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ABSTRACT

Investigated with a 26-year-old male graduate student were the immediate and long-term effects of social reinforcement and feedback on the incidence of stuttering. The S's speech dysfluencies were recorded under baseline and intervention conditions in three settings: two classes the S taught and a weekly hour-long conversation period with peers. Reinforcement consisted of graphic feedback (histograms) of the percent decrease in disfluency (delivered immediately after each session) and verbal praise. Intervention was judged successful due to the 62 percent decrease in stuttering at the end of intervention, and a 95 percent decrease observed at the 3-month maintenance check. (LS)

The Use of Contingent Reinforcement in Modifying Stuttering Behavior[1]

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STATEMENT OF THE PROBLEM AND PERSPECTIVE

The purpose of this study was to investigate the immediate and long-term effects of social reinforcement and feedback on the incidence of stuttering. The objective of the modification program was to increase fluent speech in natural settings.

Like the common cold, stuttering continues to baffle most researchers who search for its causes and cures. Unfortunately, while colds are self-limiting, stuttering is generally not. Thus, some type of intervention program seems critical for diminishing most types of stuttering. This study investigated the effect of contingent social reinforcement, delivered in a natural setting, upon the incidence of stuttering. Because of the behavioral nature of the study, no attention was given to the historical causes of stuttering. Rather, attention was focused on the observable behavior and its remediation.

Many methods intended to minimize stuttering have been investigated; few have shown long-range success. Traditional speech therapy methods, and such newer methods as pacing speech with a metronome (Silverman, [illegible], and Trotter, 1973b), use of masking noise (Silverman et al., 1973a), and rhythmic stimulation of the stutterer while speaking (Silverman et al., 1973b) are characterized by limited success. Because there is little research identify what type of therapy works best with each individual, the overall success of any single program is far from guaranteed. Fitting speech therapy programs to individual cases has often been a "hit-or-miss" proposition, with little assurance of long-range change.

Operant conditioning programs, however, seem easily adaptable to individual cases through the application of reinforcements, punishments, and flexible reinforcement schedules. Operant programs have also claimed a quicker rate of change than have traditional speech therapies (Andrews and Ingham, 1972). Although operant

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programs often show a more dramatic rate of change than traditional speech therapy, both methods of remediation generally fail to show evidence of permanent reduction of stuttering. Less than a quarter of the operant studies reviewed reported any evidence of maintenance over time. When maintenance programs were reported, most involved a three-month follow-up, and very few were extended as long as nine months.

Two additional problems are found in operant research on stuttering. First, many of the behavior modification programs employed with stutters have used punishment to decrease dysfluent speech. Bar (1971, p. 1) pointed out that the "extinction of the stuttering episode is theoretically and clinically an unsound, self-defeating and tedious process....increasing frequency of occurence [of existing fluency] should be the major goal." By focusing on the stutter, the experimenter calls added attention to dysfluent speech. The stutterer is already aware of the dysfluency; increased attention to the fault may cause more self-consciousness and anxiety. This may, in turn, inhibit a decrease in stuttering. On the other hand, reinforcement of existing fluencies might build confidence and help to increase fluencies. Bar (1971) also suggested that social reinforcement may serve as the best type of reward (rather than tokens or money), because it is more likely to be naturally assumed by the environment or internalized by the subject. In this way, maintenance of behavioral change can be facilitated.

Again, the most common techniques employed in operant conditioning have used some type of punishment. These techniques include the use of time-out from social interaction (Adams and Popelka, 1971; Egolf, Shames, and Seltzer, 1971; Martin and Haroldson, 1971; Quera, 1971), shock (Daly and Cooper, 1967; Curlee and Perkins, 1968) and aversive noise (Maharada, 1970) contingent upon stuttering. Recently, though, more researchers have begun to employ positive reinforcement techniques. Often, contingent reinforcement and punishment have been used simultaneously (Halvorson, 1969; Ingham and Andrews, 1973; and Moore and Rittman, 1973), but in some cases, positive reinforcement alone has been used (Browning, 1967; and Russell, 1968). These later studies generally employ tokens or monetary rewards. Few researchers have investigated Bar's (1971) suggestion that social reinforcement might be the most efficient tool for permanent behavior change.

