THE EFFECTS OF RESPONSE CONTINGENT NEGATIVE-STIMULATION ON

SELECTED RESPONSES IN A MOMENT OF STUTTERING

By

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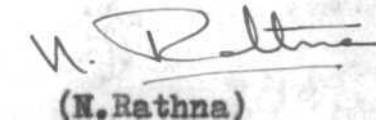
C E R T I F I C A T E.

This is to certify that the dissertation entitled "THE EFFECTS OF RESPONSE CONTINGENT NEGATIVE STIMULATION ON SELECTED RESPONSE IN A MOMENT OF STUTTERING" is the bonafide work in part fulfilment for M.Sc. Speech and Hearing, carrying 100 marks, of the student with Register No.19



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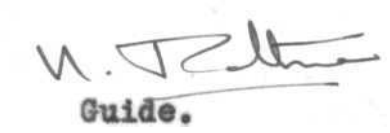

Guide.

D E C L A R A T I O N

This dissertation is the result of my own study undertaken under the guidance of Dr.N. Ratna, Professor in speech Pathology, All India Institute of Speech and Hearing, and has not been submitted earlier at any University for any other diploma or degree.

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CONTENTS

CHAPTER I

INTRODUCTION

The emergence of behavior therapy aS a speciality has greatly revolutionised conceptulization of behavioral problems and their treatment (YateS 1970). Speech and hearing problems are not exempt from the influence of thiS emerging force. This influence is maximally felt in the area of stuttering.

The first comprehensive book on stuttering with the behavioral-learning orientation was written by Brutten & Shoemaker (1967). After critically examining the existing theories of stuttering which use learning constructs and principles (Sheehan 1958, Wishner 1950, Shames and Sherrick 1963) Brutten & Shoemaker present the two-factor theory of stuttering as an alternative. One of the main criticisms levelled by them against these theoretical positions iS that they cannot explain punishment data related to stuttering behavior satisfactorily. They point out that these theoretical positions generate the prediction that under punishing conditions the frequency of stuttering will decrease in accordance with the negative law of effect. The data they present leads them to the conclusion that it is possibly true with regard to certain responses in a moment of stuttering (tongue protrusions, foot tapping, etc.) and not with others (repetitions and prolongations of sounds

and syllables). The latter responses increase in frequency when punished. (Martin et al 1964).

Considerations such as these and the data relating to the conditions and nature of fluency disruptions in normal speakers (Hill 1954, Savoye 1959) lead them to the hypothesis that stuttering is an involuntary disruption of fluency characterized by repetitions and prolongations of sounds and syllables caused by conditioned negative emotion. They also maintain that behaviors traditionally considered stuttering - like foot-tapping, disturbance in breathing, etc. - are instrumentally learned escape or avoidance behaviors (adjustive behaviors).

Siegal (1970) has critically examined the data relating to stuttering and punishment and normal non-fluency and punishment. He concludes that the existing data do not sum up in favour of Brutten & Shoemaker's position (1967). He cites series of studies (Martin & Siegal, 1966 a, 1966 b, 1969, Siegal and Martin 1965 a, 1965 b, 1966, 1967) in favour of the interpretation that stuttering is an instrumentally conditioned behavior.

The existing confusion relating to the data and the consequent differences in the theoretical statements regarding the effect of punishment on stuttering is a compound of several factors. Some of these factors have been delineated by the theorists (Siegal 1969, Brutten & Shoemaker 1970) themselves. The most generally recognized factor is the

paucity of data - moat of the studies have involved only a few casea. The need for continued research relating to the effect of punishment on stuttering to the theoretical issues involved has been stressed by both the theorists (Brutten & Shoemaker 1970; Siegal 1970). The present study is an outcome of the recognition of this need.

Definitions:

There are certain key concepts whoae meaning should be specified in the context of the present study.

1) **Stuttering**: There is no one acceptable definition of stuttering. For the present purpose definition emphasizing observable behavioral features is stressed. It can be defined as repetitions and for prolongations of sounds and syllables which may be accompanied by behaviors like tongue protrusions, finger snappings, etc. Emphasis on repetitions and/or prolongationa of sounds and syllables as the primary characteristics of stuttering is in accordance with the standard definition of stuttering by Wingate (1964). Thus the stutterers selected for this study exhibited either repetitions and/or prolongations of sounds and syllables. A few of these stutterers also exhibited behavior like tongue protrusion, tight eye closure.

2) **Punishment**: Azrin & Holz (1966) defined punishment as "a reduction of the future probability of a specific response as a result of immediate delivery of a stimulus for that response" (pp. 381). Siegal (1970) has accepted this defini-

tion. Brutten & Shoemaker (1970) define punishment as an aversive or negative stimulus contingent on a specific response. A negative or an aversive stimulus is in turn defined as that stimulus which an organism will try to escape or avoid when placed in a free choice situation.

