8-1968

An Investigation of the Effect of Response-Contingent Shock on Stuttering Behavior

Kenneth Welt
Western Michigan University

AN INVESTIGATION OF THE EFFECT OF RESPONSE-CONTINGENT SHOCK ON STUTTERING BEHAVIOR

by

Kenneth Welt

A Thesis
Submitted to the
Faculty of the School of Graduate
Studies in partial fulfillment
of the
Degree of Master of Arts

Western Michigan University
Kalamazoo, Michigan
August 1968

ACKNOWLEDGEMENTS

The experimenter wishes to express his sincere appreciation to Dr. Louise R. Kent for her guidance and patient assistance in this research. The experimenter is indebted to Dr. Howard Farris and Dr. Malcolm Robertson for their constructive criticisms and suggestions concerning this paper.

Special mention is due Mr. Thomas Kucera for his assistance throughout the present research. Finally, the experimenter wishes to express his gratitude to his wife, Karen Sue, for her aid in the preparation of this research and her continuous support and encouragement.

Kenneth Welt

MASTER'S THESIS M-1644

WELT, Kenneth Alan
AN INVESTIGATION OF THE EFFECT OF RESPONSE-CONTINGENT SHOCK ON STUTTERING BEHAVIOR.

Western Michigan University, M.A., 1968
Psychology, clinical

University Microfilms, Inc., Ann Arbor, Michigan

TABLE OF CONTENTS

INTRODUCTION

The relationship between punishment and the speech disfluencies of normal speakers and stutterers has been investigated by scientists representing speech pathology and psychology (Ahlstrand, 1961; Frick, 1951; Flanagan, Goldiamond, and Azrin, 1958, 1959; Van Riper, 1936; Martin and Siegel, 1966; Kent and Welt, 1967). The results, however, have been inconsistent and, it is felt, reflect the absence of (a) an adequate analysis of stuttering behavior, and (b) an adequate definition of punishment.

Van Riper (1936) demonstrated that threat of punishment by electric shock resulted in an increase in the frequency of stuttering over repeated readings of the same material. Moreover, it had previously been demonstrated that repeated readings of the same material without the threatened shock contingency would yield a decrease in the frequency of stuttering (Van Riper and Hull, 1934). Van Riper's data (1936) demonstrated further that threat of response contingent shock increased the frequency of stuttering incidents to a significantly greater degree than did threat of non-contingent shock.

The frequently observed decrease in frequency of words stuttered as a function of repeated readings of the same material is referred to as the stuttering adaptation phenomenon. A review of the research dealing with stuttering adaptation has recently been provided by Wingate (1965a, 1965b). Essentially, adaptation, as the term is used with respect to stuttering, may be implicitly defined by the following observations (Wingate, 1965a):

(a) A typical course may be identified. Specifically, it is characterized by a negatively accelerated curve, reaching a minimum plateau somewhere around the eighth to twelfth reading. Most of the adaptation occurs in the early readings, the greatest amount occurring typically on the first repetition.

(b) Adaptation varies with the nature of the material. It is reported that the amount of stuttering decreases upon repeated readings of the same material, successive readings of different material, and from segment to segment within any given reading selection. The amount of adaptation, however, has been shown to be greatest in repeated readings of the same material - typically 50%.

(c) Adaptation is affected to some degree by certain independent variables. Certain unfavorable events, for example, threat of shock and talking on the telephone, evidently adversely affect this phenomenon.

(d) The adaptation effect is transitory. Increased stuttering recurs relatively shortly after adaptation, occasionally as soon as twenty minutes after meeting criterion. Further, in repeated readings of the same material, the extent of stuttering behavior apparently varies directly with the length of time since adaptation. In successive readings of different material, however, the recurrence of stuttering is independent of a temporal variable. Specifically, stuttering frequency represents essentially the same pattern over passages, adaptation occurring with each reading.

An investigation by Frick (1951) attempted to explore further the effects of punishment upon stuttering. In this study, 48 subjects were assigned to 4 groups of equal number, according to an operationally defined measure of the severity of stuttering. All subjects were run under one control and three experimental conditions. During the control condition, the subjects read a 40-word list 15 times. Experimental condition I involved the presentation of subject-adjusted electric shock contingent upon the completion of each word adjudged to have been stuttered in trials 1 - 10 with the shock contingency withdrawn during trials 11 - 15. In experimental condition II, the subjects were told in advance that the number of stuttering incidents observed during each trial would be tabulated by the experimenter and that they would be "paid-off" with a like number of shocks at the end

of each reading of the 40-word list. As in the first experimental condition, the shock contingency was in effect on trials 1 - 10 and was withdrawn during trials 11 - 15. Experimental condition III involved a contingency such that the subject was shocked immediately following each word spoken, independent of whether or not he was adjudged to have stuttered. The results of Frick's study indicate that the frequency of stuttering in the three shock conditions considered as a whole was significantly greater than the control condition. From these data, Frick concludes that aversive stimulation, administered contingent upon stuttering, increases the frequency of this behavior.

Stassi (1961), using normally speaking subjects, programmed verbal consequences contingent upon reading of nonsense words but independent of judgements of fluency. Specifically, according to a predetermined schedule, some words were followed by a taped presentation of the word "wrong", whereas others were followed by the word "right". It was concluded that the increase in the disfluencies of these subjects were attributable to the presentation of the word "wrong".

Flanagan, Goldiamond and Azrin (1958) reported an attempt to demonstrate the operant nature of stuttering behavior in three adult male stutterers by manipulating the consequences of this behavior. In this study, an aversive stimulus (a 105 db tone at 6000 Hz) was administered via earphones to the subjects contingent upon blockages (as defined) while the subjects read aloud a continuous prose passage. Results reflect the suppression of stuttering during the thirty minute

aversive period. Moreover, stuttering response rate rose when termination of the tone was made contingent upon stuttering during the escape period. Flanagan et al. (1958) suggest that these data support an hypothesis of stuttering as a form of operant behavior.

Ahlstrand (1961) systematically replicated the work of Flanagan et al. (1958) using a 95 db tone at 6000 Hz as the punishing stimulus. In addition, Ahlstrand's study investigated the effectiveness of verbal instructions in controlling stuttering behavior as compared to punishment. Her 10 subjects were assigned to one or the other of two groups, both of which read continuous prose material for 1½ hours. For Group I, the first ½ hour was a control condition; the second ½ hour involved the response contingent application of the aversive stimulus; and, during the third ½ hour, the punishment contingency was removed. Group II also was run through three ½ hour reading periods; for this group, however, the instructions "Try not to do anything that might be considered stuttering" were given for the second ½ hour. The first and third periods were essentially the same as those used for Group I. It was found that both aversive control and verbal instructions were effective in reducing the frequency of stuttering behavior. Ahlstrand's data show that the total frequency of stuttering was lower during the experimental aversive period than during the control condition for all subjects in Group I and for 90% of the subjects in Group II, There was, however, a tendency for punishment to suppress the frequency of all verbal behavior (as reflected by reading rate), and two subjects in the aversive condition showed a consequent increase in the percent of words stuttered during

the experimental condition. Ahlstrand discusses the aversive control procedure, pointing out that the presentation of the tone interrupts the performance of the subject during the time that it is on; therefore, one would expect a reduction of reading rate for this reason independent of any generalized suppressing effect of the aversive stimulus. Ahlstrand concludes that verbal instructions are probably as effective as punishment in the control of stuttering behavior.