Finally, the setting of most behavioral intervention studies is a problem. While most stutterers are dysfluent across all settings (e.g., home, social, academic, professional), researchers have restricted their study to only a single setting. Usually, operant schemes are structured to require a laboratory or speech

class setting. Thus, if a subject is to read from a text at a constant rate or to be immediately shocked when a dysfluency occurs, natural interactive speech is preempted. While laboratory settings may provide optimum conditions to institute a behavior modification program, they give a very limited representation of speech in the natural environment. Also, there is sparce evidence that remediation in a lab setting will transfer to more natural settings in which a subject uses conversational speech. Related to the question of transfer is the issue of maintenance. Even if lab success generalizes to natural speech, is the success likely to be maintained? Unless the behavioral change demonstrated in the lab can be transferred and maintained in the natural environment, the problem faced by the stutterer has not been solved.

METHOD

The primary goal of this research was to increase a stutterer's fluent speech in natural settings. A subsidiary goal was to determine whether the increase in fluent speech could be maintained over a one year period.

S was a 26 year old male graduate student employed as a teaching assistant in a large university. He had a 22 year history of stuttering, and had previously undergone traditional speech therapy in an effort to decrease stuttering. Prior therapy had had no clear effect upon the frequency of dysfluent speech. S had not been involved in any previous behavior modification program intended to diminish the stuttering.

Multiple baselines were carried out in three separate settings: two classes the subject taught (each two hours in length), and a weekly hour-long conversation period with peers. Simple frequency counts of dysfluencies in a five-minute interval of continuous speech were taken in each setting. Dysfluency was behaviorally defined as a pause in fluent speech accompanied by superfluous jaw movement, head nodding, protusion of the tongue from the mouth, upward eye movement, or oral but non-verbal sounds. Any of these behaviors, when paired with a pause in speech, had been observed to be associated with an extention of the pause and a dysfluency in speech. To obtain data which would represent an increase in fluent speech, the incompatible behavior of speech dysfluencies was observed. For the purposes of this study, a decrease in the incompatable behavior of stuttering was used to indicate an increase in fluent speech. After baselines for number of stutters per interval had been established, the mean number of dysfluencies per five-minute was calculated for each setting. Terminal behavior was set as a 50 percent decrease in the average number of dysfluencies. To achieve the decrease in dysfluencies,

the incompatable behavior of fluent speech was reinforced. Reinforcement consisted of graphic feedback (histograms) of the percent decrease in dysfluency in each observation session as compared with the previous session recorded. Feedback was delivered immediately at the end of each session. The subject was informed at the beginning of each intervention session that he would receive feedback at the end of the session. The subject was also verbally praised for achieving any decrease in dysfluency. A decrease in dysfluency became a reward and an increase in dysfluency was perceived by the subject as aversive.

Intervention was begun at different times in each of the three separate observational settings. Intervention began in a small class in which the subject lectured and conducted group discussions. All three settings were observed for the next one week. Intervention was then initiated in setting two, a class of 40 students in which the subject lectured. Intervention was continued in setting one, and all three settings were observed for one more week. Finally, intervention was started in setting three, a regularly scheduled but informal peer discussion group of which the subject was a member. Intervention was maintained in all three settings simultaneously for one week. Figure 1 depicts the schedule of intervention in the three settings.

