchy of environmental stimuli; and
5. To establish "self-monitored verbal behavior" which is resistant to extinction over a period of time.

Program Framework

The basic phases of this program were comprised of baseline, conditioning and follow-up. Three 30 minute baseline sessions were constructed to obtain the base operant level of interference responses and positive and negative language responses in reading, monologue and dialogue.

The conditioning phase included 20 one-hour sessions to develop "self-monitored" fluent motor responses in four stages and to test the subject's level of proficiency in four extinction sessions, one at the end of each stage. Extinction sessions were similar in format to

baseline sessions, except that the base operant level of interference responses were measured against a specific criterion standard for advancement to the next stage.

Each of the four stages of the conditioning phase represented a specific motor response pattern; the stages were: (1) "stretch and flow;" (2) "increased breathiness-reduced stretch;" (3) "reduced breathiness;" and, (4) "normal, fluent speech" (see Chapter I-Definitions). These motor response patterns were achieved in three settings: reading, monologue and dialogue; thus, there were four steps for each of these settings. If the subject failed to attain the criterion measure for advancement in one of the settings, he remained at that level until the criterion measure was achieved.

Reading, monologue and dialogue settings were 20 minutes each for conditioning sessions; for extinction sessions, they were ten minutes in length.

Positive language responses were developed by the use of modeling, explanation and differential reinforcement in monologue and dialogue settings, rather than in discrete steps.

The follow-up phase began four weeks after the end of the conditioning phase and consisted of one 3- minute baseline session to obtain the base operant level of interference responses and positive and negative language responses in reading, monologue and dialogue, following the removal of reinforcement and a time lapse of four weeks.

Type, Frequency, Magnitude of Reinforcement

Response contingent positive reinforcement and punishment in the form of verbal and non-verbal stimuli were presented during the conditioning phase of this program. Motor and language responses were shaped through continuous positive reinforcement; an intermittent schedule was then introduced in order to increase response "strength" (Bandura, 1969). Since the focus of the program was the establishment of fluent response patterns and positive language responses, the presentation of punishment for incorrect responses was initially intermittent and gradually became continuous as the frequency of positive reinforcement decreased. This reinforcement paradigm was the overall design for the conditioning phase; however, this paradigm was introduced earlier after the first stage of the program.

The intensity (loudness) and semantics of verbal stimuli constituted the magnitude of reinforcement, which was presented proportionate to the level of "self-monitored verbal behavior" emitted (see Chapter I-Definition of Terms). Since "self-monitored behavior" at the beginning of the program was being shaped (Stage I), the magnitude of reinforcement was mild, in order to facilitate the subject's concentration during response production and his recognition of appropriate feedback stimuli. The intensity of positive and

negative stimuli was, thus, very low. Positive stimuli included, "good," "right," "uh-huh," head nod (following correct motor responses) and "I like your use of that language, because..." (for positive language responses). Punishing stimuli for improper motor responses included reinstruction and modeling; for negative language responses, the consequence was, "What you mean to say is..." (modeling the correct language response).

When "self-monitored verbal behavior" reflected fluent motor response patterns in Stage II and III, with the percentage of positive language responses being 50 per cent or higher, the loudness of verbal stimuli reflected a normal conversational level of intensity. Positive verbal stimuli included "very good" or "that's good" for correct motor responses and "I understand that language" or "good language" for positive language responses. Negative stimuli presented were, "no," "uh-uh" and head shake for interference responses, with "I don't agree," "I don't understand" and "that's vague" presented for negative language responses.

When "self-monitored verbal behavior" reflected normal, fluent patterns of response (Stage IV) in conjunction with a high percentage of positive language responses (90 per cent or higher), verbal intensity increased to a loud level. Positive verbal stimuli included, "great!" and "excellent!" for correct motor responses and "excellent language!" for positive language responses. Negative stimuli included,

"no!" and "wrong!" (banging table) for interference responses, with "wrong language!" and "bad language!" following negative language responses.

II. METHOD

Selection of Subject

The subject for this program was selected on the basis of:

- (1) a score of 5 or higher on the Iowa Scale of Severity of Stuttering;
- (2) a chronological age of 14 years of age or more (due to the sophisticated level of language responses required); (3) lack of exposure to this particular treatment program; and (4) agreement by the person not to participate in any clinical programs throughout the duration of this study.

The first person interviewed met the above criterion and was selected as the subject for this study. The subject was a 35 year old male, who was referred to the experimenter by a member of the Stuttering Council of Portland. He was unfamiliar with any treatment programs in the area, having recently moved to Portland from Ogden, Utah. During the interview, he expressed some concern over the fact that he would not be able to participate in the Stuttering Council meetings (membership consisted largely of persons either actively or formerly involved in the Portland State University treatment

program); however, because of its short duration, he agreed to accept the commitments and engage in this program.

Clinical Environments

For this study, the "clinical environment" was operationally defined as the environment in which the individual received clinical assistance for a designated period of time (one hour for conditioning sessions and 30 minutes for extinction sessions): "clinical environment" also referred to the environmental setting for all baseline sessions.

All baseline sessions as well as the majority of conditioning sessions were carried out in an eight by ten feet clinical practice room in the university speech and hearing clinic; this room served as the primary clinical environment (symbolized as C.E.¹). The furniture in this environment included a table and two chairs. Reading materials and a tape recorder were placed on the table, which was situated in front of a two-way mirror. The subject and experimenter sat facing each other beside the table in order to be seen through the mirror.

Lighting in this room was provided by ceiling lights as well as a small, bright light over the mirror. The subject wore a lavalier microphone, which was plugged into a socket over the two-way mirror. The small light and microphone were utilized to improve the

production and quality of video-taped sessions. While video-taping was not available for each session, the light and microphone were employed for all sessions in the primary clinical environment so that video-tapes reflected behaviors resulting from techniques of behavior modification and not the presence of these physical stimuli. Video-taping was carried out behind the two-way mirror; thus, the camera and technician were not visually present in the primary clinical environment. The subject was not aware of his being video-taped.

A secondary clinical environment (C.E.²) was used to accommodate a larger audience and enhance stimulus generalization. This environment was a university classroom, approximately 15 by 30 feet, and was comprised of desks, a chalk board, windows, a lecturn and tape recorder on a table and overhead lights (additional lighting was not available). The lavalier was present during video-taped sessions only, since the camera and technician were in the classroom at those times. In this environment, the subject sat or stood in front of the blackboard, facing the audience; the experimenter sat beside the subject, except for the last extinction session, when the experimenter joined the audience.

Clinical environments used for only one session included: (1) a classroom (similar size) in the same building (C.E.³) and (2) a large reception room in the basement of a bank (C.E.⁴).

Apparatus

The equipment used for all baseline sessions (initial and follow-up) included a tape recorder, audio tape, lavalier microphone and electric timer. This equipment (substituting a stop watch for the electric timer) was employed for conditioning sessions. A video-tape camera and video-tape were used for taping certain sessions of this program. These sessions were: (1) the second baseline session, (2) the third (last) session of each week during the conditioning phase, and (3) the baseline session of the follow-up phase.

Judgment of Severity of Stuttering

The Iowa Scale of Severity of Stuttering was used to rate the severity of stuttering in reading, monologue and dialogue settings from video-tapes of (1) a baseline session, (2) the last extinction session of the conditioning phase and (3) the follow-up session. The settings on the baseline tape were viewed and rated (see instructions to judges, Appendix I and II) by two speech pathologists, one at the doctorate level and the other at the master's level, who were members of the experimenter's committee from Portland State University. The settings in the last extinction session were viewed and rated by a panel of three speech pathologists, each at the master's level, who were serving as clinicians in the Portland Public Schools. The three

settings on the follow-up baseline tape were observed and rated by a panel of three speech pathologists, each at the doctorate level, from the University of Oregon Medical School.

Interference Response Tracking

Audio-tapes were analyzed following each session to determine the rate of interference responses per minute in each setting (reading, monologue and dialogue) and the rate of types of interference responses per minute in each session. A random sampling procedure was utilized to select a number of minutes considered representative of the length of the settings. Five minutes were considered to be a representative sample of a 20 minute (conditioning) setting; three minutes were designated as representative of a ten minute (extinction) setting. The random sampling procedure was uniform with regard to the three settings recorded for every session.

Using the fast-forward switch on the tape recorder, the beginning of a setting was located and the tape was stopped. The three digit counter on the left side of the tape recorder was turned to zero (0-0-0) and the fast-forward switch was turned on until the beginning of the last minute in that setting was located. The experimenter noted the numbers registered on the counter. The number of minutes selected for tracking depended on the length of the setting.

If the digital counter registered 3-4-7 for the next to the last

minute of a twenty minute setting, four cardboard discs, numbered from 0-3 (representing the first digit) were mixed (contained in a sack) each time before a disc was selected and the number recorded. Five numbers were recorded for the first column of numbers. Five discs representing the second digit (0-4) were placed in the sack and the procedure was repeated until a column of five numbers was recorded next to the first column. The same procedure was utilized to select randomly five numbers and record them in the third column, representing the last digit. Thus, five units of numbers were obtained and then listed in the order of their sequence (e. g., 0-4-7; 2-2-3; 2-7-5; 3-1-0; 3-3-9). For ten minute settings, the same procedures was utilized to obtain three units of numbers.

The experimenter then played the tape backward to locate the beginning of the first unit. The tape was played on a normal speed for one minute and the experimenter counted the number of interference responses and catagorized them as tonic interferences, clonic interferences, prolongation interferences, combination interferences, retrials or verbal junk (see Chapter I-Definition of Terms). The number of minutes tracked (3 or 5, depending on the duration of the session) in each setting was divided into the number of interference responses counted to obtain a representative figure of the number of interference responses per minute in each setting. Each of the types of interference responses counted were divided by the total

number of minutes tracked to determine the rate (in minutes) of the various types of interference responses.

Language Responses Tracking

Language responses were tracked once a week by the experimenter and three student trackers (see instructions to judges, Appendix IV). The tracking of language responses pertained to the video-taped sessions, which were viewed in order to determine the frequency of positive and negative language responses. Tracking sheets were utilized which enabled both positive and negative language responses to be tallied in minute segments (to determine the rate of responses); language response tracking pertained to monologue and dialogue settings only. The total number of language responses counted were divided into the separate totals of positive and negative language responses to arrive at percentage scores, representing the frequency of these responses in sessions.