Flanagan, Goldiamond and Azrin (1959) demonstrated that the verbal disfluencies of normally speaking subjects were amenable to modification in terms of the principles of operant conditioning such that the subject's verbal behavior could be shaped to represent stuttering at time 1 and fluent speech at time 2. Of particular interest here is the demonstration of stuttering instatement through a negative reinforcement procedure. Specifically, it was found that when the disfluencies of normal speakers briefly terminated an ongoing electric shock, the rate of such disfluencies increased markedly. The implication inherent in the results is that stuttering may be regarded as a complex operant, having been established and maintained by its consequences.

Goldiamond (in Krasner and Ullmann, 1965) has demonstrated the effectiveness of a delayed auditory feedback procedure in controlling stuttering behavior. It was found that when delayed auditory feedback was made contingent upon instances of stuttering, stuttering frequency decreased and overall reading rate increased. Further, it was found that (a) when non-contingent constant delayed feedback was programmed, stuttering soon returned to its baseline rate and (b) that where

decrease in stuttering was demonstrated, escape from the feedback, contingent upon stuttering, was sufficient to return stuttering to its previous rate. Goldiamond reports complete elimination of stuttering in the laboratory as a function of this paradigm. It is interesting to note that Goldiamond's subjects were run during a period lasting many weeks before complete elimination of stuttering could be demonstrated. Insofar as the delayed auditory feedback contingency was responsible for lowering the rate of the behavior which it followed, it may, by definition, be considered an aversive stimulus, and the procedure itself may be considered to be a punishment procedure.

The present research will define punishment as a procedure which brings about a reduction of the future probability of a specific response as a result of the immediate delivery of a stimulus for that response (Azrin and Holz, 1966). The effectiveness of punishment in suppressing any particular response is enhanced if the subject has an alternative response in his repertoire which, if strengthened, will compete with the punished response (Azrin and Holz, 1966). The average stutterer has, as part of his existing repertoire, normally fluent speech, a response which may be presumed to be incompatible with stuttering. Moreover, Azrin and Holz indicate that punishment must be delivered immediately following the specified response to facilitate enduring effectiveness. These authors report that with non-immediate punishment, responses recover substantially and often completely after a temporal interval of approximately one hour. Further, when using shock, it seems that the greater the intensity of the punishing stimulus,

the greater the reduction in the punished response (Azrin and Holz, 1966).

Thus, in programming the aversive control of a specific behavior in humans, it will be necessary to deliver the punishment immediately following the response, to deliver a punishment of sufficient intensity to facilitate response reduction, and to make an alternative response available to the subject which will compete with the punished behavior. It is felt that such a procedure can be programmed in the control of stuttering behavior.

Stuttering may be conceptualized as a response chain with both operant and respondent components. Bijou and Baer (1965) in their discussion of chainbreaking, suggest two ways in which an operant chain may be disrupted. Specifically, a chain will be disrupted if the terminal reinforcer is withheld, or if a response anywhere in the chain fails to produce the discriminative stimulus for the next response in the chain. Employing the latter approach, Kent and Welt (1967) demonstrated that punishing a specific but subjectively defined pre-verbal component of the stuttering chain as soon as it could be detected by the experimenter, yielded a marked suppression of its emission and the almost total disappearance of stuttering behavior as well. Apparently, as stuttering was suppressed in this manner, an alternative behavior available to the subject, i.e., normally fluent speech, was strengthened. Using essentially the same approach, Martin and Siegel, (1966) studied the effects of response contingent shock on certain non-verbal aspects of stuttering behavior. These investigators explored the effect of response contingent punishment on

stuttering behavior per se, on speaking rate, and investigated whether or not previously neutral stimuli acquire punishing properties after being paired with an aversive stimulus. Three stutterers served as subjects and all were run under conditions of conversational monologue. The behaviors upon which shock was made contingent were (a) a wrinkling of the nose, (b) a protrusion of the tongue and (c) a jerky holding and releasing of the breath. It was found that for all subjects, the introduction of response contingent shock resulted in an almost total reduction of stuttering behavior, removal of shock being followed by a return to base rate frequency. It was found that decreasing stuttering rate did not lower speaking rate (as measured in words per minute); and that it was possible to bring stuttering under the discriminative control of previously neutral stimuli.

Statement of the Problem

The current research defines punishment as a procedure which brings about a reduction of the future probability of a specific response or response chain as a result of the immediate delivery of a stimulus contingent upon the occurrence of the response or response chain. Stuttering behavior is viewed as a complex chain in which some non-verbal components precede verbal components. The effects of two punishment procedures on stuttering behavior are contrasted; one involves an attempt to punish one of the terminal components of the stuttering response chain, while the other involves a chain-breaking procedure wherein an attempt is made to punish one of the

first detectable non-verbal components of the chain. It is assumed that if the stuttering response chain is suppressed, the subject has available in his existing repertoire alternative response chains which, if strengthened, might compete with the stuttering response chain. The alternative response chains are viewed as those which comprise normally fluent speaking behavior. The aversive stimulus is an electric shock, the aversive intensity of which ranges from 60v. to 95v. The shock is presented as soon as possible after completion of the stuttering response chain (E_1) and after the detection of the specified non-verbal component of the stuttering chain (E_2).

Each of 7 subjects reads a 40-word list, 32 times. The 32 readings are divided into a control condition of 12 trials in which no punishment contingency is operative, and 2 experimental conditions of 10 trials each. Twelve trials are used in the control condition to facilitate adaptation. In the first experimental condition, the subject is shocked following completion of each stuttered word; in the second, punishment is made contingent upon the emission of a specified non-verbal behavior occurring early in the stuttering response chain and is delivered immediately following its detection by the experimenter. The order of the three conditions is control (C), E_1 and E_2 for odd numbered subjects, and C, E_2, E_1 for even numbered subjects. The present research, then, represents a test of an hypothesis of no difference between these conditions.

METHOD

Subjects

Seven adults, 5 males and 2 females, all of whom had previously been defined as stutterers, served as subjects for the present research.

Apparatus

A variable shock apparatus by Behavior Research Instrumentation was employed in the current experiment. Essentially, it is a transistorized, battery powered unit which can deliver an alternating current shock of up to 150v. amplitude for a preset fractional second duration. Delivered current is limited by a fuse to a maximum of 5 milliamperes. A Sony model TC-105 tape recorder was used to record all sessions.

A 40-word list described by Frick (1951, Appendix A) was used in the present experiment. Each subject was required to read the entire list 32 times. The words were presented to the subjects on 3x5 white index cards attached to a No. B717 Ever Ready desk calendar base. Index tabs were attached to facilitate flipping the cards with one hand.

Procedure

The experimenter and his assistant conducted a brief discussion with each subject prior to the start of the experiment. The purpose of this meeting was to identify the non-verbal response to be shocked

in E_2. These responses were expected to differ from subject to subject, but an effort was made in all cases to specify a response which occurred early in the stuttering response chain. All subjects were required to sign a personal injury disclaimer (Appendix B) before submitting to the experimental treatments. Only the experimenter, the subject, and a trained undergraduate assistant were present during the experimental sessions. In the control condition (C), the subject was required to read 12 repetitions of the word list. The electrodes were in place on the subjects' forearm during this control condition, and remained attached until the end of the complete session. The number of instances of the specified non-verbal behavior were recorded independently by the experimenter and the assistant on individual data recording sheets (Appendix C). A description of the specific stuttering-related behaviors for each subject is provided in Appendix D.