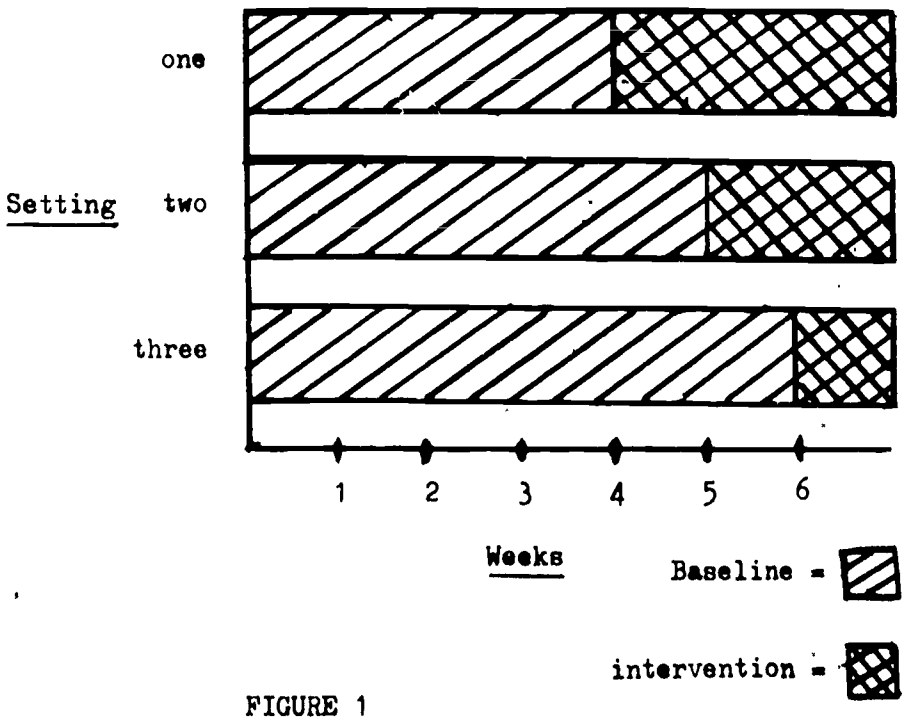

FIGURE 1

Schedule of intervention in three settings

One maintenance check was conducted in a new class lecture setting, three months after terminal behavior had been accomplished. A second maintenance check was conducted 12 months after the initial intervention had been completed.

Results

Interrater agreements, using one trained and one untrained rater, were found to be 95 percent for "time spent in actual speech," and 100 percent for "incidence of stuttering." Intervention via the simple feedback technique with praise for decreases in dysfluency was judged successful. Figure 2 depicts stuttering rates for each phase of the study. The average baseline stuttering rate (8.5 per five minute interval) decreased about 62 percent (to 3.2 per interval) across all three settings. The three month follow up of the decrease in dysfluency showed an additional decrease in dysfluency to an average of .5 stutters per five minutes of continuous speech. The 12 month maintenance check showed a slight increase to .9 stutters per five minute interval.