Thus, for Siegal (1970) any stimulus which is immediately delivered (contingent) on a specified response is a punisher if it reduces the future probability of that response. However, for Brutten & Shoemaker (1970) reduction of response is irrelevant to establish a stimulus as a punisher. What is important is a prior demonstration that the subject tries to escape or avoid the stimulus. In the present study a known aversive stimulus (electric shock) was used.

Statement of the Problem:

The problem of the present study is to investigate the effect of contingent negative stimulation on selected responses in a moment of stuttering. From the two-factor theory of stuttering propounded by Brutten & Shoemaker (1967, 1969), the following predictions can be made:

i) Repetitions and/or prolongations, when contingently negatively stimulated,increase in frequency consequent on an increase in negative emotion.

ii) Adjustive behaviors like tight eye closures, tongue protrusions when contingently negatively stimulated decrease in frequency as dictated by the negative law of effect. However, under this condition, repetitions and prolongations of

sounds and syllables increase in frequency, because

iii) Negative stimulation (contingent or non-contingent) of any type increase negative emotion.

As compared to this, Martin & Siegal (1968) position asserts that all behaviors, which constitute a moment of stuttering decrease as dictated by the negative law of effect.

Purpose:

The purpose of this study is to test the following null hypotheses:

i) Contingent negative stimulation of repetitions and/or prolongations of sounds and syllables will not alter their rate significantly.

ii) Contingent negative stimulation of adjustive behaviors will not alter their frequency significantly.

iii) Contingent negative stimulation of adjustive behaviors will not alter the frequencies of repetitions and prolongations of sounds and syllables.

iv) Contingent negative stimulation of repetitions and/or prolongations of sounds and syllables will not alter the frequency of adjustive behaviors significantly.

v) The rate of responding of the chosen are not related to reading rate (word out put/minute) when the responses are contingently negatively stimulated.

CHAPTER II

REVIEW OF LITERATURE

In recent years one can witness the increasing use of learning constructs and principles in the understanding and treatment of speech disorders. The generalizations and theories emanating from learning laboratories have influenced greatly the present day thinking about the genesis, maintenance, and development of stuttering behavior. This influence is felt in the form of different, sometimes overlapping theories of stuttering (Wischner 1950; Sheehan 1958; Shames & Sherrick 1963). Brutten & Shoemaker (1967) point out that there are certain significant facts which these theories of stuttering fail to explain or do not explain. They list two of them:

i) phenomenon of adaptation;
ii) effect of punishment on stuttering.

The more relevant of these for the present paper is the effect of punishment on stuttering behavior. On the basis of studies conducted by Van Riper (1937), Frick (1951) and Martin et al (1964) Brutten & Shoemaker conclude that stuttering increases rather than decreases - in direct opposition to the expectations from these theoretical positions and in general, to the negative law of effect. They present their two-factor theory of stuttering as an alternative.

Another group of workers (Martin et al 1968; Goldiamond et al 1965) have hypothesized that stuttering and normal non-fluencies are operant behaviors and they have shown that stuttering is manipulabable by the consequences it generates. The data they present (Martin et al 1968; Goldiamond 1965) support this assumption, and thus identify stuttering not as a special class of behavior as Brutten & Shoemaker hold but as an operant, subject to both positive and negative law of effect. Their conclusions have important bearing on the theories held by Wischner (1950), Sheehan (1958), Shames & Sherrick (1963) and any type of theorizing in this area. Specifically the controversy between the two group of workers, Brutten and hia associates (Webster 1968; Starkweather 1969; Brutten & Shoemaker 1967) and Martin and his associates (Martin et al 1965, Siegal 1969, Siegal 1970) has enlivened the area with vigorous research and stressed the need for fresh rethinking on the relationship between punishment and stuttering. Their mutual criticisms of each other's positions go beyond the interpretation of the punishment data and involve methodological and definitional issues as well. In this paper, before the controversy is taken up in detail, some of the studies on the effect of punishment on stuttering behavior and normal non-fluencies will be reviewed. This will be followed by an exposition of the Two-factor theory of stuttering and of the controversy.

PUNISHMENT AND STUTTERING

The first study on the effect of punishment on stuttering behavior was conducted by Van Riper (1937). The study involved sixteen stutterers. Each stutterer read a passage six times. Shock electrodes were attached to the neck of the subjects. After three readings the subjects were given a sample shock and told that they would receive as many shocks as there were moments of stuttering in the fourth reading, after its completion. Similarly, the subjects were told after the fifth reading that they would receive a shock for each stuttering that had occurred during the initial reading in the series, after the completion of the sixth reading. Fifteen subjects increased stuttering from reading three to four. Similar increase was seen from the fifth reading to sixth though lesser in magnitude, and in fewer subjects. It is not clear from the study whether in fact the shocks were delivered.