Reliability

Intra-judge reliability was determined for the experimenter only; randomly selected audio and video-tapes were tracked by the experimenter to measure intra-judge reliability. The experimenter and three graduate students who were trained to count and categorize interference responses, tracked these responses for each setting

from video-tapes each week to determine: (1) the reliability of the random procedures applied to the tracking of audio-tapes; and, (2) the ability of the experimenter in tracking interference responses.

After initial training sessions, the students were given brief instructions as to their task at the beginning of each tracking session (see instructions to judges, Appendix IV). A stopwatch was utilized to signal the minute being tracked to achieve uniformity in tracking procedures.

The procedures noted above were used with the students tracking language responses to determine inter-judge reliability.

Data Analysis

The data gathered throughout this program was analyzed in the following manner: (1) intra-judge reliability was determined for sessions tracked by the experimenter; (2) inter-judge reliability was determined for judgments of interference responses from audio-tape analysis (random tracking) versus video-tape analysis (complete tracking); (3) inter-judge reliability was determined for response tracking (interference and language responses) on video-tapes between the experimenter and judges; (4) the rate of interference responses per minute and the percentage of positive language responses were measured throughout the four stages of conditioning and extinction in order to assess the development of appropriate

"self-monitored verbal behavior" during increasingly complex speech activities and in the presence of varying intensities of environmental stimuli; (5) the effects of the program in developing and maintaining a motor response pattern of "normal speech" and a repertoire of positive language responses was measured by a comparison of the pre-program and post-program (final extinction session and follow-up baseline) levels of interference responses, positive and negative language responses and judgments of the severity of stuttering.

Graphic Analysis

Cumulative records were kept of the tracking data from both audio and video-tapes; these were graphed in the following manner: rates and frequencies of interference responses and percentages of positive and negative language responses were presented on the ordinate; the abscissa delineated one or more of the three settings (reading, monologue, dialogue) for baseline, conditioning, and/or follow-up baseline sessions. Lines connecting points on the graphs illustrated the cumulative effect of response change. On certain graphs, lines additionally illustrated specific types of interference responses, or positive and negative language responses.

III. PROCEDURES

Baseline Phase

Three baseline sessions were carried out in order to assess the base operant level of: the rate and frequency of interference responses per minute in reading, monologue and dialogue; the rate of positive and negative language responses per minute in monologue and dialogue; the rate of different types of interference responses per session; and, the percentages of both positive and negative language responses. Each baseline session totalled 30 minutes, with ten minutes designated for reading, monologue and dialogue settings. Baseline sessions took place in the primary clinical environment (C. E. ¹).

During the reading setting, a book was presented to the subject every 3.3 minutes, along with the instruction, "Please read this." The same reading materials were used for each baseline session.

The experimenter presented traditional topics for monologue and asked questions for dialogue. During monologue, the client was instructed to discuss various topics, such as his speech behavior, speech therapy, history of onset and development of stuttering, educational background, job, family, situational problems with stuttering, attitudes toward speech and so on.

During dialogue, the subject was asked specific questions, such as, "Why do you stutter?" "What is your reaction to stuttering?", "What is fluency?", "What are some things you can do to improve your speech?", "What was your medical history as a child?", "Is stuttering a psychological problem?", and other queries of the same nature.

Response-contingent verbal stimuli were not presented during baseline sessions. Two members of the experimenter's thesis committee (instructors in the university stuttering program) tracked responses behind a 2-way mirror for each baseline session. One instructor tallied positive and negative language responses during monologue and dialogue and the other instructor counted and categorized interference responses in each setting.

Conditioning Phase

Introductory Procedures. At the beginning of the conditioning phase, in the first session of Stage I, the main goal response of the program, a "normal, fluent speech" pattern of response, was explained to the subject. The subject was also explained the importance of positive language responses in the establishment and maintenance of self-directed behavior change, in addition to variables necessary for "self-monitored verbal behavior:" feedback, response correction and "listener awareness"(see Chapter I-Definition of Terms).

"Stretch and flow" was defined (see Chapter I-Definition of Terms) and the importance of this response (the identification of appropriate feedback stimuli) in the establishment of fluent speech was explained.

Prior to the introduction of the "stretch and flow" response pattern, differential relaxation procedures were initiated. The subject sat in a chair and was instructed to relax ("let go") his body parts. The procedures for relaxation, which were then applied, resembled those described by Jacobsen (1965) in Progressive Relaxation. The subject was instructed to tense and "let go" successively smaller muscle groups and to attend to the kinesthetic stimuli of resultant responses. The purpose of differential relaxation for (1) the identification of tense versus relaxed bodily responses, and (2) the use of appropriate muscular tension while speaking, were explained to the subject.

Positive reinforcement was presented continuously for the emitted relaxation of various body musculature, after which the experimenter described the subject's behavior ("Good, you've let you're arm go", etc.).

The experimenter checked residual tension by lifting and releasing the subject's limbs, noting whether they fell heavily; the shoulders, head and facial features (particularly the eyes and mouth) were checked to see if they exhibited no excess tonus.

Stage I: Reading. The end goal response of the first stage of the program was the motor response pattern "stretch and flow." When general physical signs disclosed that adequate relaxation had been achieved by the subject in the first session, he was presented a book to read. The subject was instructed to "stretch and flow," by prolonging the vowel-like characteristics of the sounds, within and across words, initiating the continuous, forward movement of air. The subject was also instructed to attend to the auditory, proprioceptive, kinesthetic and tactile stimuli produced by "stretch and flow" responses (for the development of "self-monitored verbal behavior"). The importance of "stretch and flow" responses for the development of fluent speech responses in Stage I was explained.

For each of the four stages of the program, explicit instructions for response production and self-reinforcement, as well as explanatory statements, were utilized during the first session of each stage, in the reading setting only.

After the experimenter read a few sentences, modeling "stretch and flow," the experimenter and subject simultaneously read two sentences with the "stretch and flow" response pattern. For the remaining portion of the first reading setting, the experimenter modeled "stretch and flow" while instructing the subject to read: one sentence; two sentences; one paragraph; one page; and, two pages. For this initial session, reinforcement included mild positive verbal

stimuli following words best reflecting the desired motor behavior (nearly continuous schedule of reinforcement) and mild verbal punishment (reinstruction and modeling) for the improper production of "stretch and flow" in words (presented intermittently).

The first instruction at the beginning of the four remaining reading settings of Stage I directed the subject to "let go" and read something, using a "stretch and flow" pattern of response (the experimenter modeled "stretch and flow" during these instructions). Instructions, thereafter, pertained only to the amount of material to be read (with no modeling), while intermittent mild punishment (reinstruction and modeling) pertained specifically to motor responses necessary for "stretch and flow."

After the subject produced "stretch and flow" with no interferences for two pages, he was instructed to read a variety of materials (books and magazines), which were presented every five minutes.

The criteria for positive reinforcement changed throughout the first three settings, from the correct production of "stretch and flow" in words, to correct production in sentences, paragraphs and pages. For the last two sessions, the criterion for positive reinforcement was appropriate "stretch and flow" for a page of reading. Positive reinforcement was presented intermittently by the end of the fourth session. Punishment for incorrect motor responses (improper motor response pattern and/or interference responses)

was presented continuously by the fourth session of Stage I; the magnitude of all reinforcement throughout Stage I was weak, utilizing low verbal intensity and non-emotive semantic cues (see Type, Frequency and Magnitude of Reinforcement, pp. 40). The primary clinical environment (C. E. ¹) was utilized throughout Stage I and included the experimenter and subject only.

Stage I: Monologue. For the first session of monologue in Stage I, the experimenter modeled "stretch and flow" and described a picture. The subject was then presented a picture and instructed to describe it, using "stretch and flow." This procedure was repeated ten times. The subject was then instructed to describe three picture-sequence stories, without the cue to "stretch and flow." Modeling, specific response instructions, and explanations of the significance of "stretch and flow" in the development of normal fluent speech were not utilized in the initial monologue (or dialogue) setting, having been introduced in the reading setting. The responses reinforced and the method of reinforcement was identical to that used during the first reading setting in this stage.

For remaining monologue settings in Stage I, the experimenter modeled "stretch and flow" when presenting the first instruction. The following speech activities were performed: (1) descriptions of objects in the room; the experimenter's physical appearance and the subject's physical appearance; (2) informal monologues (2-3 minutes

in duration), such as, the subject's job, family, weekend activities, speech behavior emitted in a previous activity and speech behavior outside the clinic; and (3) a formal five minute monologue (previous speech therapy).

Throughout Stage I monologue settings, positive reinforcement was applied for words best reflecting "stretch and flow," and sentences with the desired response pattern. The type, schedule and magnitude of reinforcement for motor responses were the same as those utilized during reading sessions (sessions 2-5) in Stage I. A weak magnitude of reinforcement was utilized in presenting continuous positive reinforcement and intermittent punishment (at the end of activities) for language responses emitted in monologues. The same clinical environment for reading was employed for monologue, with the subject and experimenter present.

Stage I: Dialogue. The experimenter modeled the correct response pattern during the first two activities of the first session of dialogue only. The experimenter first modeled a four word response with the carrier phrase, "I have a..." using "stretch and flow"; the subject then emitted a four word response, using the same carrier phrase. This was repeated five times. The same procedure was utilized for a six word response. For the rest of the activities in the first dialogue session and remaining sessions, modeling of the appropriate motor response pattern was not utilized. The experimenter,

however, consistently modeled positive language responses throughout this stage.

Speech activities during dialogue sessions included: (1) answers to questions about the subject's age, birthdate, address and family names (session 1); (2) answers to questions about hobbies, favorite movies, future plans and the experimenter's speech behavior (sessions 2, 3); (3) answers to questions about assignments, the subject's speech behavior and his attitudes toward speech and speech improvement (sessions 3, 4, 5); (4) progressive stories (session 4); and, (5) role playing (session 5). Discussions between the subject and experimenter were often generated as a result of questions presented by the experimenter and the reinforcement of certain language responses.