Upon completion of the 12th reading, the subject was given a brief series of shocks so that he would be familiar with the intensity of shock to be used in the experiment. This value was initially defined as 95v., but several subjects required that it be lowered. The actual intensities are recorded in Appendix E. Beginning with the 13th reading, each observed occurrence of the specified behavior was consequated by a ½ second shock delivered upon the completion of the word being uttered (E_1). The assistant recorded the number of punishments delivered and the word being attempted at the time of punishment. This procedure was followed through the 22nd reading.

Beginning with reading 23, each observed occurrence of the

specified behavior was punished as soon as it was detected by the experimenter (E_2). The assistant recorded the number of punishments delivered and the word being uttered at the time punishment was delivered. This procedure was terminated following the 32nd reading. For even numbered subjects, E_2 was introduced beginning with the 13th reading and E_1 began with reading number 23. Throughout the two experimental conditions, the assistant recorded any occurrences of the specified behaviors which the experimenter failed to punish.

RESULTS

The mean number of stuttering-related behaviors per subject per condition was computed. These sets of means are presented in Appendix F. The means for all subjects were then ranked and analyzed by using Friedman's Two-Way Analysis of Variance by Ranks (Siegel, 1956). A summary of the analysis, shown in Table 1, indicates that a difference exists among the three treatment conditions that is significant beyond the .01 level of confidence. Inspection of Table 1 suggests that the control condition differs significantly from the experimental conditions. In computing the data analysis only the experimenter's observations of responses occurring during the pre-shock condition was employed. This decision was rendered because (a) the experimenter administered all of the electric shocks, and (b) the percentages of agreement between the experimenter and the observer described in Table 2 were sufficiently high to support an assumption of no difference between judgements.

For each subject under each condition on each reading of each word, two measures were obtained with respect to the occurrence or non-occurrence of the stuttering behavior, one from the experimenter and one from the assistant. These data were recorded on the data sheets referred to above and subjected to a reliability analysis. Reliability was calculated by dividing the number of agreements by the number of agreements plus disagreements (Thomas, Becker, and Armstrong, 1968). The obtained percentage of agreement between the

experimenter and the observer regarding the occurrence of the stuttering-related behaviors for all conditions combined was 94 (see Table 2). Percent of agreements range from 82 to 92 in C, from 88 to 99 in E_1, and from 97 to 100 in E_2. The actual numbers of agreements and disagreements for each subject, in each condition, are presented in Appendix G.

The relationship between the two estimates of the occurrence of the specified stuttering-related behaviors in the control condition, and the resultant effects of the two shock contingencies is represented graphically in Figures 1 through 7 for subjects 1 through 7, respectively. For each subject, the number of shocks administered in the two experimental conditions is represented as the number of response occurrences.

For subjects 1, 3, 5, 6 and 7 the data reflect a tendency for the number of shocks per trial in the experimental conditions to be fewer than the number of responses observed in the control condition. It will be noted, however, that for subjects 2 and 4 there is no apparent difference between the three conditions.

Table 1

Summary of Friedman's Two-Way Analysis of Variance by Ranks

	Conditions		
Subjects	C	E1	E2
1	3	2	1
2	3	2	1
3	3	2	1
4	2	3	1
5	3	2	1
6	3	1	2
7	3	2	1
Column Sums	20	14	8
Sums Squared	400	196	64

N	k	dF	Xr^2
7	3	2	10.3

Table 2

Percent of Agreement between Examiner and Observer Estimates of the Occurrence of the Stuttering-Related Behaviors in C, E_1, and E_2

	Conditions		
Subjects	C	E1	E2
1	84	88	97
2	92	99	99
3	82	99	99
4	91	99	100
5	89	99	99
6	92	99	99
7	83	99	99

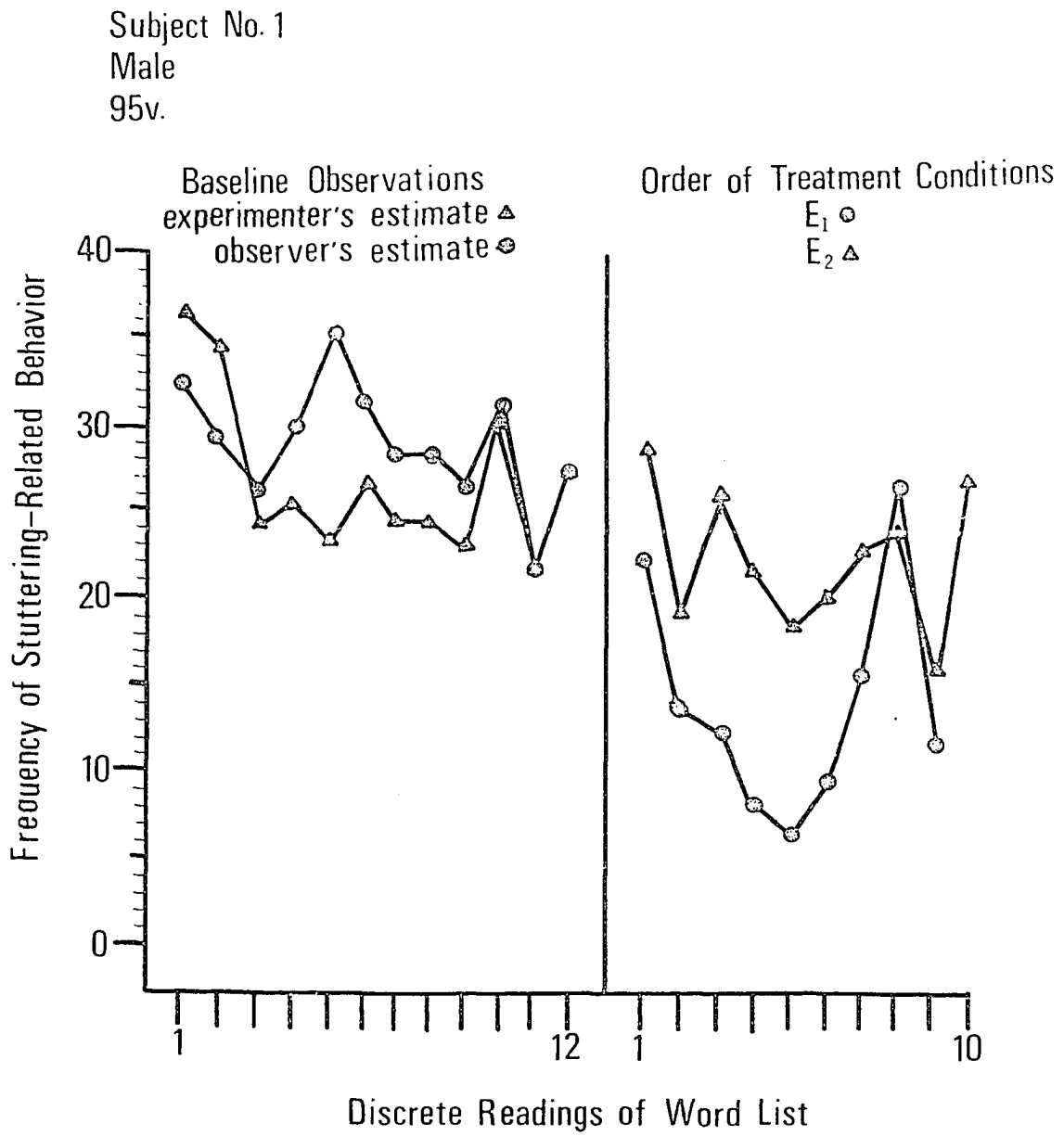

Figure 1. The frequency of stuttering-related behavior during pre-shock, and the resultant effects of two shock contingencies.