Because of its presumed conclusiveness there was no research relating to punishment and stuttering for next 15 years. The results of this study exerted a great influence on theorising therapy procedures. Therepeutically, it resulted in advice like stutterers should not be punished at any cost (Johnson 1967; Van Riper 1954; Brutten & Shoemaker 1967) and as Siegal (1969) notes admonitions like "it is dangerous to reward fluency since, by implication, we thereby suggest to the stutterer that we disapprove of his disfluencies"(p. 129).

Chronologically, the next study was done by Frick (1951) He attempted to replicate Van Riper's findings. He divided 48 stutterers into four groups and assigned them to each of the following conditions. The subject read a list of words rather than a prose passage.

Condition I (control):	Shock was neither delivered nor threatened
Condition II (experimental):	Shock was delivered for each stuttered word
Condition III (experimental):	Shock was threatened and delivered in fact, for every stuttered word after the reading
Condition IV (control):	Shock was delivered after each stuttered and non-stuttered word.

There was no significant difference between Conditions I and II, between Conditions I and III, between Conditions IV and II and between Conditions IV and III. However, Frick reanalyzed the data by recombining the shock conditions (II, III & IV) and comparing it with no shock condition (I). There was significant difference, with more atutterings in combined shock conditions than the no-shock conditinn.

The more recent work involving the effect of punishment on stuttering can be traced to Flanagan, Goldiamond and Azrin (1958). Their extensive research with stutterers and normally non-fluent speakers has been summarized by Goldiamond(1965) The studies have either involved the use of high intensity white noise - 105 dB blast (Flanagan, Goldiamond and Azrin, 1958)

or DAF (Goldiamond 1960, 1962) as the punishing stimuli. When either high intensity white noise or DAF is made contingent on stuttering thus punishing it, it decreases dramatically. In escape conditioning i.e. when termination of these stimuli are made contingent on the occurrence of stuttering, stuttering increases in frequency. The results of the punishment procedure and the escape conditioning establish certain essential similarities between an operant and stuttering. This has led Goldiamond et al (1965) to conclude that stuttering is an operant behavior.

The results emanating from Minnesota laboratory in general support this conclusion (Siegal 1970). These studies (Martin and Siegal, 1966 a, 1966 b, Quist and Martin 1967, Haroldson, Martin and Starr 1968) establish the fact that stuttering decreases when punished, and that it can be brought under the control of discriminative stimuli (1966a). All these studies have involved intensive experimentation with single subjects, which involves obtaining control and experimental data on the same subject in the tradition of Skinner (1966). The contingently punished behavior is either narrowly specified as tongue protrusion, nose wrinkling, S-prolongations (Martin and Siegal 1966a), repetitions, prolongations, 'uh' (Quist and Martin 1967) or broadly specified as "moments of stuttering" (Martin & Siegal 1966 a; 1966 b; Haroldson, Martin and Starr 1969). The punishing stimuli used range from electric shock (Martin & Siegal 1966 a) to

verbal punisher like "no good (Martin & Siegal, 1966 b), "wrong" (Quist and Martin 1967). Time Out (Haroldson, Martin and Starr 1969) in which a stutterer is signalled to stop contingently on the occurrence of a stuttering has decreased stuttering. One of these studies (Martin and Siegal 1966 b) involved simultaneously punishing and rewarding fluency. The experimenters conclude that reward may not be essential to the decrement of stuttering.

The effect of punishment on signalled expectancies of stuttering (Curlee & Perkins, 1967) has revealed that both the frequency of stuttering and expectancy decrease. Cooper et al (1970) have shown that stuttering frequency decreases when contingently stimulated by words like "Wrong", "Right" and "Tree". They conclude "Affective content of dysfluency contingent verbal stimuli may not be a significant factor in any change of dysfluency rate".

In contradistinction to these studies there are studies which go to show stuttering or certain aspects of a moment of stuttering increase when punished. Martin et al (1964) found that response contingent shock suppressed the non-verbal (nose-wrinkling) and the verbal behavior (ah-ah-ah but also suppressed the rate of verbal output, though ia their other studies this did not happen. Thus, the decrease in the non-verbal and verbal behavior may have been less striking if considered relative to the verbal output. Moreover, this decrease was associated with an increase in

prolongations. Re-introduction of shock increased the prolongations eight-fold which was persistent. Webster (1968) found that reduction of head turn movement was associated with significant increase in part-word repetitions (syllable repetitions). He also found that suppression of instrumental behavior was accompanied by increase in other behavioral aspects of the stuttering moments. Frederick (1955), Hegde (1971) found that stuttering increased significantly when punished.