Particularly, in this stage, the subject and experimenter discussed the importance of using behavioral terms to describe speech behavior. The subject often stated that his use of certain language responses should not be considered a detriment to his improvement and that his presence in the clinic was proof of his desire to improve his speech. To this, the experimenter repeatedly stated that what the subject "desired" and what he "expected" was reflected in the language he used and that the emission of statements reflecting responsibility for his speech were necessary in order that he monitor his speech behavior outside the clinic. The experimenter and subject

also discussed the importance of the identification of correct and incorrect motor responses away from the clinic as well as the correction of responses following the reception of negative stimuli.

The type, schedule and magnitude of reinforcement for motor and language responses were the same as those utilized during monologue; the clinical environment was also the same.

Stage I: Extinction (Criterion Testing). Extinction sessions assessed the base operant level of interference responses to determine the subject's level of "proficiency" with regard to a criterion measure of 1.0 or less, interference responses per minute, for advancement to the next step. Each setting for this session was ten minutes in duration. The reinforcement of motor and language responses was withdrawn. In reading, the subject was instructed to read continuously, while materials (novels) were presented every 3.3 minutes. In monologue, the subject was instructed to perform (1) a five minute formal monologue (developed during conditioning) and (2) two informal monologues (approximately 2-1/2 minutes each) on the subject's past speech behavior and his present speech behavior. In dialogue, the subject was presented questions concerning, family, hobbies, "stretch and flow," assignments and speech behavior outside the clinic. C.E.¹ was used for this session with only the subject and experimenter present.

Stage II: Reading. The end goal response for this stage was

"increased breathiness-reduced stretch." Again, in the first reading setting of the stage, specific instructions were utilized to establish a self-monitored fluent motor response pattern (the specific instructions used in the initial reading session were not applied to the other settings). The subject was first instructed to read with a shorter amount of "stretch." When this was attained, he was told to exaggerate "flow" or increase "breathiness." The subject was informed that having learned to monitor correctly the resultant stimuli of a very relaxed, fluent, motor response, he would learn to produce and identify the consequent stimuli of a closer motor approximation to fluency. The subject was instructed to attend particularly to the tactile sensation of the "breathy" forward movement of air, as he moved his lips and tongue at his normal rate.

The experimenter modeled the response while reading a few sentences and, again, the subject and experimenter produced the response together as they read. For the remaining portion of this initial setting, the experimenter modeled the proper response only when instructing the subject to read. Again, continuous reinforcement was presented for the best production of words; however, the criteria for reinforcement changed rapidly in this session. The experimenter reinforced words until the subject produced the proper response for a few pages of reading, then the experimenter reinforced successive sentences, paragraphs and pages, to establish a

consistently "self-monitored" response by the end of the first session of reading. Intermittent punishment for incorrect responses (improper motor response patterns and/or interference responses) was again utilized. The magnitude of consequent verbal stimuli was weak.

For remaining reading settings in this stage, the subject was given the same instruction to read continuously; materials were again changed every five minutes. Reading materials included novels, text books and magazines. The modeling of motor responses during reading instructions was eliminated after the second session.

The schedule of reinforcement was similar to that presented during Stage I; however, an intermittent schedule of positive reinforcement (for the correct motor response in a page of reading) was introduced earlier (second session). A continuous schedule of punishment (for incorrect responses) was introduced by the third session. Language responses were elicited during this stage of reading, through questions concerning the subject's speech behavior; the same schedule for motor responses was presented for language responses.

The magnitude of reinforcement for motor and language responses was increased in the fourth session of Stage II (based on the type of "self-monitored verbal behavior" emitted in the previous session), to a conversational level of verbal intensity in conjunction with more emotive semantic cues ("very good, " "no, " "I agree

(disagree), " see Type, Frequency and Magnitude of Reinforcement, p. 40).

The primary clinical environment (C. E. ¹) was used throughout this stage. For sessions 2 and 3, two additional people were present in the room; for sessions 4 and 5, three people were included in the environment besides the subject and experimenter.

Stage II: Monologue. For the first session in this stage, the appropriate motor response was shaped with procedures similar to those utilized during the first monologue session in Stage I. The experimenter modeled the appropriate response pattern and described a picture; the subject was then instructed to describe a picture, using the desired motor response. This procedure was repeated ten times. The subject was then instructed to give short descriptions of various items (without modeling from the experimenter), such as his house, car, hobbies and favorite foods. The criteria for positive reinforcement were the most appropriately produced words (during the first activity) and correctly produced sentences (for succeeding activities). Continuous positive reinforcement and intermittent punishment (for incorrect responses) were utilized and the magnitude of consequent verbal stimuli was weak.

For remaining monologue settings, the experimenter modeled the desired response pattern for the first instruction. The speech activities included informal and formal monologues. Informal

monologues reflected generally more emotive subject matter, such as the subject himself, Viet Nam, Middle-East crisis, space program, pornography, interfering behavior after a speech activity and interfering behavior outside the clinic. The minimum time for informal monologues was three minutes. In addition, the subject developed a five minute monologue on Chess.

Positive reinforcement in these sessions (following correctly produced sentences) changed from a continuous to an intermittent schedule by the third session. The intermittent punishment schedule for incorrect responses changed to a continuous schedule by the third session. Language responses emitted during monologues were rewarded or punished only when the subject finished speaking. The significance of positive language responses and/or the reinforcement of these responses were not discussed in monologue settings. The magnitude of reinforcement increased in the second session to the conversational level of intensity with the combined semantic cues (see Type, Frequency and Magnitude of Reinforcement, p. 40). The same clinical environment and increasing audience size for reading was used for monologue during Stage II.

Stage II: Dialogue. The modeling of responses and speech activities performed during the first dialogue session was the same as that presented in the first session of dialogue in Stage I. Speech activities for remaining sessions were: (1) answers to questions

about assignments, speech behavior inside and outside the clinic, the subject's interests and attitudes (sessions 2, 3, 4, 5); (2) conversations about current events (sessions 2, 3, 5); (3) progressive stories (session 3); (4) role playing (session 2, 5); and, (5) phone calls (sessions 4, 5). Discussions between the subject and experimenter regarding the significance of positive or negative language occurred less often. By Stage II, the subject had generally accepted the necessity of using behavioral terminology as indicative of self-managed behavioral change. The subject and experimenter, however, discussed: (1) the subject's negative attitude of people in general; (2) the importance of maintaining the appropriate monitoring of fluent motor response patterns outside the clinic; and, (3) the subject's inconsistent attention to the feedback stimuli directed from listeners (lack of "listener awareness"). The experimenter consistently modeled positive language responses.

The type, schedule and magnitude of reinforcement used for Stage II in monologue settings were presented in dialogue. The same clinical environments and audience sizes used for reading and monologue were employed here; however, the subject and experimenter went outside the environment to make phone calls.

Stage II: Extinction (Criterion Testing). Each setting was ten minutes in length. Reinforcement was motor and language responses was withdrawn. C.E.¹ with three additional people, made up the

stimulus situation for this session. The procedures for reading were the same as for Stage I. Reading material included text books and magazines. In monologue, the subject was instructed to perform (1) a five minute formal monologue (developed during conditioning) and (2) two informal monologues (job description and description of present speech behavior). In dialogue, the subject was presented a variety of questions from audience members.

Stage III: Reading. The end goal response of Stage III was "reduced breathiness." In the first session of this stage, the subject was instructed to read faster and louder, using less breath. The subject was told to attend to the resultant stimuli from the production of less breath in addition to the stimuli resulting from "effortless" speech (produced in Stage I); the importance of "effortless" productions in the presence of greater tone was explained. The experimenter modeled the response for the subject; however, the subject and experimenter did not read simultaneously, as before. The subject was instructed to read continuously, while materials were presented every five minutes. The schedule and magnitude of positive reinforcement and the varying criteria were the same as that applied to the initial session of reading in the preceding stage. Punishment for incorrect responses was presented continuously throughout this session; however, the magnitude was weak (reinstruction and modeling).

For each of the remaining reading settings, the subject was instructed to read continuously; materials were changed from every 5 to every 2 minutes. Reading material included magazines, text books and a joke book. Questions concerning the subject's speech behavior, while reading, were occasionally presented by the experimenter.

Positive reinforcement following the appropriate motor responses (for a page of reading) and positive language responses was intermittent by the second session. Continuous punishment for incorrect motor and language responses was presented throughout this stage. The magnitude of reinforcement increased by the second session of this stage and was the same as that presented during the last two sessions of Stage II (e. g., conversational level of intensity with verbal stimuli, such as, "good, " "no, " "uh-uh, " "I understand (don't understand) that language").

The first three sessions of this stage took place in C. E. ¹. The fourth session was carried out in the secondary clinical environment (C. E. ²) and the fifth session was in the reception room of a bank (C. E. ⁴), where the Stuttering Council of Portland was meeting. Only the subject and experimenter were present in the first session, there were four people present in the second and third session, six people in the fourth session and twelve people in the fifth session.

Stage III: Monologue. Instructions to emit the appropriate

response pattern and modeling of the response were not utilized during the first session. Each session the subject was instructed to perform formal and informal monologues. Informal monologues included topics, such as analysis of the subject's motor and language behavior during speech activities, film censorship, drug abuse, and homosexuality, in addition to topical suggestions from the audience. The subject expanded the five minute formal monologue from Stage III to a fifteen minute monologue.

Positive reinforcement in these sessions (following correctly produced sentences and positive language responses) was changed from a continuous to an intermittent schedule after ten minutes of the first session. Punishment for incorrect motor and language responses was presented continuously throughout Stage III. Language responses were reinforced immediately rather than at the end of each monologue. The magnitude of reinforcement was weak for the first ten minutes of monologue (first session); thereafter, the conversational level of loudness and combined semantic cues (p.40) were utilized. The same environments and audience sizes for reading in Stage III were utilized for monologue settings.