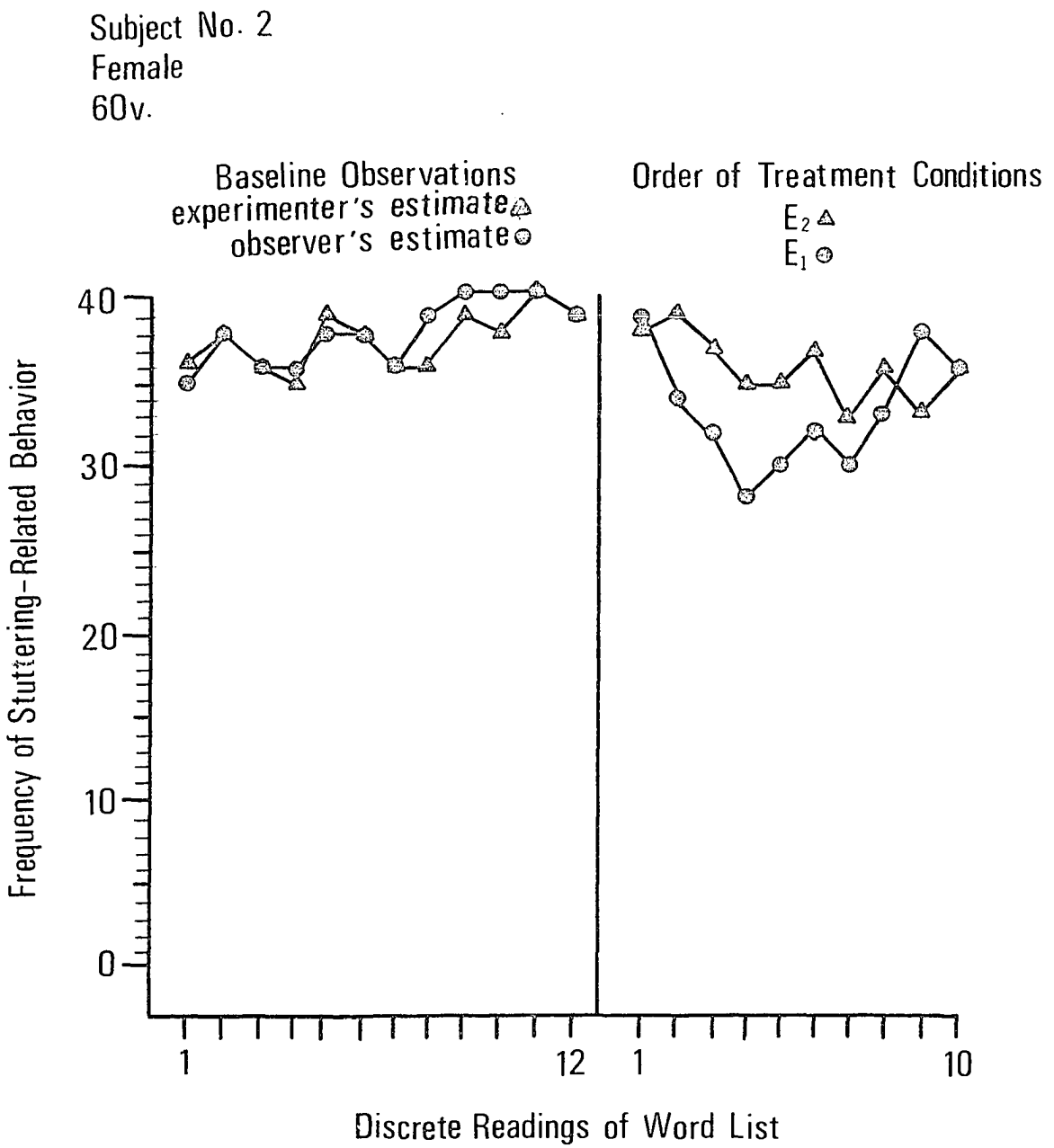

Figure 2. The frequency of stuttering-related behavior during pre-shock, and the resultant effects of two shock contingencies.

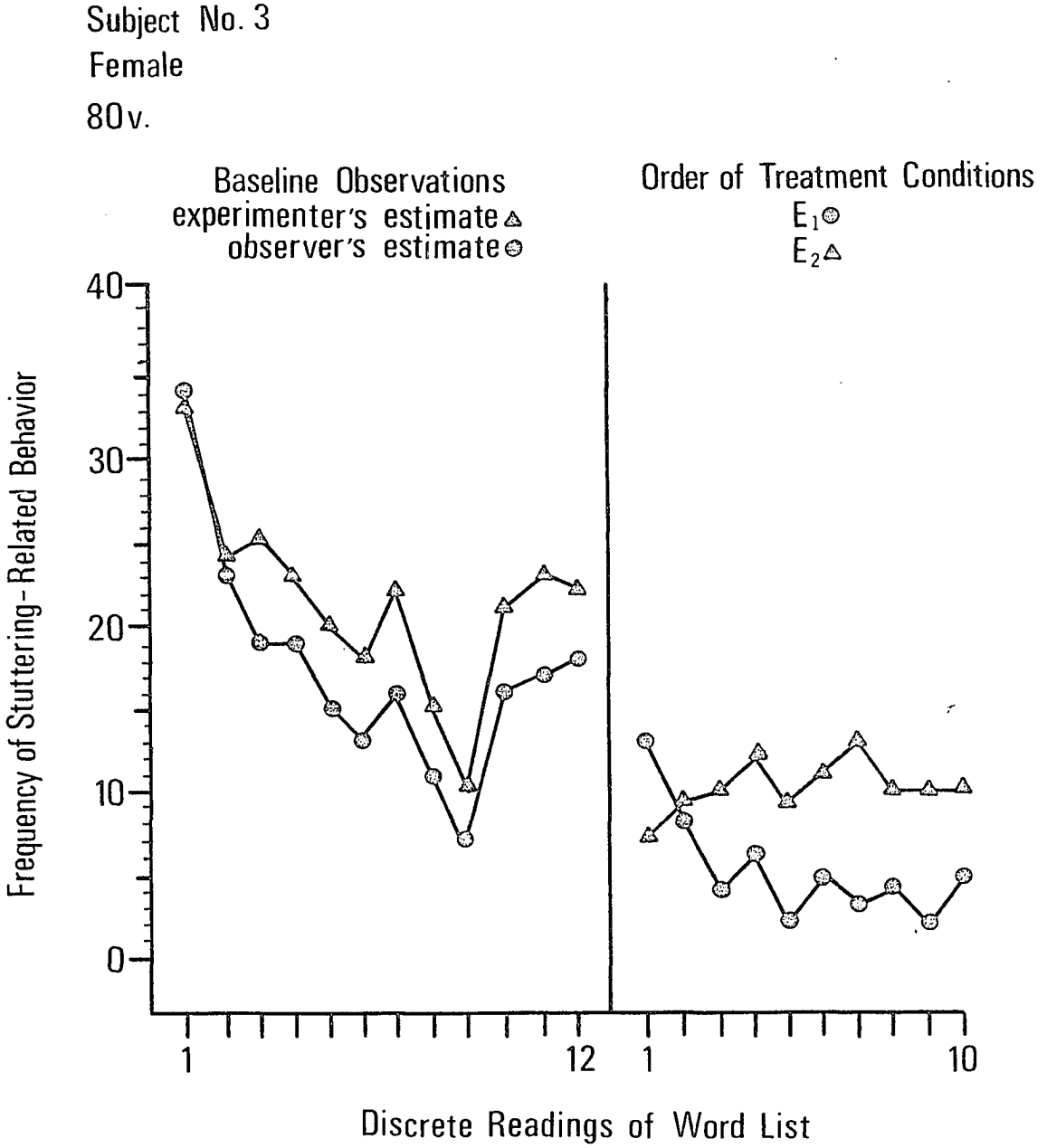

Figure 3. The frequency of stuttering-related behavior during pre-shock, and the resultant effects of two shock contingencies.