In contrast to these two groups of studies, Stevens (1963), Timmons (1966), Daly (1968), Starkweather (1969) have shown that punishment has no significant effect on fluency failures.

PUNISHMENT AND NORMAL NON-FLUENCY

The studies on the effect of punishment on normal non-fluency have been critically reviewed by Siegal (1970). The early studies (Hill 1954; Stassi 1961; Savoye 1959) lead to the general conclusion that punishing stimuli disorganize speech behavior. Hill (1954) classically conditioned normal speaking subjects by pairing red light and shock during speech activity, resulted in prolongations considered indistinguiahabl from stuttering. Savoye (1959) on Skinner Estea operant conditioning punishment paradigm found similar results, namely, that significantly greater disfluency existed

periods for the experimental sample than for the non-shocked controls. Shock was the unconditioned stimulus. Stassi (1961) found similar results using preprogrammed presentation of reward ('right')or punishment ('wrong'). More significantly he found males showing more disorganization of speech than females.

In contrast, the recent studies involving the effect of punishment on normal non-fluency (Siegal and Martin 1965a, 1965 b, 1966, 1967, 1968, 1969, Martin and Siegal, 1969; Brookshire and Martin 1967; Cooper et al 1970) have consistently shown that normal non-fluencies decrease when punished. The punishing stimuli used range from electric shock,(Siegal and Martin 1965a) 'Wrong', (Siegal & Martin 1965 b; 1966, 1967, 1968) neutral buzzer (Martin & Siegal 1969) to noise (Brookshire and Martin 1967). Response specified for stimulation range from 'disfluencies' (Siegal & Martin 1965 a, 1965 b, 1966, 1967, 1968) - a molar specification to "repetition and prolongations" (Brookshire and Martin 1967) - a molecular specification. Cooper et al (1970) have used the words "Right", "Wrong" and "Tree" contingent on interjections, part-word repetitions, word repetitions.

THE TWO-FACTOR THEORY 0F STUTTERING

The two-factor theory of stuttering propounded by Brutten & Shoemaker is based on the two-factor theory of avoidance conditioning (Mowrer 1960). In its essentials

the two-factor theory of avoidance conditioning asserts that both classical conditioning and instrumental conditioning are involved in the establishment of an avoidance behavior. Classical conditioning serves the function of associating the fear elicited by the unconditioned stimulus with the conditioned stimulus. This is accomplished relatively fast depending on a favourable temporal order between the conditioned stimulus and the unconditioned stimulus. Instrumental conditioning, for its part, is assigned the task of associating instrumental response to the conditioned stimulus in sufficient strength for it to occur early enough to antedate the unconditioned stimulus. The instrumental response results in fear-reduction and thus gains in strength.

Brutten & Shoemaker (1967) take an essentially a similar line of reasoning while explaining the genesis, maintenance and development of stuttering. They recognize several stages in the development of stuttering:

Stage 1 At this stage the individual speaks fluently, and to an extent the observed fluency in a function of positive emotion.

Stage 2 There is disorganization of fluency due to negative emotion elicited by environmental stimuli. The dysfluency is essentially characterized by repetitions and prolongations of sound and syllables (Hill 1954; Stassi 1961, Savoye 1959). At this stage, the problem is not called stuttering as it is transitory, All normal individuals may

exhibit such diaorganizacions in their life time.

Stage 5 Such disorganizations become more frequent and gain the characteristic of stimulus-dependence. Episodes of disorganizations are more frequent and consistent. At this stage the individual can be called a stutterer. Brutten & Shoemaker stress that stuttering is an involuntary disruption of fluency of speech caused by conditioned negative emotion characterized by repetitions and prolongations of sound and syllables. What is conditioned is emotionality to the situation and not stuttering.

Stage 4 Because of the punitative reactions from the environment and his own reactions to the disrupted speech the stutterer develops escape and avoidance behavior. He may swing his arms, close his eyes, take a deep breath, or indulge in all those activities which are called "secondaries". These behaviors are not essential to the definition of stuttering but signify its development. They call these behaviors adjustive behaviours.

THE CONTROVERSY

For the sake of clarity and convenience the controversy will be considered under three headings:

i) Theoretical issues;
ii) Contingency Vs. Non-contingency issue; and
iii) Definitional issues.

i) Theoretical issues:

The logical consequences of Brutten & Shoemaker's (1967) position are

a) Stuttering defined as repetitions and prolongations of sounds and syllables increase in frequency when punished. This is because punishment in general tends to increase already present conditioned negative emotion disrupting speech.

b) Adjustive behaviors like arm-swinging, tongue protrusion, tight eye closure, decrease when punished according to the negative law of effect. This is because they are instrumentally conditioned escape and avoidance behavior. However, the punishment procedure increases negative emotion with a consequent increase in repetitions and prolongationa of sounds and syllables.