Stage III: Dialogue. The modeling of the motor response pattern during initial activities was not utilized; however, consistent modeling of positive language responses was provided during this stage. The following speech activities were performed by the subject:

(1) answers to questions about assignments, speech behavior inside and outside the clinic, interests and attitudes (sessions 1, 3, 4, 5); (2) role playing (sessions 1, 4, 5); (3) phone calls (sessions 1, 3); and (4) asking questions of students in the library, cafeteria and hall (session 2) and of members of the audience (sessions 4, 5). Some of the participants were asked to question the subject about his use of behavioral terminology, using negative language responses when they referred to speech behavior. The subject responded in a positive manner, by explaining the goals of the program and the necessity of emitting language responses consistent with such goals.

The type, schedule and magnitude of reinforcement for motor and language responses presented in each dialogue setting were those applied in Stage III-monologue settings. The dialogue environments and audience sizes were the same as in reading and monologue; the subject and experimenter left the clinical environment to make phone calls and to ask questions to students in the areas noted above.

Stage III: Extinction (Criterion Testing). Settings were ten minutes. Reinforcement for responses was withdrawn. C.E.² and 9 additional people comprised the stimulus situation for this session. The same procedures for reading used in former extinction sessions were used here; reading materials included magazines and a joke book. In monologue, the subject was instructed to perform a ten minute monologue (developed during conditioning). In dialogue, the

subject was presented a variety of questions from the group.

Stage IV: Reading. The end goal response of Stage IV was "normal, fluent speech." Response instructions were less explicit for the first session of this setting. To reduce the breathy quality of the voice, the subject was instructed to speak "louder" while reading. The cue "louder" was introduced every 15 seconds while the subject read; the cue was faded when the subject assumed the appropriate intensity. The subject was told to attend to resultant stimuli from "flow" and the appropriate amount of muscle tonus during articulation. Because of the nature of this response, modeling by the experimenter was continuous. Responses were shaped in the manner of the former stage to establish normal, fluent, speech patterns in continuous reading of constantly changing materials; thus, the schedule of reinforcement used in the first session of Stage III was utilized here; although the magnitude of reinforcement was increased (same level presented at end of Stage III).

For the remaining settings, materials were presented in the same manner as in Stage III, with instructions to read continuously (modeling was consistently provided by the experimenter). Reading materials included magazines and joke books. Language responses were again elicited by questions concerning the subject's speech behavior in reading. Positive reinforcement (for a page of reading with the appropriate motor response and positive language responses)

was presented intermittently by the second session. Punishment for incorrect responses remained on a continuous schedule. During the third session of Stage IV, the magnitude of reinforcement was further increased to a very loud presentation of verbal stimuli, with semantic cues, such as, "no!", " "wrong!", " (banging on the table), "great!", " "Excellent!", " and "Excellent (bad) language!" (see Type, Schedule and Magnitude of Reinforcement, p. 40)..

C.E.¹ was used for the first session. C. E.² was used for sessions 2 and 5; C. E.³ was utilized for the session 4. The additional people present included: four in session 2; fifteen in session 4; and twenty in session 5. Session three took place outside of the clinic and pertained to dialogue only.

Stage IV: Monologue. For the first session of this stage, the experimenter presented topical suggestions for informal monologues (opinion of marijuana, birth control and suggestions for succeeding monologue sessions). Since an audience was present for the remaining sessions of this stage, the experimenter merely instructed the subject to perform informal monologues; the subject, then, asked for suggestions from members of the audience. The schedule of reinforcement for motor and language response was the same as for Stage III, ixcept that the frequency of positive reinforcement was much less. The magnitude of reinforcement was average (conversational loudness level and combined semantic cues) for the first

session; thereafter, the magnitude of reinforcement was intense (loud level of verbal intensity with the combined semantic cues, described in reading, Stage IV). The same environments and audience sizes for reading were utilized for monologue settings.

Stage IV: Dialogue. Modeling was provided for positive language responses but not for motor response patterns. The following speech activities were performed: (1) opinion poll taking (sessions 1, 2); (2) phone calls (session 3); (3) conversations with strangers (sessions 2, 3, 4); and (4) answers to questions from the audience (sessions 4, 5). Session 3 of this stage was devoted to dialogue situations outside the clinic. Certain participants were instructed (before the beginning of sessions) to initiate heated debates with the subject concerning any topic, in particular the subject's accomplishments and expectations with regard to speech improvement.

The method of reinforcement was the same as for Stage IV-monologue settings. The same clinical environments and audience sizes for reading and monologue were utilized. The subject and experimenter left the clinical environment for phone calls, opinion poll taking and conversations with strangers (university cafeteria and halls).

Stage IV: Extinction (Criterion Testing). Settings were ten minutes long. Reinforcement was withdrawn. C.E.² in addition to 18 people made up the stimulus situation for this session. Reading

procedures were the same as for previous extinction sessions. The reading materials were joke books. In monologue, the subject performed informal monologues (no time limit) on topics suggested from the audience. In dialogue, the subject was presented a variety of questions from the audience.

Follow-Up Baseline

One 30 minute follow-up baseline was carried out four weeks after the last extinction session, in order to assess the base operant level of: the rate and frequency interference responses per minute in reading, monologue and dialogue; the rate of positive and negative language responses per minute in monologue and dialogue; and, the percentage of positive and negative language responses and rate of types of interferences per minute during the session. Ten minutes were designated for each setting. The follow-up baseline took place in the primary clinical environment (C.E.¹). Response contingent reinforcement was withdrawn. The experimenter selected another clinician to carry out baseline activities, because of the role of the experimenter as a discriminative stimulus for appropriate, "self-monitored" behavior.

The same procedures and materials, topics and questions were utilized for this baseline as for initial baseline sessions. Topics added to the monologue setting were: the subject's present speech

behavior and the subject's opinion of the treatment program. Questions added to dialogue were: "What would you add to, or take out of this program?" "Would you recommend this program to anyone?" and "Would you continue in this program if it was available?"

CHAPTER IV

RESULTS AND DISCUSSION

I. RESULTS

Intra- and Inter-Judge Reliability

The experimenter listened to randomly selected audio and video-tapes and tracked responses (interference and language responses); the results from these tapes were compared to results from initial trackings of these tapes. The correlation of the two sets of scores was .96 for interference response tracking and .89 for language response tracking.

To evaluate the random tracking of interference responses per minute in reading, monologue and dialogue, a comparison of interference response tracking in certain sessions was made between: (1) the experimenter's random tracking of audio tapes and results obtained by the experimenter from complete video-tape tracking, and (2) the experimenter's random tracking of audio-tapes and the means of results obtained by judges tracking video-tapes. Agreement was .99 between the rates of interference responses in reading, monologue and dialogue combined for the sessions which were tracked both

randomly (audio-tape analysis) and completely (video-tape analysis) by the experimenter. Agreement was .99 between the rates of interference responses in reading, monologue and dialogue combined for the same sessions, which were tracked randomly (audio-tape analysis) by the experimenter and completely (video-tape analysis) by the judges. The high correlations obtained by comparing the random method of audio-tape tracking used by the experimenter to the complete method of video-tape tracking used by the experimenter and judges indicate that the random method of response tracking was effective in determining a representative measure of the number of interference responses per minute throughout this program.

The rate of types of interference responses determined by the random analysis of audio-tapes by the experimenter was evaluated by comparing the results tracked by this method in certain sessions, to the means of results obtained by judges tracking each minute of the same sessions from video-tapes. Agreement between types of interference responses was: .99 for tonic interferences, .25 for clonic interferences, .95 for prolongation interferences, .67 for retrieval interferences, .97 for verbal junk interferences and -.41 for combination interferences. The low correlation obtained for clonic interferences and the negative correlation obtained for combination indicate that random sample tracking was not effective as an accurate measurement of these responses.

The video-tape tracking of responses by the experimenter was compared to the means of video-tape response tracking by judges. Agreement between the experimenter's and judges' tracking of the rate of interference responses in reading, monologue and dialogue combined was .90. Agreement between the experimenter's and judges' tracking of the rate of language responses was .91 in monologue and dialogue combined. Agreement between the experimenter and judges regarding the frequencies of positive and negative language responses was .90. These correlations indicate the reliability of the experimenter's tracking of interference and language responses.

Baseline Phase

Analysis of Interference Responses. The following symbols will be used to present and later discuss the measurement of interference responses in the baseline, conditioning and follow-up phases of this program: (1) IR = interference response; (2) IR /m = interference responses per minute; (3) W /m = total words per minute emitted in a setting; (4) T /m = tonic interferences per minute; CL /m = clonic interferences per minute; P /m = prolonged interferences per minute; R /m = retrial interferences per minute; VJ /m = vergal junk interferences per minute; CB /m = combination interferences per minute.

The results obtained by the tracking of interference responses

for the three baseline sessions were averaged to determine the mean rate and frequency of interference responses. The mean number and frequency of interference responses per minute (IR/m) in reading, monologue and dialogue are presented in Table I. The means of the types of interference responses per minute for baseline sessions are presented in Table II.

Analysis of Language Responses. The following symbols will be used to present and later discuss the measurement of language responses in the baseline, conditioning and follow-up phases of this program: (1) +LR = positive language responses; (2) -LR - negative language responses; (3) +LR/m = positive language responses per minute; (4) -LR/m = negative language responses per minute; (5) LR/m = total number of language responses per minute.

The results obtained by the tracking of language responses for the three baseline sessions were averaged to determine the base operant level of positive and negative language responses. The average rates of positive and negative language responses (+LR/m and -LR/m) and the percentage of these responses in monologue and dialogue settings combined are shown in Table III.