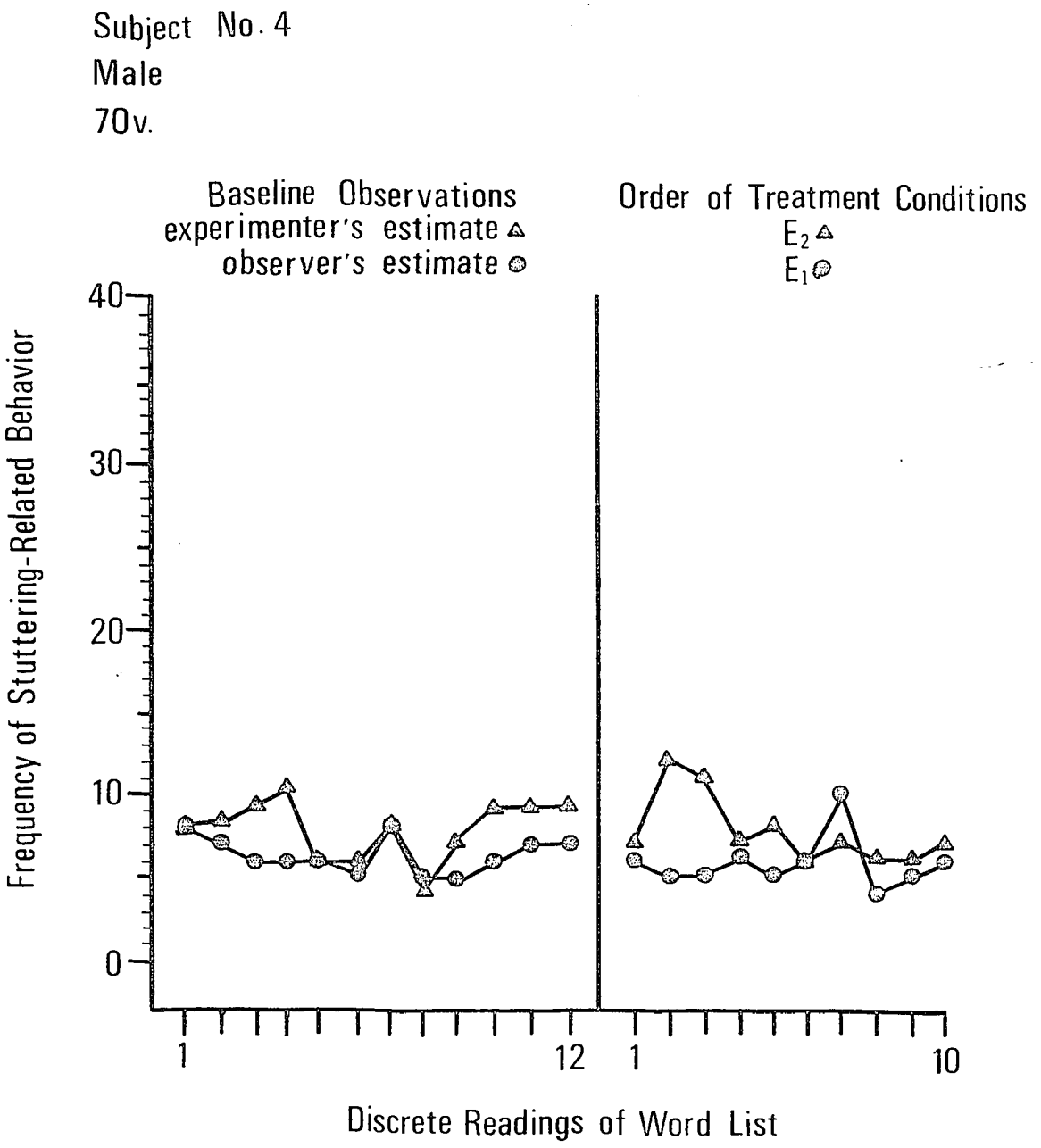

Figure 4. The frequency of stuttering-related behavior during pre-shock, and the resultant effects of two shock contingencies.