Martin et al (1968) consider all the behaviors of a stutterer as instrumentally conditioned, hence they predict the will decrease in frequency when punished.

Thus the two groups of workers diverge as to the predicted effect of punishment on certain behaviors - repetitions and prolongations of sounds and syllables will increase (Brutten & Shoemaker 1967), will decrease (Martin et al 1968) - but converge on certain others - tongue protrusion, tight eye closure, etc., will decrease as dictated by the negative law of effect.

ii) Contingency Vs. Non-Contingency Issue:

Siegal (1969; 1970) has pointed out that most of the studies Brutten & Shoemaker (1967) quote as supporting the contention that punishment disrupts normal speakers spontaneous speech (Hill 1954; Stassi 1961; Savoye 1959) did not involve contingent presentation of the stimulus. Contingency of a stimulus is an essential aspect in the definition of punishment. Moreover, the studies which Brutten & Shoemaker quote as supporting their contention that stuttering increases when punished is questioned on similar grounds. Van Riper (1937) threatened shock before performance but did not deliver it soon after stutterings (contingency). Though Friok (1951) included response-contingent condition, the stimulus did not have punishing effect, i.e., when this condition was compared with no-shock condition, there was no significant increase.

Brutten & Shoemaker (1970) agree with Siegal (1969) to restrict the term punishment only when contingency is involved. However they maintain their original hypothesis that response contingent negative stimulation or non-contingen negative stimulation will disorganize speech (Hill 1954; Savoye 1959; Stassi 1961) in normal speakers. They defend their contention that stuttering increases when punished by quoting the results from the studies done by Martin et al (1964) and Webster (1968).

iii) Definitional Issue:

1. Definition of stuttering: Brutten & Shoemaker (1970) stress that stuttering is characterized by repetition and prolongation of sounds and syllables and all other behavior are adjustive in character. They are not essential in the definition of stuttering but signify development of stuttering. Martin et al (1968) do not make such distinctions and consider any type of dysfluency as stuttering.

Thus the specification of behavioral features is essential for one group of workers (Brutten a Shoemaker) and not for the other (Martin et al) Many of the studies reviewed early do not give information about behavioral analysis. This does not make the studies valuless, but difficult to evaluate in the light of Brutten & Shoemaker's (1967) position.

2. Definition of punishment: Siegal (1970) defines punishment after Azrin and Holz (1966) as . . . . a reduction of future probability of a specific response aa a result of the immediate delivery of a stimulus for that response" (p. 381). The definition does not have reference to "pleasantness - unpleasantness" aspect of the stimulus. The definition has two parts. The first specifies the direction of the effect, the second part the procedure. All the studiei done by Goldiamond et al (1965) and Martin et al (1968) used this definition.

Brutten & Shoemaker (1970) characterize this definition of punishment aa 'a-poateriori' definition in contrast to their 'a-priori' definition of punishment. Brutten & Shoemaker (1930) note with regard to 'a-posteriori' definition thus: "Within this framework, a buzzer, a light, a piece of candy, money, or the word "right" is considered punishing stimulus if its presentation is correlated with the reduction in contingently stimulated behavior" (p.10). Furthermore, they note that the very nature of the definition precludes the possibility that stuttering may increase or may not be influenced by a punishing stimulus.

In contrast Brutten & Shoemaker's definition involves an 'a-priori' demonstration that the stimulus is aversive or negative (negative stimulus is one which an individual will escape or avoid when placed in a free choice situation). The operation of punishment involves making such a stimulus contingent on a specified response. Brutten & Shoemaker (1960) note thus on this definition: "It permits us to make an independent determination of the contingent effect of a negative stimulus on specific behavior; we are not forced to preclude, by definition, the very real possibility that a negative stimulus can be ineffective or lead to an increase in the contingently stimulated behavior." (p. 10).

Experimental psychologists in general have opted for 'a-priori' definition of punishment. Church (1963) writes that several recent theoretical treatments of punishment

have employed escape operation as the basis for the definition of a noxious stimulus. They note ". . . . . There are no logical grounds for defining a noxious stimulus in terms of escape operation rather than in terms of punishment operation, but it appears at present time that the effects of escape operation are far more reliable than those of punishment operation". Furthermore, much more significantly Church comments "In practice, however, very few experimenters have taken seriously the empirical definition of noxious stimulus", (pp.370).