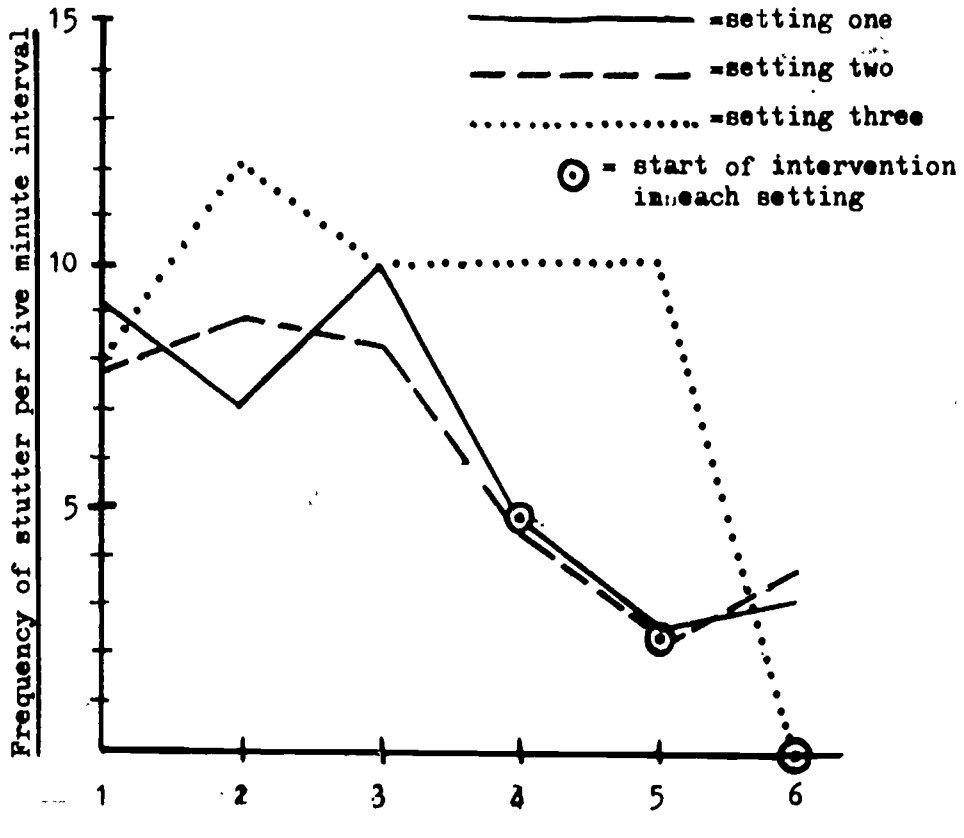

FIGURE 2

Baseline and rates of stuttering in three settings of intervention

Following the 12 month maintenance check, an investigation of the effect of a discriminative stimulus was conducted. Hypothetically, the presence of an observer might have an inhibitory effect upon the incidence of stuttering. To establish whether this was occurring, and if so, to what extent, the subject was observed without his knowledge. A student in one of his classes, a class that was comparable to one of the original multiple setting conditions, was used as an observer. Observation under this condition showed an incidence of .9 stutters per interval over nine intervals of observation.

Discussion The terminal behavior was clearly met by the subject. The goal of a 50 percent decrease in incidence of stuttering was surpassed; at the end of intervention, stuttering had decreased 62 percent. This decrease continued following the end of intervention and reached 95 percent at the three month maintenance check. During the next nine months without intervention, stuttering increased slightly to .9 incidences per five minute interval. Thus, the 12 month maintenance check showed an 89 percent decrease from baseline. These data indicate that the increase in fluent speech was maintained by the subject in the absence of actual graphic feedback from the change agent. This evidence supports the idea that operant techniques can indeed have long-ranging effects in diminishing stuttering.

The discriminative stimulus check which was conducted two weeks after the twelve month maintenance check served two purposes. First, it lends support to the data collected on the maintenance check by finding the same frequency of dysfluencies. In both checks, incidence of stuttering was .9 per interval. The second purpose was to eliminate the possibility of a discriminative stimulus (a known observer recording stuttering) causing a decrease in dysfluency when the subject was aware of being observed. By observing the subject without his knowledge, it became clear that the stuttering change was not simply a function of being observed.

The subject's knowledge that feedback was going to be administered seemed to act as an incentive. When intervention began in setting one, week four, the subject was informed that he would receive feedback to his progress. An immediate decrease in dysfluency was seen. A similar decrease was seen in setting two, week four, which was observed the following day. The decrease may be explained by the subject's expectation of feedback. Following observation, he inquired about his progress. When informed that he would not be given feedback in that setting until the next week, he was somewhat surprised and disappointed. The following day, when observed in setting three, week four, the subject resumed his baseline rate

of dysfluencies, aware of the fact that he would not be receiving feedback in that setting that week. See Figure 2 for visual confirmation of this "expectancy" hypothesis.

The implications of such a program are numerous. First, the program may be conducted in a natural setting rather than in a laboratory setting. Clearly, natural settings enhance generalization of behavior change. Secondly, the present behavior modification program used social reinforcement rather than punishment to change stuttering frequencies. This procedure overcomes two of the limitations described by Bar (1971). Rather than punishing the subject for problems that he is already aware of, the reinforcement of increased fluent speech draws the stutterer's attention to existing capabilities. In so doing, less attention is focused on faults and more attention on prowess. This would have the effect of building self confidence and reducing anxiety. As Bar (1971) asserted, previous programs involving punishment have increased anxiety and self consciousness and made behavior change more difficult. This experiment supported Bar's (1971) suggestion that social reinforcement is more easily assumed by the environment than are tangible rewards (i.e., tokens or money). The continued behavior change suggests that the subject's environment, and his own success supplied the necessary reinforcements after intervention was terminated.

Finally, the simplicity of the program appears to be the most important implication. No tape recorders, specific training, or special settings are necessary for implimentation suggests that a program of this sort might be transferred to classrooms with a minimum of disruption. Peers, teachers, or teacher aides could be used to collect data. Multiple intervention settings can be used by enlisting parents as data collectors and change agents. During maintenance, the subject himself might log incidental data on his own progress.

The research reported here needs replication and extension to determine the generalizability of the techniques across various subjects and settings. In particular, it is not clear that pictoral feedback would be effective with all types and all ages of stutterers. Still, feedback can easily be modified. For example, with elementary age youngsters, a cartoon format might be more effective than histograms.

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