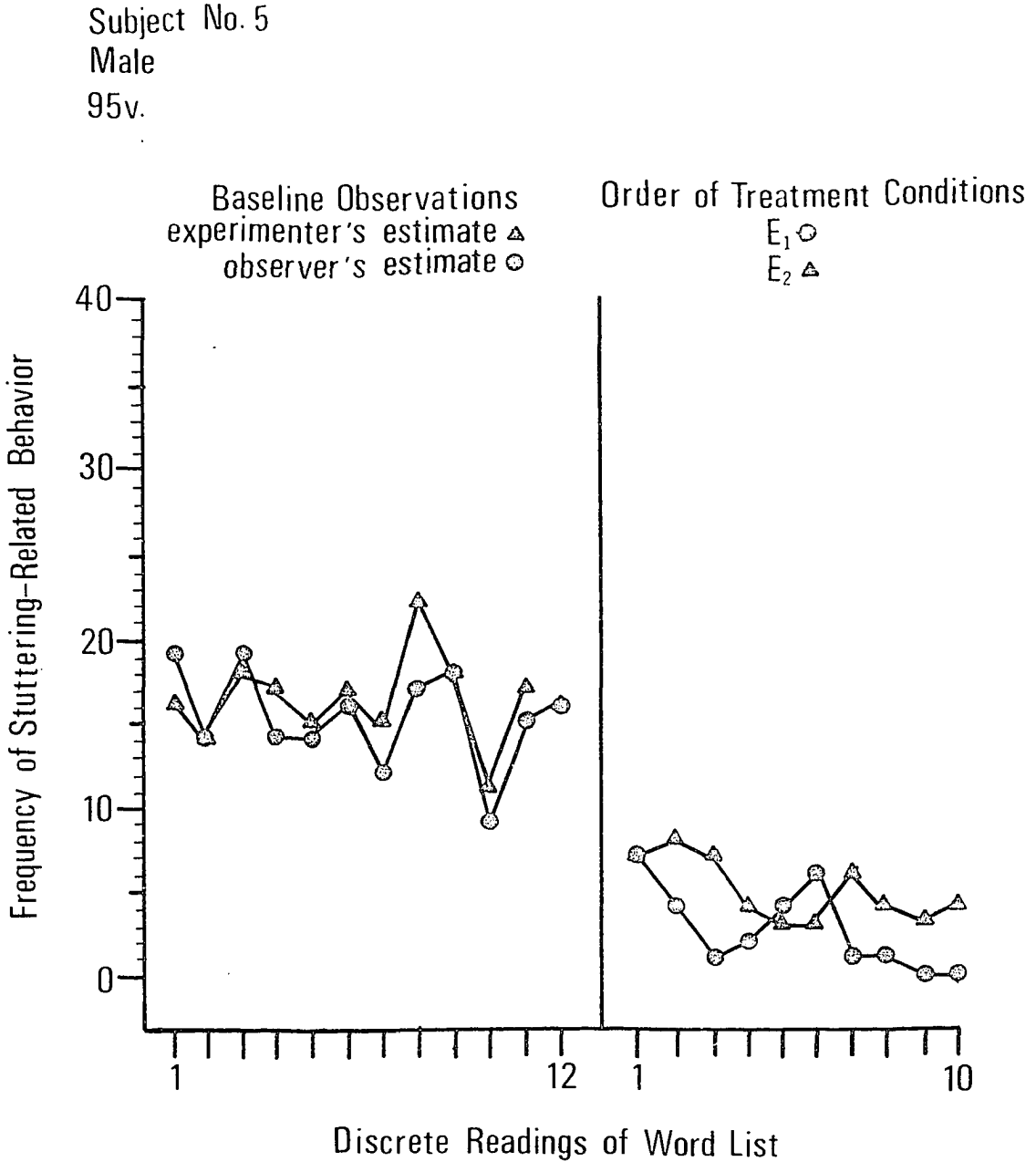

Figure 5. The frequency of stuttering-related behavior during pre-shock, and the resultant effects of two shock contingencies.

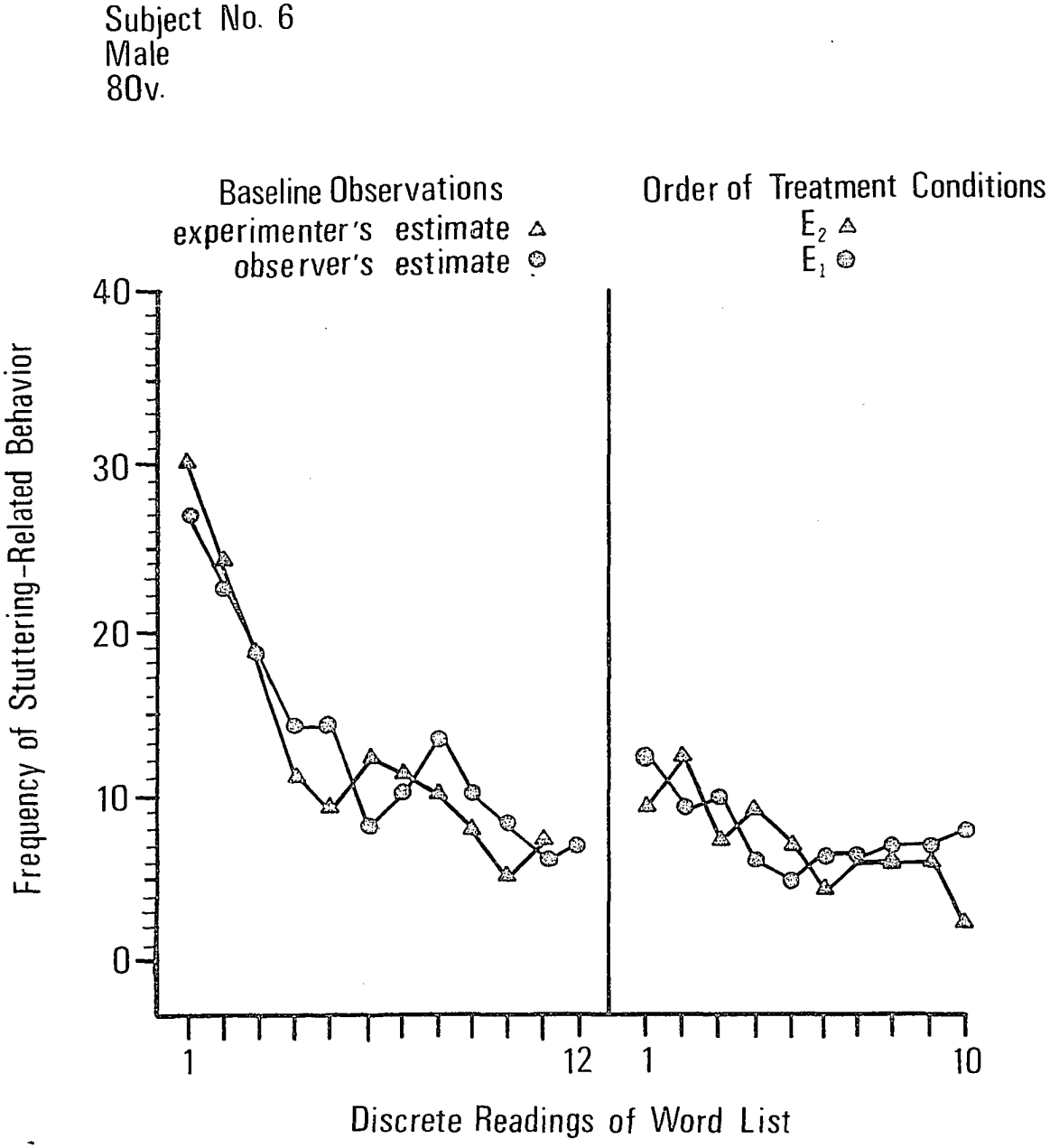

Figure 6. The frequency of stuttering-related behavior during pre-shock, and the resultant effects of two shock contingencies.