Conditioning Phase

The results of the subject's performance in reading, monologue and dialogue which were obtained by interference response tracking

TABLE I

THE MEANS OF THE NUMBER OF INTERFERENCE RESPONSES
PER MINUTE, THE TOTAL NUMBER OF WORDS PER
MINUTE AND THE FREQUENCY OF INTERFER-
ENCE RESPONSES DURING BASELINE
READING, MONOLOGUE, AND
DIALOGUE SETTINGS

Setting	IR /m (mean)	W /m (mean)	Frequency of IR /m (mean)
Reading	12.9	64.5	20 %
Monologue	11.3	50.5	22.39%
Dialogue	11.0	47.5	23.15%

TABLE II

THE MEANS OF THE NUMBER OF TYPES OF
INTERFERENCE RESPONSES PER MINUTE
DURING BASELINE SESSIONS

Setting	T/m (mean)	CL/m (mean)	P/m (mean)	R/m (mean)	VJ/m (mean)	CB/m (mean)
Reading, monologue, and dialogue	3.93	2.43	2.66	.14	.00	2.5
Mean of IR/m for sessions = 11.66						

TABLE III

THE MEANS OF THE NUMBER OF POSITIVE AND NEGATIVE LANGUAGE RESPONSES PER MINUTE, THE TOTAL NUMBER OF LANGUAGE RESPONSES PER MINUTE AND THE PERCENTAGE OF POSITIVE AND NEGATIVE LANGUAGE RESPONSES DURING BASELINE MONOLOGUE AND DIALOGUE SETTINGS

Setting	+LR /m (mean)	-LR /m (mean)	Total LR /m (mean)	% +LR (mean)	% -LR (mean)
Monologue and dialogue	.8	1.95	2.75	29	71

(random analysis of audio-tapes) and language response tracking (complete analysis of video-tapes) are presented and described here. While the rate of types of interference and language responses were measured during conditioning, these measures were considered significant for comparison of pre- and post-program analysis only.

Stage I. The end goal response of "stretch and flow" was achieved quickly in this stage (first session) and was emitted in increasingly difficult speech activities in reading, monologue and dialogue. The subject achieved the criterion of 1.0 or less interference responses per minute in each of the three settings during the 30 minute extinction session presented at the end of five conditioning sessions. The rates of interference responses for reading, monologue and dialogue settings in Stage I are presented in Figure 2.

Figure 2. The number of interference responses per minute in reading, monologue and dialogue settings during Stage I - "Stretch and Flow."

In reading settings, the subject demonstrated an increase of .3 interference responses per minute (IR /m) in the second session, which decreased by .4 to .0 IR /m in the third session and increased and decreased by .2 IR /m for the fourth and fifth sessions. The rate of interference responses per minute for reading was .0 during the extinction session.

The overall rate of interference responses per minute increased during monologue settings. For the first two sessions of monologue, the number of interference responses per minute was .2; for the third session the rate of interference responses per minute decreased by .2 to 0 and increased to .4 in the fourth and fifth sessions. For the extinction session, a rate of .7 IR /m was obtained for monologue.

The rate of interference responses in dialogue started at .0 IR /m and varied only slightly during remaining sessions. The rate of interference responses per minute increased to .2 in session two, decreased to .0 in session three, increased to .2 in session four, decreased to .1 in session five and decreased further during extinction to .0.

The percentage of positive versus negative language responses measured for the video-taped conditioning session was 55 per cent; for the extinction session the percentage of positive language responses was 67 per cent.

Stage II. The end goal response for this stage was "increased

breathiness-reduced stretch." The procedures utilized in the first session resulted in the correct production of the response in reading, monologue and dialogue. The rates of interference responses for the first session of Stage II were: .0 IR/m for reading and monologue and .8 IR/m for dialogue. Audience members were introduced in the remaining sessions of this stage; two people were present in sessions two and three and three people were involved in sessions four and five. The extinction session included three audience members in the primary clinical environment (C.E.¹). The rates of interference responses per minute in reading, monologue and dialogue settings during Stage II are presented in Figure 3.

The rate of interference responses per minute demonstrated the greatest consistency for reading settings of this stage. The number of interference responses per minute increased to .4 in session two; thereafter from sessions three to five, the rate of interference responses was .0. During extinction in reading, the rate of interference responses per minute was maintained at .0.

For remaining monologue settings, the number of interference responses per minute increased by .4 in the second session, decreased by .2 in the third session and increased by .2 for sessions four and five. During extinction, when reinforcement was withdrawn, the rate of interference responses further increased by .3 to .7 IR/m.

During State II dialogue settings, the rate of interference

Figure 3. The number of interneece responses per minute in reading, monologue and dialogue settings during Stage II - "Increased Breathiness-Reduced Stretch."

responses per minute showed the greatest amount of change. From session one to session two, the rate of interference responses increased by .6 IR/m and decreased by 1.2 IR/m in session three; for session four, the rate of interference responses again increased by .4 IR/m and decreased by .2 IR/m for session five. During extinction, the number of interference responses increased by .3 to .7 IR/m.

For Stage II reading, monologue and dialogue settings, the subjects achieved the criterion of 1.0 IR/m during the extinction session (after five conditioning sessions) in order to be advanced to the next stage.

The percentage of positive versus negative language responses for the video-taped session in Stage II (session three) was 74 per cent. During extinction, the percentage of positive language responses further increased to 79 per cent.

Stage III. "Reduced-breathiness" was the end goal response and was shaped by the end of the first session. The number of interference responses per minute was .2 for reading, 1.0 for monologue and .8 for dialogue. For remaining sessions, the subject performed a variety of speech activities in the presence of four audience members in sessions two and three (in C.E.¹), six people in session four (in C.E.²) and 12 persons in session five (in C.E.⁴). The extinction session included nine people (in C.E.²). The rates of interference

responses per minute in reading, monologue and dialogue for the Stage III response are presented in Figure 4.

The number of interference responses per minute for remaining reading settings remained low: .0 in session two, .2 in session three and .0 in sessions four and five. The rate of interference responses in the extinction session remained at .0 IR /m.

For remaining monologue settings, the rate of interference responses decreased by .8 to .2 IR /m in session two and remained at .2 IR /m for sessions three, four and five. During extinction, however, the number of interference responses per minute increased to .7 IR /m.

The number of interference responses per minute in remaining dialogue settings decreased to .6 in session two and to .0 in session three, then increased to .4 for session four and to .6 for session five. The rate of interference responses during extinction increased by .1 to .7 IR /m.

The subject achieved the criterion of 1.0 or less interference response per minute in each setting during the extinction session presented at the end of five conditioning sessions and was advanced to the next stage.

The percentage of positive versus negative language responses obtained for the video-taped conditioning session (session three) in this stage was 87 per cent and was measured at 91 per cent for the

Figure 4. The number of interference responses per minute in reading, monologue and dialogue settings during Stage III - "Reduced Breathiness."

extinction session.

Stage IV. The end goal response for Stage IV was "normal fluent speech." In the first session, where shaping procedures were initiated, the rates of interference responses were .0 IR/m for reading, .6 IR/m for monologue and .9 IR/m for dialogue settings. For the remaining sessions of Stage IV, slightly more complex speech activities were carried out in the presence of the following environmental stimuli: four participants in C.E.² for session two, 15 persons in C.E.³ for session four and 20 audience members in C.E.² for session five. The final extinction session included 18 audience members in C.E.². Session three of Stage IV pertained strictly to dialogue; however, the rate of interference responses per minute emitted in this session could not be accurately measured since the experimenter accidentally erased portions of the tape. The rates of interference responses per minute throughout Stage IV in reading, monologue and dialogue settings are shown in Figure 5.

The number of interference responses per minute for remaining reading settings in this stage was .0, including extinction.

The rates of interference responses for remaining monologue settings were: .4 IR/m in session two, an increase of .2 to .6 IR/m in session four and an increase of .4 to 1.0 IR/m in session five. During extinction, the rate of interference responses decreased by .3 to .7 IR/m.

Figure 5. The number of interference responses per minute in reading, monologue and dialogue settings during Stage IV - "Normal, Fluent Speech."

For remaining dialogue settings, the number of interference responses per minute increased by .7 in session two, decreased by .6 for session four and increased by .1 for session five. The rate of interference responses during extinction was 1.0 IR/m, demonstrating a decrease of .1 IR/m from the last conditioning session.

The subject achieved the criterion of 1.0 IR/m or less, for each setting in the final extinction and, thus, completed the program in the allotted time of 22 hours.

The percentage of positive versus negative language responses was measured for the final extinction session only, since the conditioning session which would have been taped was carried on outside of the clinic. For the last extinction session, the percentage of positive language responses was 91 per cent.

In addition to obtaining the rate of interference responses and the percentage of positive language responses in the Stage IV - extinction session, a complete analysis of interference and language response was made, in order to compare the results with those obtained in initial and follow-up baseline sessions. The number of interference responses per minute and the relative frequencies of these responses in reading, monologue and dialogue are presented in Table IV. The rate of the types of interference responses per minute for these settings combined are illustrated in Table V.

The rates (+LR/m and -LR/m) and percentages (+LR and -LR) of positive and negative language responses in monologue and dialogue

TABLE IV

THE NUMBER OF INTERFERENCE RESPONSES PER MINUTE,
THE NUMBER OF WORDS EMITTED PER MINUTE AND
THE FREQUENCY OF INTERFERENCE RESPONSES
DURING READING, MONOLOGUE AND
DIALOGUE SETTINGS IN STAGE IV -
EXTINCTION

Setting	IR /m	W /m	Frequency of IR /m
Reading	.0	102.9	.00%
Monologue	.7	88.1	.79%
Dialogue	1.0	74.2	1.33%

TABLE V

THE NUMBER OF TYPES OF INTERFERENCE
RESPONSES PER MINUTE DURING
STAGE IV - EXTINCTION

Setting	T /m	CL/m	P/m	R /m	VJ/m	CB /m
Reading, monologue and dialogue	.11	.15	.13	.00	.09	.08
Mean of IR /m for session = .56						

settings combined, for the last extinction session of conditioning are shown in Table VI.

TABLE VI

THE NUMBER OF POSITIVE AND NEGATIVE LANGUAGE RESPONSES PER MINUTE, THE TOTAL NUMBER OF LANGUAGE RESPONSES PER MINUTE AND THE FREQUENCY OF POSITIVE AND NEGATIVE LANGUAGE RESPONSES IN MONOLOGUE AND DIALOGUE SETTINGS, DURING STAGE IV - EXTINCTION

Setting	+LR /m	-LR /m	Total LR /m	% of +LR /m	% of -LR /m
Monologue and dialogue	.50	.05	.55	91	9

Follow-up Phase

Analysis of Interference Responses. The base operant level of interference responses, four weeks after the end of the conditioning phase, was determined in a follow-up baseline session. The rates and frequencies of interference responses in reading, monologue and dialogue are presented in Table VII. The rate of the types of interference responses in reading, monologue and dialogue combined are shown in Table VIII.