Whatever the relative merits of one definition over the other certain implications follow when one assumes this or that definitional posture, as indicated by Brutten & Shoemaker (1970). They have indicated that Siegal's (1970) definition of punishment precludes the possibility of increase or no effect of the contingently stimulated behavior. By implication they are criticizing Azrin & Holz (1966). Azrin & Holz, however, recognize what has been called the paradoxical effect of punishment (i.e. facilitation of the punished behavior) and the possibility that a punishing stimulus can be ineffective. In the light of this fact, it is difficult to understand Brutt & Shoemaker's (1970) criticism of Siegal's definitional postur

The 'a-priori' definition raises several serious questions. How many of the experimenters satisfied the escape or avoidance criterion? If they have not, as it is with so in many studies (Martin 1968, Goldiamond, 1965) do the results become irrelevant to Brutten & Shoemaker's

position? If one makes an allowance for the differences between the primary puniahers (stimuli like shock which have aversive properties naturally) and the secondary punishers (stimuli which have acquired, and hence can become neutral, aversiveness like "no good", "wrong") then electro-shock studies become relevant to Brutten & Shoemaker's position.

The resolve of this relevance - irrelevance problem partly depends upon the theory of punishment espoused by Brutten and Shoemaker. Theorists (Mowrer 1960; Dinsmoor 1954; Skinner 1953, Soloman 1964) who have opted for a priori definition of punishment have generally espoused passive avoidance theory of punishment. In short, the theorists claim that an alternative (hypothesized) avoidance response is learned instead of the suppressed response. Mowrer (1960) calls this avoidance response "learning not to respond" within this framework if a stimulus suppresses stuttering behavior (avoidance criterion is thus satisfied) in the first instance it can be characterized as negative. The succeeding experiments with same stimulus with the same subject can be considered as punishment as defined by Brutten & Shoemaker. Such studies become relevant to their theoretical position.

The confusion which the review has revealed is a compound of several factors. Some of them have been delineated under the controversy. By far the most important seems to be the paucity of data, which both the group of workers admit

(Siegal 1970, Brutten & Shoemaker 1959). This ia an inevitable product of the acceptance of a single group design (involving intensive study of individual cases under different values of independent variables, control data provided by the same individual) as opposed to the traditional separate group designs (Experimental group Vs. Control group, with all the pitfalls involved in matching and randomizing) (D'Amato 1970)

The conflicting results may be partly attributable to the fact that stuttering is a very general term designating various types of dysfluencies. Toomey & Sidman (1970) have shown that to a warning buzzer (previously associated with shock) stutterers reacted differently. One subject increased his stuttering, another who seemed to do so, coincidently spoke more rapidly, his stutterings increasing in proportion to the increasing opportunity. Stuttering decreased in two other cases with increase in reading rate. The validity of the assumption that stuttering is a general term matter ia an empirical which can be systematically explored by punishment procedure.

Stuttering responses should be systematically studied using punishment procedure. It promises greater theoretical understanding of the phenomenon because most of the theories of stuttering (Van Riper 1937, Johnson 1967, Wischner 1950, Brutten & Shoemaker 1967) postulate some kind of trauma or social disapproval or punishment as the basis for the genesis

of stuttering. To the extent punishment reinstates these conditions of genesis, the result of these experiments have a great bearing on these theories.

The present study was done with an idea of increasing the understanding of the problem of stuttering. Specifically it involved testing Brutten & Shoemaker's hypothesis Vs. Martin & Siegal's position.

CHAPTER III

METHODOLOGY

Selection of Cases:

Five male subjects were selected from the population of stutterers visiting the All India Institute of Speech and hearing clinic for therapy. The selected cases had to satisfy the following criteria:

i) There should not be any demonstrable organic basis for the problem as revealed by medical check up.

ii) The topography of stuttering should include responses repetitions and/or prolongations of sounds and syllables and may include any other responae(s).

iii) The stutterer's prior consent should be taken. He should be told the experimental nature of the therapy and the equivocal state of knowledge as regards the effect of shock on stuttering. He should also be told that therapy would be discontinued if stuttering increases. If the stutterer is young the prior consent of the parents should be taken as well.

Selection of Observer-experimenter:

Two undergraduate students were selected and trained to observe and contingently stimulate the chosen responses. Initially, the investigator discussed with them the procedural rationale of the study keeping them in the dark as regards

the theoretical expectations. It was underlined that they should be very vigilant in the observation of the responses assigned to them. For the purpose of recording of each observed occurrence of response stuttering data sheet was used (Appendix X) similar to the operant data sheet given by Reese (1964). It consists of information regarding the subject's name, sex, age, the date, the name of the experimenter and description of the specified response. Occurrence of each response can be tallied against each minute. The observer-experimenters were shown how to record the relevant information on the sheet. The rationale for the use of observer-experimenters was to minimize whatever bias the investigator might have.

Description of stuttering behavior:

The two observer-experimenters and the investigator catalogued all the observed responses in moments of stuttering in a thirty minute reading. Sometimes discussion use to ensue on the best way of describing the response, which would distinguish it from the responses of the like sort. For example, instead of 'tight eye closure ' the total phenomenon was described thus, "the eye lid moves downward suddenly, like a curtain released suddenly" to be distinguished from the natural eye lid movement which involves only the distal end of the eye lids. Such a clear description sharpened the observer-experimenters focus on the chosen response.