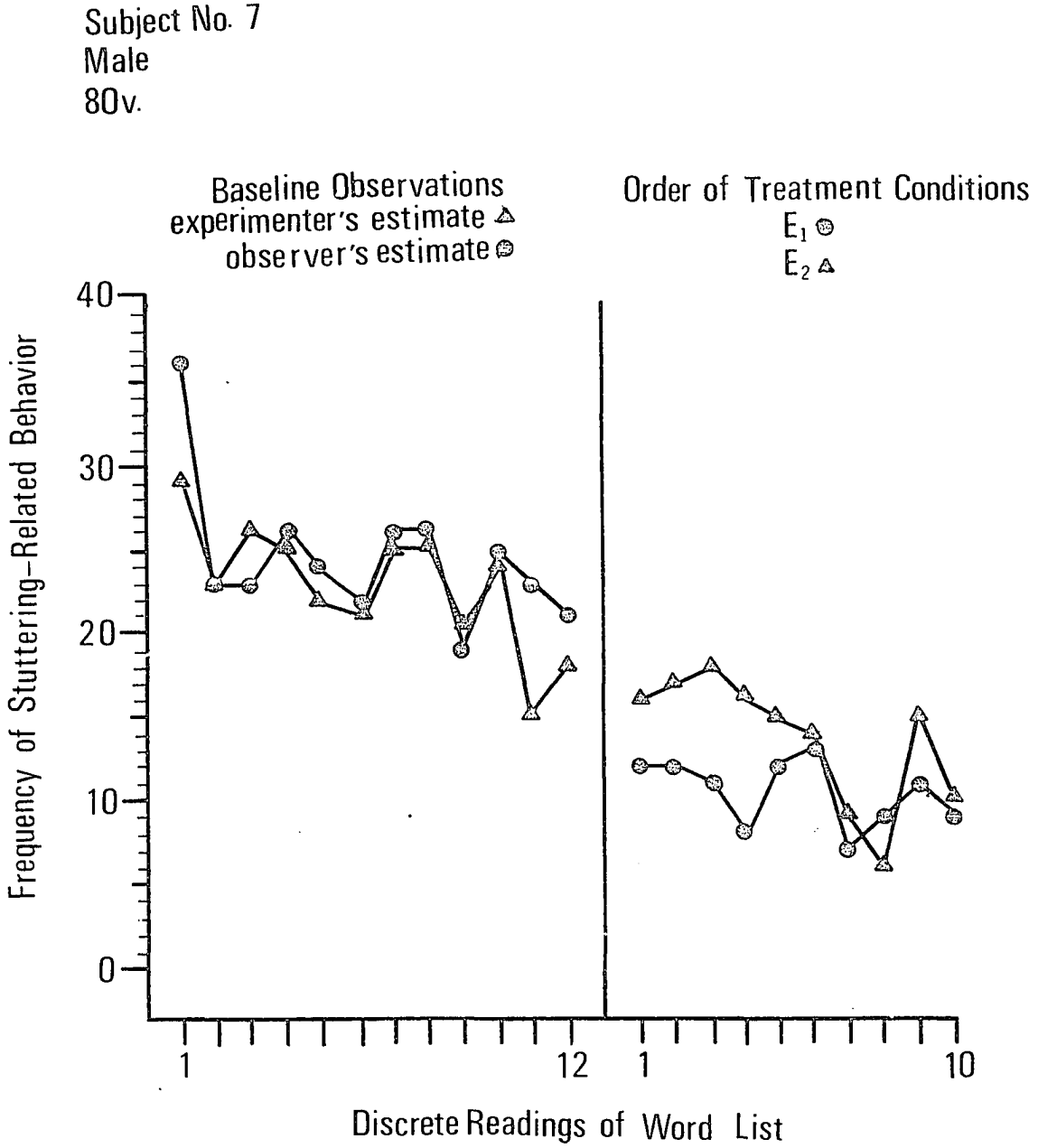

Figure 7. The frequency of stuttering-related behavior during pre-shock, and the resultant effects of two shock contingencies.

DISCUSSION

On the basis of the results, it appears that response contingent electric shock represents an effective method of lowering the frequency of the occurrence of stuttering-related behaviors. Apparently, most subjects already possess in their repertoire a readily available response which is incompatible with stuttering behavior, namely, normal or normally fluent speech. It was, however, the purpose of the current research to investigate the relative effectiveness of two shock contingencies on stuttering behavior. Specifically, an attempt was made to determine whether a difference in amount of response suppression would be obtained by the use of two different shock contingencies: (a) delivering the shock contingent upon the completion of the word stuttered, and (b) by shocking the first detection of a pre-verbal component of the word. In the former case, the contingency involves removing the reinforcer which theoretically follows at the completion of the chain, whereas the latter involves removing a discriminative stimulus which occurs early in the operant response chain.

The data do not permit a conclusion regarding the differences between the two experimental conditions. Although the second experimental condition (E_2) appears to be more effective than the first in suppressing response frequency for subjects 1, 3, 5 and 7, these subjects received E_1 first and E_2 second. On the basis of these data alone, however, the interpretation that E_2 is more effective

only when it follows E_1 is not justified. The remaining three subjects (subjects 2, 4 and 6) were run with the treatment order inverted; and their data fail to contribute to this argument. For subjects 2 and 4, no pattern of response suppression was demonstrated. For subject 6, whereas both shock contingencies were more effective than the control condition, there appears to be no difference between the experimental conditions. Therefore, it is felt that no statement can be made with respect to greater effectiveness when E_2 follows E_1 because the data fail to define or suggest the procedural effect of the opposite order on the relative effectiveness of the two experimental treatments. Certainly further research is indicated to explore the relationship between order of treatment presentations and the resultant response suppression. The present data, however, are sufficient to suggest that an order inversion counterbalance should be included in research which attempts to evaluate the relative effectiveness of two treatment conditions on stuttering behavior.

It is possible to isolate a variable common to subjects 2 and 4 which, it is felt, may account for the apparent lack of stimulus control. Both of these subjects refused to tolerate what appears to be a minimum effective shock intensity. Subject 2 received 60v., whereas subject 4 received 70v. The remaining five subjects received at least 80v.; and response suppression was consistently demonstrated. It is significant also that the rate of response during C was quite low for subject 4 relative to the rates of the other subjects. Thus, it might be argued that because disfluency was being maintained on a

lean schedule of reinforcement for this subject, response suppression was more difficult to achieve.

The percent of agreement between the experimenter and the observer regarding response occurrence was considerably higher for the experimental conditions relative to C (see Table 2). It is felt that this discrepancy may be partly a function of the greater number of stuttering-related behaviors occurring in C. The overall percent of agreement between the experimenter and the observer, 94, is sufficiently high, however, to suggest that no significant difference obtained between the two sets of judgements.

The data indicate that for most of the subjects it was possible to achieve control over stuttering behavior by manipulating the consequences of that behavior. These data, then, tend to support the position that stuttering is a behavior which is maintained by its consequences; that is, stuttering is a learned, operant behavior. If stuttering behavior is viewed as an operant response chain, the data suggest that an effective way to suppress a chained operant is to suppress an early component of the chain. Further research, utilizing a larger sample of subjects, is indicated to contribute to our understanding of the relationship between punishment contingencies and temporal location at the point of introduction of the aversive consequences.

The present experiment suggests further, that certain other controls might be programmed in future research concerned with the analysis of stuttering behavior. Specifically, a criterion of stability whould be employed as a baseline rather than reliance on a

previously determined number of trials. This seems indicated in future stuttering research because the current data suggest that the adaptation phenomenon does not obtain reliably between the eighth and twelfth trials as previously suggested (Wingate, 1965a). Other suggestions include shortening the 40-word stimulus list. This represents a particularly valuable contribution because of time limitations which are often a factor in work with adult stutterers. It will also be important in future research to time the reading trials to demonstrate suppression of stuttering frequency rather than a general lowering of reading rate. Moreover, other techniques, such as positive reinforcement and the introduction of non-aversive novel stimuli, which might yield results similar to those obtained in this research, should be investigated.

SUMMARY AND CONCLUSIONS

This research evaluated the effect of two punishment procedures on stuttering behavior. The first of these (E_1) involved an attempt to punish the completion of the stuttering response chain, while the other (E_2) involved delivering the punishment contingent upon the detection of an early non-verbal component of the chain. The aversive stimulus was to be an electric shock of 95v. intensity. All but one of the subjects, however, refused to tolerate this intensity and required that it be lessened. The two punishment conditions described above involved (a) shocking the completion of the word stuttered (E_1) and (b) shocking the occurrence of specified non-verbal stuttering-related behaviors which were observed immediately prior to one reading of any given word (E_2).

Each subject read a 40-word list, 32 times. The 32 readings were divided into a control condition of 12 readings in which no punishment contingency was programmed, and two experimental conditions of 10 readings each. The order of the three conditions was C, E_1, E_2 for odd numbered subjects, and C, E_2, E_1 for even numbered subjects. The hypothesis tested was one of no difference between the three conditions.

Statistical analysis of the obtained data indicated the presence of a significant difference among the three conditions. This difference was significant beyond the .01 level of confidence. Graphic representations of the data reveal that C apparently differed significantly

from E_1 and E_2. Whereas a tendency was found for greater decrement to have occurred under E_2 than E_1, the difference appears slight and must be interpreted with caution.