Analysis of Language Responses. The base operant level of positive and negative language responses was also reassessed in the

TABLE VII

THE NUMBER OF INTERFERENCE RESPONSES PER MINUTE,
THE NUMBER OF WORDS EMITTED PER MINUTE AND THE
FREQUENCY OF INTERFERENCE RESPONSES IN
READING, MONOLOGUE AND DIALOGUE
FOLLOW-UP BASELINE SETTINGS

Setting	IR /m	W /m	Frequency of IR /m
Reading	.0	101.5	.00%
Monologue	.8	84.3	.95%
Dialogue	1.8	69.3	2.59%

TABLE VIII

THE NUMBER OF TYPES OF INTERFERENCE RESPONSES
PER MINUTE DURING THE FOLLOW-UP
BASELINE SESSION

Setting	T /m	CL /m	P /m	R /m	CJ /m	CB /m
Reading, monologue and dialogue	.19	.32	.21	.00	.06	.08
Mean of IR /m = .86						

follow-up baseline session. The rates and percentages of positive and negative language responses, in monologue and dialogue settings combined, are presented in Table IX.

TABLE IX

THE NUMBER OF POSITIVE AND NEGATIVE LANGUAGE RESPONSES PER MINUTE, THE TOTAL NUMBER OF LANGUAGE RESPONSES PER MINUTE AND THE FREQUENCY OF POSITIVE AND NEGATIVE LANGUAGE RESPONSES DURING FOLLOW-UP BASELINE MONOLOGUE AND DIALOGUE SETTINGS

Setting	+LR /m	- LR /m	Total LR /m	% of +LR /m	% of - LR /m
Monologue and dialogue	.8	.16	.96	83	17

Comparison of Pre- and Post-Program Response Measurements

Response measurements which were obtained before and after the program are presented here for comparison. In addition to the responses tracked for these sessions, three panels of judges rated the subject's speech behavior from video-tapes of the second baseline session, the last extinction session at the end of the conditioning phase (Stage IV) and the follow-up baseline session.

Comparison of Judgments of Severity of Stuttering. Three

panels of judges viewed video-tapes of the three sessions noted and rated the severity of the subject's speech behavior on a scale from 0-7, on the Iowa Scale of Severity of Stuttering (see Appendix II) for each of the three settings. The scores obtained from the three panels of judges for the baseline, Stage IV - extinction and follow-up baseline sessions are presented in Table X. The means of these scores for reading, monologue and dialogue are compared in Figure 6.

On the Iowa Scale of Severity of Stuttering, the means of the ratings for reading settings placed the severity of the subject's "stuttering" behavior between "moderate" and "moderately severe" for the baseline session; the subject was given a mean rating of "no stuttering" for both the last extinction session and the follow-up baseline session. The means of the ratings for monologue settings indicated that the subject's "stuttering" was "moderate to severe" for the baseline session, "mild" for the last extinction session and "very mild" for the follow-up baseline. The mean ratings of severity of "stuttering" for dialogue settings indicated "moderate to severe" behavior during the baseline session and "mild stuttering" behavior during the Stage IV-extinction and follow-up baseline session. With the exception of the monologue ratings, these curves reflect the same trends illustrated by measures obtained by the tracking of interference and language response for these sessions (a decrease between baseline and extinction and a slight increase -- except for reading -- between

TABLE X

THE SCORES OF THREE PANELS OF JUDGES, USING THE
IOWA SCALE OF SEVERITY OF STUTTERING IN
READING, MONOLOGUE AND DIALOGUE
SETTINGS FOR THE BASELINE, STAGE
IV - EXTINCTION AND FOLLOW-UP
BASELINE SESSIONS

Judges	Reading	Monologue	Dialogue
<u>Baseline</u>			
1	5	5	5
2	4	5	5
Average	4.5	5	5
<u>Stage IV - Extinction</u>			
1	0	1	1
2	0	1	2
3	0	3	3
Average	0	1.66	2
<u>Follow-up Baseline</u>			
1	0	1	2
2	0	1	1.5
3	0	1	3
Average	0	1	2.16

Figure 6. The mean scores of three panels of judges from the Iowa Scale of Severity of Stuttering, for baseline, Stage IV - extinction and follow-up baseline reading, monologue and dialogue settings.

Stage IV - extinction and follow-up baseline sessions). The mean rating for the follow-up baseline monologue setting indicates a further reduction in the severity of "stuttering" behavior, which is not substantiated from the measures determined by response tracking of monologue settings.

Comparison of Interference Response Measurements. The number of interference responses per minute in reading, monologue and dialogue, which were measured for pre- and post-program sessions, are presented in Figures 7, 8 and 9. In each setting, the rate of interference responses per minute decreased from baseline to the end of conditioning. The most reduction in interference response rates is seen in the reading setting, where the rate of interference responses decreased by 12.9 to .0 IR/m by the end of conditioning. The rate of interference responses did not increase in reading, during the follow-up baseline session (remaining at .0 IR/m).

The number of interference responses per minute decreased by 10.6 to .7 from baseline to the end of conditioning in the monologue setting and increased by .1 after four weeks absence from the clinic to .8 IR/m. The rate of interference responses in dialogue, from baseline to the end of conditioning, decreased by 10.0 IR/m to 1.0 IR/m; however, the number of interference responses per minute increased by .8 in the follow-up baseline session to 1.8.

The pre- and post-operant levels of frequencies of interference

Figure 7. The number of interference responses per minute in reading settings, during baseline, Stage IV - extinction and follow-up baseline sessions.

Figure 8. The number of interference responses per minute in monologue settings, during baseline, Stage IV - extinction and follow-up baseline sessions.

Figure 9. The number of interference responses per minute in dialogue settings during baseline, Stage IV - extinction and follow-up baseline sessions.

responses in reading, monologue and dialogue are presented in Figures 10, 11 and 12. The decrease in frequencies of interferences throughout the program are similar to that of the rate of interference responses (presented earlier). The frequency of interference responses in reading settings decreased from 20 per cent to .0 per cent by the end of conditioning and remained at 0 for the follow-up baseline. It is of interest to note that the number of words read (from which the percentage was derived) also increased by 38.4 words per minute during the Stage IV - extinction session and decreased only slightly (1.4 W/m) in the follow-up session.

The frequency of interference responses in monologue decreased by 21.60 per cent at the end of conditioning and increased by .16 per cent from Stage IV - extinction to the follow-up baseline session. The number of words per minute in this setting increased 37.6 by the end of conditioning, but a decrease of 3.8 W/m was seen (similar to that in reading) in the follow-up baseline.

In dialogue settings, the frequency of interference also decreased from baseline to the end of conditioning, by 21.82 per cent and increased by 1.26 per cent in the follow-up session. Similarly, the number of words increased by 26.7 per minute by the end of the program; however, a greater decrease in the number of words per minute was seen for the dialogue setting of the follow-up baseline (4.9 W/m) than for the other settings.

Figure 10. The frequency of interference responses per minute in reading settings during baseline, Stage IV-extinction and follow-up baseline.

Figure 11. The frequency of interference responses per minute in monologue settings during baseline, Stage IV-extinction and follow-up baseline sessions.

Figure 12. The frequency of interference responses per minute in dialogue settings during baseline, Stage IV-extinction and follow-up baseline sessions.

The number of types of interference responses for the pre- and post-program sessions are presented in Figure 13. The greatest amount of decrease can be seen in tonic interferences, the rate of which decreased by 3.82 IR/m, as measured in the Stage IV - extinction session; an increase of .8 tonic interferences per minute was measured in the follow-up session. The second greatest reduction occurred for prolongation interferences, decreasing by 2.53 IR/m at the end of conditioning (to .13 IR/m), and increasing .8 IR/m for the follow-up session. Combination interferences decreased 2.5 to .0 IR/m in the Stage IV - extinction session and remained at that level in the follow-up baseline session. Clonic interferences decreased by 2.28 IR/m (2.43 to .15 IR/m); clonic interferences demonstrated the greatest increase during the follow-up session, an increase of .17 IR/m. Retrial interferences decreased by .5 IR/m (.14 to .09 IR/m) at the end of conditioning, and decreased further during the follow-up session by .03 IR/m. The rate of verbal junk interference responses increased from .0 IR/m to .08 IR/m in the Stage IV - extinction session and further increased by .1 to .09 IR/m for the follow-up baseline session.

Comparison of Language Response Measurements. The rates and percentages of positive and negative language responses in combined monologue and dialogue settings for baseline, Stage IV - extinction and follow-up sessions are shown in Figures 14 and 15,

Figure 13. The rate of types of interference responses per minute in baseline, Stage IV - extinction and follow-up baseline sessions.

Figure 14. The number of positive and negative language responses per minute in monologue and dialogue settings during baseline, Stage IV - extinction and follow-up baseline sessions.

Figure 15. The frequency of positive and negative language responses in monologue and dialogue settings during baseline, Stage IV - extinction and follow-up baseline sessions.

respectively. The number of positive language responses per minute decreased by .3 during Stage IV - extinction and increased by .3 to the pre-program rate of .8 +LR/m. The number of negative language responses per minute decreased by 1.90 at the end of conditioning and increased by .11 to .16 -LR/m for the follow-up session.

Following conditioning, the percentage of positive language responses increased and the percentage of negative language responses decreased by 62 per cent; the reverse occurred during the follow-up baseline session, where the percentage of positive language responses decreased and the percentage of negative language responses increased by 8 per cent.

II. DISCUSSION

The main focus of this study was directed to the question: Is it possible to construct a four stage program with specific procedures which will produce a 'normal fluent speech' pattern and a repertoire of positive language responses?

Results of the data obtained at the end of the 22 hour conditioning phase, in the Stage IV - extinction session, establish that the subject achieved the "criterion of proficiency", 1.0 IR/m or less, in reading, monologue and dialogue settings, emitting the motor response pattern of "normal, fluent speech." These results suggest

the effectiveness of the procedures used to attain this goal.