Selection of the responses:

The bases for selection of responses were,

(i) Theoretical: The two chosen responses belonged to the two categories of responses suggested by Brutten & Shoemaker (1969). In case adjustive behaviors were Absent either repetitions or prolongations were considered for contingent stimulation.

(ii) The most frequent response in the two response classes were selected.

(iii) Facility with which the boundary of a response could be specified. In other words how readily the response could be identified and discriminated from the response of like sort.

Training of the Observer-Experimenter to a criterion:

After the selection of two responses, a response was "assigned" to each of the two observer-experimenters. The purpose of the training session was to make the observer—experimenters discriminative. Generally following steps were taken:

(i) The investigator and the observer-experimenter tapped as soon as they saw the specified response independentl of each other. If one missed a tap or delayed tapping, the reason was sought and rectified. Simultaniety of tapping was emphasized.

(ii) The investigator and the observer-experimenter recorded occurrence of the chosen responses independently of each other for fifteen minutes. A minute to minute comparison was made. If out of fifteen minutes there were three minutes or less than three minutes having a difference of three responses, the observer-experimenter was considered trained to the criterion.

DESIGN

ABA design, a type of single group design was used. There were several reasons for using the single-group design as opposed to separate-group design. Moat of this reason establish superiority of single-group design in general over separate-group design. They are:

(a) the control and experimental data are obtained on the same subject, and the same subject serves under different values of independent variable.

(b) Data gathered on each subject could be analyzed using non-parametric statistical techniques independently of each other. The independent tendencies of each case is thus not "dissolved" in a group average.

The letter ABA refer to three succeeding time segments. First A refers to the control segment when occurrences of a response is recorded but not manipulated. B refers to the experimental segment when the independent variable is introduced. Last A refers to the withdrawal of independent

variable, establishing a condition similar to First A. The differences between the first A and B establishes the effect of independent variable on the response, between B and last A (henceforward written A_1) establishes the ongoing effect of independent variable on the response. A fuller discussion of the rationale of the design is given by D'Amato (1970),

The base rate sessions and the experimental sessions in the present study were of thirty minutes duration. Each session was divided into three time segments (10 minutes duration each). The first segment was termed A segment, the second B segment and the third A_1 segment. It should be borne in mind that "B" in base rate sessions did not carry the usual connotation - introduction of the independent variable.

Selection of Punishing Stimulus:

Slectric shock was preferred to other non-verbal and verbal punishing stimuli. It was felt that the escape criterion laid down by Brutten & Shoemaker (1969) could be easily shown using shock than with other stimuli. Yet another reason is that it qualifies as an ideal punisher (Azrin & Holz 1966). An ideal punisher has following characteristics:

a) Its physical dimension(a) is/are precisely specifiable;

b) It will enable easy replications of the punishing conditions; and

c) The range of values over which it can be varied will be broad.

Description of the electro-shock apparatus:

The electro shock instrument (Appendix Y) has the following provisions built into it:

i) A voltmeter which enables stepwise increase in voltage of shock delivered. The effective range of the meter extends from 0 volt to 120 volts. If the varial is manipulated even after reaching this upper limit the needle is reset at 0 volt,

ii) An ammeter which indicates the current flowing between the two applied electrodes. The meter is graduated in terms of milli-amperes. At very low levels of voltages (below 20 volts) the ammeter is not sensitive.

iii) A counter which counts the number of shock deliveries (Each delivery is of one second duration).

iv) Two steel electrodes. Watch strapes are provided to hold the electrodes tightly on a forearm.

Stimulus Material:

Stimulus material used were chosen passages from a popular Kannada magazine. Only one subject read stories in English from a collection of O'Henry's work. Another spoke spontaneously.

Base-rate Sessions:

The two observer-experimenters recorded occurrence of the chosen responses in two sessions. The two sessions were held on alternate days in the same location.

The base rate sessions give information about the inherent variations (unsystematic variance) in the rate responding from segment A to B, segment B to A_1. and segment A to A_1 The independent variable in the experimental sessions should produce variance over and above the unsystematic variance observed in the base rate sessions.

Reading Rate:

The total number of words uttered by a subject was counted in each of these two base-rate sessions. The subjects were given a signal, to make a pencil mark on the passage, after every five minutes of reading. Reading rate for every five minute was calculated by dividing number of words uttered by five.

The arrangement of the apparatuses, placement of the observer-experimenters and the investigator:

The electro shock instrument and a tape recorder were present throughout the sessions on a table. The subject was seated on a chair on one side of the table. The two observer-experimenters sat directly in front of the subject. The investigator recorded deflections in the ammeter when the observer-experimenters delivered contingent shock. He also recorded the number of shocks delivered.