The following conclusions were generated by the present experiment:

1. Stuttering appears to be an operant behavior.

2. It appears that the frequency of stuttering can be reduced by means of response-contingent shock.

3. Removing a discriminative stimulus which occurs early in the stuttering response chain appears to be a more effective technique of reducing response frequency than removing the reinforcer which theoretically follows the completion of the chain.

4. Shock intensity apparently represents an important variable in the suppression of stuttering behavior. Evidently, 80v. was the minimum effective aversive intensity.

REFERENCES

Ahlstrand, Ann, "The Effect of Punishment and of Verbal Instructions Upon Stuttering Frequency." Unpublished Master's Thesis, State University of Iowa, 1961.

Azrin, N. H. and Holz, W. C., "Punishment." In Honig, Werner K., Operant Behavior: Areas of Research and Application. New York: Appleton, Century, Crofts, 1966, ch.9.

Bijou, Sidney W. and Baer, Donald M., Child Development Vol. II. New York: The Century Psychology Series, 1965, Pp. 171-174.

Frick, James V., "An Exploratory Study of the Effect of Punishment (Electric Shock) Upon Stuttering Behavior." Unpublished Doctoral Dissertation, State University of Iowa, 1951.

Flanagan, Bruce, Goldiamond, Israel and Azrin, Nathan, "Operant Stuttering: The Control of Stuttering Behavior Through Response Contingent Consequences." J. Exp. Anal. Behav., 1958, 1., 173-177.

Flanagan, Bruce, Goldiamond, Israel and Azrin, Nathan, "Instatement of Stuttering in Normally Fluent Individuals Through Operant Procedures." Science, 1959, 130, 979-981.

Goldiamond, Israel, "Stuttering and Fluency as Manipulatable Operant Response Classes." In Krasner, Leonard and Ullmann, Leonard P., Research in Behavior Modification: New Developments and Implications. New York: Holt, Rinehart, and Winston, 1965, Pp. 106-156.

Kent, Louise R. and Welt, Kenneth, "Effect of Shock on Stuttering Behavior during Conversational Monologue." Paper presented at the 1967 Convention of the American Speech and Hearing Association, Chicago.

Martin, Richard R., and Siegel, Gerald M., "The Effects of Response Contingent Shock on Stuttering." J. Speech Hearing Res., 1966, 3, 340-352.

Siegel, Sidney, Non-Parametric Statistics. New York: McGraw-Hill Book Co., Inc., 1956.

Stassi, Eugene J., "Disfluency of Normal Speakers and Reinforcement." J. Speech Hearing Res., 1961, 4, 358-361.

Thomas, Don R., Becker, Wesley C., and Armstrong, Marianne, "Production and Elimination of Disruptive Classroom Behavior by Systematically Varying Teacher's Behavior." J. App. Behav. Anal., 1968, 1, 38.

Van Riper, C., "The Effect of Penalty Upon Frequency of Stuttering Spasms." J. Genet. Psychol., 1936, 193-195.

Van Riper, C., and Hull, C. J., "The Quantitative Measurement of the Effect of Certain Situations on Stuttering." In Johnson, Wendell. Stuttering in Children and Adults. Minneapolis: University of Minnesota Press, 1955.

Wingate, M. E., "Stuttering Adaptation and Learning: The Relevance of Adaptation Studies to Stuttering as 'Learned Behavior'." J. Speech Hearing Dis., 1965, 148-156.

Wingate, M. E., "Stuttering Adaptation and Learning: The Adequacy of Learning Principles in the Interpretation of Stuttering." J. Speech Hearing Dis., 1965, 211-218.

APPENDIX A

Frick's Word List

waitress
disaster
workmanship
yesterday
rhinestone
shortcake
kindergarten
dangerous
general
shudder
pitchfork
thinking
kerchief
musician
chairman
zealous
singular
vulgarity
vegetable
bombardment
whitewash
tapestry
judicial
balcony
locality
guarantee
zoology
necessity
whipcord
politician
thankful
scrimmage
turpentine
yardage
reasoning
champion
negligent
laboratory
military

APPENDIX B

Disclaimer

KNOW ALL MEN BY THESE PRESENTS:

WHEREBY, I am to undergo certain experiments in connection with the control of stuttering by reason of which I shall sustain electric shocks of varying intensity at the discretion of the persons administering and controlling said experiment, and

WHEREAS, I am subjecting myself to these experiments for what benefits I may personally derive from them, and

WHEREAS, I am doing so entirely upon my own initiative, risk and responsibility,

NOW THEREFORE, in consideration of this undertaking I do hereby for myself, ny heirs, executors and administrators remise, release and forever discharge DR. LOUISE R. KENT, WESTERN MICHIGAN UNIVERSITY and KENNETH WELT, and all of their agents and employes from any and all claims, demands, acts or causes of action on account of any injury which may occur from any cause as a consequence of said experiment now or in the future.

Dated:_____

_____

APPENDIX C

Data Sheet

Trials:	1	2	3	4	5	6	7	8	9	10	11	12
WAITRESS												
DISASTER												
WORKMANSHIP												
YESTERDAY												
RHINESTONE												
SHORTCAKE												
KINDERGARTEN												
DANGEROUS												
GENERAL												
SHUDDER												
PITCHFORK												
THINKING												
KERCHIEF												
MUSICIAN												
CHAIRMAN												
ZEALOUS												
SINGULAR												
VULGARITY												
VEGETABLE												
BOMBARDMENT												
WHITEWASH												
TAPESTRY												
JUDICIAL												
BALCONY												
LOCALITY												
GUARANTEE												
ZOOLOGY												
NECESSITY												
WHIPCORD												
POLITICIAN												
THANKFUL												
SCRIMMAGE												
TURPENTINE												
YARDAGE												
REASONING												
CHAMPION												
NEGLIGENT												
LABORATORY												
MILITARY												

APPENDIX D

Description of Specific Behaviors

Subject 1. Putting lips together twice while attempting to initiate a word.

Subject 2. Rapid repetition of first syllable. Vocalization present, but no word formed.

Subject 3. Tensing of facial musculature.

Subject 4. Tensing of facial musculature.

Subject 5. Holding of breath and facial musculature tense.

Subject 6. Moving lips as if to emit sound, but remaining silent. Occasionally accompanied by "um". Also, apparent tension in neck.

Subject 7. Holding of breath. Face and neck rigid.

APPENDIX E

Shock Intensities Per Subject

Subject 1.....95v.

Subject 2.....60v.

Subject 3.....80v.

Subject 4.....70v.

Subject 5.....85v.

Subject 6.....80v.

Subject 7.....80v.

APPENDIX F

Mean Number of Stuttering-Related Behaviors Per Subject, Per Condition

Subject	C	E1	E2
1.	26.33	21.8	13.9
2.	37.42	35.9	33.2
3.	21.33	10.1	5.2
4.	7.75	7.77	5.8
5.	16.33	4.9	2.6
6.	13.5	6.8	7.6
7.	22.75	13.6	10.4

APPENDIX G

E-O Agreements (A) and Disagreements (D)
Per Subject, Per Condition

Subject	C		E1		E2	
	A	D	A	D	A	D
1.	405	75	350	50	388	12
2.	459	21	398	2	393	7
3.	395	85	397	3	396	4
4.	441	39	400	0	397	3
5.	425	55	398	2	399	1
6.	442	38	398	2	394	6
7.	400	80	389	11	388	12