Further analysis of the data obtained in the Stage IV - extinction session reveals that the lowest number of interference responses was measured in the reading setting, a rate of .0 IR/m (.7 IR/m in monologue; 1.0 IR/m in dialogue). This is not considered unusual by the experimenter, because: (1) the words emitted in reading are determined by printed material; and (2) communication with speakers is not required. The highest number of words per minute also occurred in the reading setting, which can be expected since the experimenter spent more time interacting with the subject in the monologue and dialogue (directly after monologues and throughout dialogue discussions).

It is of interest to note that while the total number of words per minute increased in all settings between baseline sessions and the Stage IV - extinction session, these rates are below the average number of words per minute as indicated in the literature (Johnson et al., 1963).

Comparisons between the types of interference responses measured in the initial baseline and final (Stage IV) extinction sessions, indicate that the largest number of interference responses emitted in initial baseline sessions were tonic interferences (3.92 IR/m), while the greatest number of emissions in the Stage IV - extinction session were clonic interferences (.15 IR/m). Further

comparisons between these sessions reveal that the greatest amount of reduction in the types of interference responses was achieved for tonic, prolongation and combination interferences. These measures indicate that the subject used less tension when he interfered with his speech at the end of conditioning.

Comparisons between the means of ratings on the Iowa Scale of Severity of Stuttering, obtained for baseline and Stage IV - extinction reading settings, which decreased from 4.5 to 0, support the experimenter's assessments regarding the subject's development of "normal, fluent speech" in reading. Comparisons between the mean ratings on the same scale obtained for baseline and Stage IV - extinction sessions, suggest that although the ratings decreased for monologue (from 5.0 to 2.0) and dialogue (from 5.0 to 2.16), there was still evidence of "stuttering," necessitating a rating of "mild stuttering." In view of these latter findings, the experimenter suggests that 1.0 IR/m or less may have been too high (less stringent) a response rate to be considered a "criterion of proficiency" for "normal fluent speech" and that a lower (more stringent) criterion measure might have been more effective.

Observations of the data throughout the conditioning phase indicates a gradual increase in the percentage of positive language responses to 91 per cent, by the Stage IV - extinction. The data fails to indicate, however, whether a "repertoire" of positive language

responses was developed. Specific types of positive language responses emitted during baseline and conditioning phases were not tracked. It is the opinion of the experimenter, based on the direct observations of the subject's language behavior during the Stage IV - extinction session, that the subject emitted a variety of the categories of statements, defined as positive language responses (see Chapter I - Definition of Terms). Specifically, these statements reflected "responsibility for speech, " a "positive attitude with regard to speech behavior, " knowledge of the correct speech behaviors" and "behavioral descriptions of behaviors emitted during the production of speech, " constituting a "repertoire" of positive language responses. The high frequency of positive language responses and the quality of responses emitted during the Stage IV - extinction session would seem to indicate the effectiveness of procedures utilized to develop a "repertoire" of positive language responses.

The second question posed by the experimenter was: Is it possible to condition "self-monitored verbal behavior" in the presence of an increasingly complex hierarchy of environmental stimuli? "Self-monitored verbal behavior:" as defined for this study pertained to the maintenance of fluent motor responses and positive language responses, through the operations of response production, internal feedback, external feedback and possible response correction (following the reception of inappropriate feedback stimuli) without modeling

or instruction from the experimenter. The "self-monitoring" of verbal responses (fluent motor responses and positive language responses) was not specifically tracked in this study. It was the opinion of the experimenter, when initiating this study, that the "self-monitoring" of fluent motor or positive language responses in increasing intensities of environmental stimuli would be revealed by analysis of the data obtained from Stage II-, Stage III- and Stage IV - extinction sessions, which included various "degrees" of environmental stimuli. The data, however, only partially reveal the development of this behavior, particularly with regard to interference responses.

In the Stage II - extinction session, with an audience of three people, the subject's rate of interference responses varied from .0 IR /m in reading to .7 IR /m in monologue and dialogue; however, it is the opinion of the experimenter that the subject maintained "fluency" with the motor response of that stage ("increased breathiness - reduced stretch"), by correcting emitted interference responses to the appropriate fluent motor response of that stage.

In the Stage III - extinction session, where the intensity of environmental stimuli was not only greater (audience size of nine), but the discrimination task necessary for monitoring fluent motor responses was more difficult ("reduced breathiness"), the rate of interference responses was the same as for the previous extinction session (noted above). The subject did not correct himself each time he

interfered with his speech in the monologue and dialogue settings; however, the subject's relatively low rate of interference responses, while emitting the more difficult motor response pattern in the presence of greater intensities of environmental stimuli, suggests that "self-monitoring" of fluent motor responses was being utilized by the subject.

In the last extinction session, emitting the Stage IV motor response pattern of "normal, fluent speech" in the presence of 18 audience members, the subject's rate of interference responses varied from .0 IR/m in reading to .7 IR/m in monologue and 1.0 IR/m in dialogue. Again, although the subject did not choose to correct himself each time he interfered with his speech, the experimenter suggests that "self-monitoring" of fluent motor responses in the presence of still higher intensities of environmental stimuli was demonstrated, in view of the even more difficult discrimination task required of the subject.

The experimenter suggests that had fluent, instead of interference, responses been measured by tracking procedures, the development of "self-monitored verbal behavior" with regard to fluent motor responses would have been self-evident.

The monitoring of positive language responses by the subject in the presence of increasing intensities of environmental stimuli seems apparent, from the percentage of positive language responses obtained

for the Stage II-, Stage III- and Stage IV - extinction sessions, which increased from 79 to 91 per cent.

It is the opinion of the experimenter, thus, that "self-monitored verbal behavior" was conditioned in the presence of an increasingly complex hierarchy of environmental stimuli.

The third question asked was: Is it possible to produce responses demonstrating resistance to extinction over a period of time? It is the opinion of the experimenter, based on comparisons of the results obtained in the final extinction session (Stage IV - extinction), that, while interference responses increased (except in reading) and positive language responses decreased after a four week extinction period, the degree of change was small enough to warrant the conclusion that the responses developed in this program ("normal, fluent speech" and positive language responses) demonstrated fairly strong resistance to extinction.

The experimenter finds interesting the possible inverse relationship between the percentage of positive language responses and the rate of interference responses in monologue and dialogue settings measured from the Stage IV - extinction to the follow-up baseline session (see Figure 16).

Siegel (1970) notes that the introduction of extinction sessions throughout phases of conditioning results in a low "recovery" rate of "stuttering" responses. The presentation of extinction sessions

Figure 16. The mean number of interference responses per minute and the percentage of positive language responses in monologue and dialogue settings for baseline sessions and the video-taped sessions of conditioning, extinction and follow-up baseline.

throughout the conditioning phase of this program may have been a factor in the final extinction curves obtained. The results obtained of each extinction session throughout the program in conjunction with the video-taped conditioning sessions are presented for comparison between these and the initial and follow-up baseline sessions in Figure 16.

Bandura (1969) notes that the schedule and magnitude of reinforcement contribute to the strength of a response. It is the experimenter's opinion that the continuous to intermittent schedule of positive reinforcement and the intermittent to continuous schedule of punishment, in addition to the increasing magnitude of reinforcing stimuli presented, were effective for "strengthening" the responses conditioned in this program ("normal, fluent speech" and positive language responses).

Shames, Egolf and Rhodes (1969) suggest that the development of behavioral statements regarding the production of speech, in addition to positive attitudes toward the speech act, through the manipulation of "thematic" responses, by operant methods, will effectively reduce the frequency of "stuttering," without the direct treatment of motor responses. The experimenter suggests that the development of a high percentage of positive language responses in this study may have facilitated the monitoring of "normal, fluent speech" during four week extinction period as evidenced from the rate of interference responses measured in the follow-up baseline session.

Bandura and Perloff (1967) suggest that the use of self-monitored reinforcement systems in behavior modification greatly affects the learning of responses, as evidenced in their study. It is suggested by the experimenter that the subject's knowledge of the self-reinforcing aspects of fluent motor and positive language responses may have contributed to the monitoring of his responses during the four week extinction period.

The answer as to whether the responses conditioned in this program were resistant to extinction over a period of time is apparent from the results obtained in the follow-up baseline session. It is difficult, however, to point to any one reason for the development and maintenance of "normal, fluent speech" and positive language responses. The preceding authors' suggestions, concerning procedures and/or behaviors which contribute to the conditioning and maintenance of responses, have been cited as possible explanations of the results obtained after the extinction period in this program.

Whether or not one or all of these factors were operating after the subject left the clinical environment is not certain. However, the experimenter suggests that: (1) the use of extinction periods throughout conditioning, (2) the use of varying schedules and magnitudes of reinforcement, (3) the conditioning of positive language responses, and (4) the explanation of factors for "self-monitored verbal behavior" contributed to the development of motor and language responses which

were emitted at a high rate after a four week period of extinction.

The single factor that appears clear from the data is that mediation was taking place. The client did perform in a distinctively different manner in follow-up baseline than he did in initial baseline.

CHAPTER V

SUMMARY AND IMPLICATIONS

I. SUMMARY

In recent years, operant conditioning techniques have been effectively used to modify a variety of behaviors. For the most part, the modification of stuttering behavior has relied solely on the use of punishment. The shaping of "fluency" through differential reinforcement has been reported as a behavioral approach for the treatment of stuttering; however, the effectiveness of this technique in combination with other "teaching" tools, such as, modeling, instruction, and explanation has not been reported in the literature.

The purpose of this study was to construct behavioral definitions of terminology utilized in a stuttering treatment program at Portland State University to produce "self-monitored normal, fluent speech" and to structure the procedures of this program with regard to baseline, conditioning, and extinction in order to provide a base for further research leading to the standardization of procedures for this program.

A 35 year old male was chosen as the subject for this study. Specific procedures were applied in three baseline sessions in order to determine the base operant level of interference responses and

positive and negative language responses in reading, monologue, and dialogue settings.

The emission of interference and language responses were tracked throughout the conditioning and follow-up phases of the program by (1) random sample analysis of audio tapes by the experimenter and (2) a complete analysis of video-tapes by the experimenter and six student trackers.

The response goals of the conditioning phase included four progressive stages of motor response ("stretch and flow, " "increased breathiness-reduced stretch, " "reduced breathiness, " and "normal, fluent speech") in addition to a repertoire of positive language responses.

The self-monitoring of these responses was conditioned by using differential reinforcement supported by modeling, instruction, and explanation of responses.

Throughout the conditioning phase, varying schedules and magnitudes of different reinforcements were utilized to strengthen the subject's monitoring of the above responses in increasing intensities of environmental stimuli.

An examiner, other than the experimenter, administered the procedures for a follow-up baseline four weeks after the conditioning phase in order to determine the base operant level of interference responses and positive and negative language responses in reading,

monologue and dialogue settings after the removal of reinforcement in the clinic.

The results of the data obtained from the baseline and follow-up phases of the program revealed a reduction from 11.7 to 0.86 in the total number of interference responses per minute emitted by the subject and an increase from 29 to 83 percent of positive language responses. These results suggest the effectiveness of the procedures in this program for establishing "self-monitored normal, fluent speech" behavior.

II. IMPLICATIONS FOR CLINIC AND FUTURE RESEARCH

Clinic

Suggestions regarding the applications of the procedures utilized in this program, are necessarily tentative, since: (1) there were no control therapies (programs utilizing differential reinforcement without the response cues of modeling, instruction and explanation) run concurrently with this program; (2) the procedures utilized in this study were applied to only one subject; and (3) the extinction period (four weeks) at the end of the program was a relatively brief time lapse between the Stage IV-extinction and follow-up baseline session.

Acknowledging, thus, the nature of the results under these

conditions, the experimenter presents the following suggestions.

The development of positive language responses should be included as a program objective for clinical programs shaping "normal fluent speech." The development of a repertoire of positive language responses enables the semantic re-organization of subjects' "feelings" about their speech; the development of a descriptive-behavioral language requires that subjects' examine their behavior and assume "responsibility" for changing their behavior. Clinicians should not make a conscious effort to change a clients language behavior by constant interruptions. Rather, clinicians should utilize a reinforcement paradigm comprised of continuous to intermittent positive verbal stimuli and intermitent to continuous negative verbal stimuli to present to specific language responses (determined in advance) in conjunction with modeling positive language responses, in order to shape a repertoire of positive language responses.

In addition, explanatory statements should be added to reinforcement or punishment for language responses (positive reinforcement, "I like your use of that word--that language, because..."; "What you mean to say is...") This would enable subjects to understand the significance of acquiring the appropriate language to discuss their behavior (which occurred in this study).

The use of questions concerning subjects' speech behavior ("What are you doing now?") is suggested as an effective method of

eliciting language responses. This method is particularly effective in dialogue settings, since clients' answers to questions can be immediately reinforced and discussed.

It is recommended by the experimenter, however, that direct attention should not be given to language responses until after "stretch and flow" has been established. The production of a "relaxed" and effortless fluent response pattern facilitates easy identification of appropriate motor responses; also, subjects would soon realize that emitting language responses reflecting their "helplessness" to improve their speech is contradictory, while concurrently emitting completely fluent motor responses.

With regard to shaping "normal, fluent speech," the experimenter suggests that use of modeling, instruction and explanation, as well as differential reinforcement, are effective procedures for establishing this response. Specifically, adding to the instructions an explanation of contingencies necessary for internal reinforcement of speech responses (e. g., explaining that the correct production of a particular motor response pattern will result in specific auditory, tactile and kinesthetic stimuli, characteristic of fluent speech behavior) facilitates the shaping process (utilizing differential reinforcement) as well as the maintenance of fluent motor responses away from the clinic.

In addition, the fading of modeling and instruction, after

"awareness" of contingencies has been developed, and the use of differential reinforcement for "self-monitored" responses, are suggested as effective techniques for promoting self-directed behavior change.

The experimenter suggests that the structuring of speech activities in reading, monologue and dialogue, from simple to increasingly more difficult activities, combined with differential reinforcement, is effective for developing "normal fluent speech" in a variety of complex response activities.

The introduction of increasing numbers of "strangers" into the clinical environment and the use of varying schedules and magnitudes of reinforcement and punishment to differentially reinforce "self-monitored" fluent motor and positive language responses emitted in these situations, is suggested for promoting stimulus generalization of "self-monitored verbal behavior" outside the clinic.

The high correlations obtained in this study for the random tracking of audio tapes indicate that this "quick" method of response analysis could be utilized by clinicians to obtain a representative number of interference responses per minute emitted by subjects during therapy sessions.

Research

It is suggested for future studies of this nature, that a larger

number of subjects (at least more than one) could aid in clarifying the trends which indicated that "normal, fluent speech" and a repertoire of positive responses were developed by procedures utilized in this program.

In addition, it is suggested that similar programs be run concurrently with this program as "controls" in order that results obtained could be considered more than "tentative."

An extinction period of more than four weeks or the use of frequent post-conditioning baseline sessions is recommended for future studies to thoroughly examine the maintenance of responses by subjects.

In future studies, it is suggested that a criterion measure of .5 IR/m or less, be utilized for assessing the "proficiency" of specific motor response patterns.

With regard to specific procedures for future studies, it is suggested that the use of questions regarding speech behavior be applied as consistently in reading, as in monologue and dialogue, where the emission of fluent response patterns is usually higher.

The experimenter further suggests that in the future, subjects be taken outside of the clinical environment in Stage I (where fluent response patterns are relatively easy to monitor) in order to promote early "self-monitoring" behavior outside the clinic. It is also suggested that subjects' families be more directly involved in the

treatment process in order to facilitate the development of "self-monitored verbal behavior" initially in the home.

For studies in the future, the experimenter suggests that structured procedures be utilized for the carrying out of assignments by subjects, (e. g., subjects' self tracking of their own monitoring of fluent motor and language responses in specific situations); the experimenter suggests that this would further develop "self-monitored verbal behavior" outside the clinic.

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APPENDIX I

INSTRUCTIONS TO JUDGES RATING
"SEVERITY OF STUTTERING"

Rules:

1. Read instructions on the Iowa Scale of Severity of Stuttering.
2. Rate the subject's behavior in reading, monologue and dialogue settings, separately, on each of the three forms you have been given.

APPENDIX II

IOWA SCALE OF STUTTERING SEVERITY AND LIST
OF SECONDARY SYMPTOMS

Panel I Judge No. _____

Tape No. _____

Instructions: You are asked to perform two tasks. First, please rate the severity of the subject's stuttering behavior on the following scale by placing a check mark opposite the appropriate description. Second, please check off any secondary symptoms noted in each sample.

I. IOWA SCALE OF STUTTERING SEVERITY

_____ 0 No Stuttering

_____ 1 Very Mild--stuttering on less than 1% of words; very little relevant tension; disfluencies generally less than one second in duration; patterns of disfluency simple; no apparent associated movements of body, arms, legs, or head.

_____ 2 Mild--stuttering on 1% to 2% of words; tension scarcely perceptible; very few, if any, disfluencies last as long as a full second; patterns of disfluency simple; no conspicuous associated movements of body, arms, legs, or head.

_____ 3 Mild to Moderate--stuttering on about 2% to 5% of words; tension noticeable but not very distracting; most disfluencies do not last longer than a full second; patterns of disfluency mostly simple; no distracting associated movements.

_____ 4 Moderate--stuttering on about 5% to 8% of words; tension occasionally distracting; disfluencies average about one second in duration; disfluency patterns characterized by an occasional distracting associated movement.

- _____ 5 Moderate to Severe--stuttering on about 8% to 12% of words; consistently noticeable tension; disfluencies average about two seconds in duration; a few distracting sounds and facial grimaces; a few distracting associated movements.
- _____ 6 Severe--stuttering on about 12% to 25% of words; conspicuous tension; disfluencies average three to four seconds in duration; conspicuous distracting sounds and facial grimaces; conspicuous distracting associated movements.
- _____ 7 Very Severe--stuttering on more than 25% of words; very conspicuous tension; disfluencies average more than four seconds in duration; very conspicuous distracting sounds and facial grimaces; very conspicuous distracting associated movements.

II. SECONDARY SYMPTOMS

_____ 1. Holding breath	_____ 6. Any visible tension
_____ 2. Gasping for breath	_____ 7. Turning or jerking head
_____ 3. Closing eyes	_____ 8. Moving hands
_____ 4. Protruding tongue	_____ 9. Moving body
_____ 5. Facial grimaces	_____ 10. Attempts at forcing
_____ 11. Any other (specify) _____	

APPENDIX III

INSTRUCTIONS TO INTERFERENCE RESPONSE TRACKERS

INSTRUCTIONS:

You are about to see a video-tape preview of one of the sessions of this program. You are to track the number and type of interference responses emitted by the subject in the three settings of reading, monologue and dialogue.

You have been given three tracking sheets; these will be utilized separately, to track interference responses emitted in each of the three settings of reading, monologue and dialogue. The setting is typed at the top of your tracking sheets. You are to track the number and type of interference responses emitted by the subject in each setting, utilizing specific symbols. These symbols are: T= tonic interferences, CL= clonic interferences, P= prolongation interferences, R= retrial interferences, VJ= verbal junk interferences, and CB= combination interferences. You will be informed of the beginning of each minute; note the minute number in the left hand column; place the appropriate symbol(s) in the space allotted, opposite the designated minute number.

Begin tracking with the reading sheet. Don't begin until I tell

you to start; stop tracking when I tell you to stop. After you have tracked interference responses for the reading setting, you are to track interferences responses for the monologue setting and, finally, the dialogue setting, utilizing the same tracking procedures.

APPENDIX IV

ATTENTION TO LANGUAGE RESPONSE TRACKERS

INSTRUCTIONS:

You are about to see a video-tape preview of one of the sessions of this program. You are to track the number of positive and negative language responses emitted by the subject in monologue and dialogue settings.

You have been given two tracking sheets, one each for monologue and dialogue settings. Note the setting at the top of your tracking sheets.

You are to tally positive language responses in the column entitled "Positive" and negative language responses in the column entitled "negative." You will be informed of the beginning of each minute; note the number of the minute in the left hand column; place tally marks in the two spaces opposite the designated minute, under the appropriate column headings.

Begin tracking with the monologue sheet. Start tracking when I tell you to start; stop tracking when I tell you to stop. Utilize the same tracking procedures for the dialogue setting.