Schedule of Punishment:

All the subjects received antingent negative stimulation on a continuous punishment schedule, i.e., shock was made contingent on every occurrence of specified response.

EXPERIMENTAL PROCEDURE:

The two electrodes were fastened on the dorsal surface of the left forearm after applying the electrode paste. One electrode was invariably fastened on the wrist the other at a fixed distances for each subject. Electrode paste served the purpose of decreasing the resistance thereby increasing the likelihood of ammeter deflection.

Determination of the level of shock to be delivered;

' After fastening the electrodes the subjects were told to signal when the delivered shock became "detectable", "painful" and "most painful". In most of the subjects "painful" level of shock and "most painful" level of shock were correlated with hand withdrawal movement. Only one subject did not reveal such a reaction at the signalled "painful" level of shock. Thus most of the subjects satisfied the escape or avoidance criterion laid down by Brutten & Shoemaker of a punishing stimulus (1970). The three levels were noted down for each case.

Experiments:

The chosen responses were stimulated on alternative days, first with the "painful" level of shock then with the "most painful" level of shock. In each of these sessions occurrence of the response not under direct stimulation or under non-contingent stimulation was observed and recorded.

This general pattern was altered in two subjects. In one subject, only one of the chosen response was punished as the other had a very low frequency. The frequency of this non-stimulated response was recorded only at the highest level of shock used with this subject. In another subject, in all the four sessions only the "painful" level of shock was used. This was because the subject was seen to react violently with forceful withdrawal of hand at the "painful" level in the experimental sessions. Hence it was felt that he may not co-operate with the "most painful" level of shock.

Before each experimental session, the investigator and the two observer-experimenters synchronised their watches. The counter reading on the electro shock apparatus and the reading on the tape recorder were noted down. The volt-meter was set at one of the predetermined levels of shock, as per schedule. As the subject was requested to start reading, the tape recorder was turned on. The distance covered by the tape in every five minute (as indicated by meter on the tape recorder) was noted down by the "free" observer-experimenter (one who was not delivering shocks). At the end of the session words were counted from the tape, (for the spontane-ous speaker) from the passage with reference to the tape (for subjects who read) to calculate the reading rates.

ANALYSIS OF THE DATA:

Wilcoxon matched-pairs Signed Ranks test was used to find the difference between segments A and B, B and A_1, and

and A and A_1 in all the sessions. Differences were evaluated on one tailed test of significance.

Intra session analysis was supplemented with inter session analysis in one subject. The next day after the experiment this subject's responses had a very low rate of responding. Hence, we were not able to continue with the scheduled experiment. Intra-session analysis revealed no significant difference but inter-session analysis between corresponding time segments in chosen sessions revealed very significant trends.

CHAPTER IV

RESULTS AND DISCUSSION

SUBJECT A

Description of Stuttering:

Subject A's stuttering was characterized by repetitions of sounds and tongue protrusions. These two responses had definite loci. Repetitions occurred only with [p] [b] ,[m] sounds whereas tongue protrusions only with [t],[d] [n],[i], [o], [r] sounds. Sometimes repetitions were accompanied by tremor-like movements of the lips.

Selection of Responses:

Repetitions of sounds and tongue protrusions (adjustive behaviors) were selected for the study.

Determination of the levels of shock:

The subject detected the shock at 10 volts, found it "painful" at 30 volts and "most painful" at 40 volts. Both "painful" level of shock and the "moat painful" level of shock were correlated with the withdrawal of the shocked hand.

Results:

Cumulative graphs for tongue protrusion response in all the sessions are given in graph I. Cumulative graphs for repetition response for all the sessions are given in graph II. Appendix A has three tables. Table I gives the frequency of

tongue protrusion response in all the sessions. Table II gives the frequency of repetitions in all the sessions. Table III gives the information about the reading rates.

There was no significant difference between segments A and B, segments B and A_1 and segments A and A_1 in the base rate sessions.

On the first experimental session tongue protrusions were contingently stimulated with 30 volts of shock.

The response did not show significant reduction from time segment A to the time segment B.

However, when comparison was made between the last eight minutes of the segment A with the last eight minutes of the segment B, there was a significant reduction, (significance at .01 level).

There was no significant difference between the time segments B and A_1 and A and A_1.

The lack of significant difference between A and B, but significant difference between the last eight minutes of these time segments can be attributed to the very rapid rate of the response in the first two minutes of the B segment. There were totally sixteen responses in the first two minutes, 14 responses in the succeeding eight minutes. The rate of the response increased soon after the withdrawal of shock in the segment A_1 but was well below what was found in A, and above what was found in B.

Repetitions were significantly reduced from segment A to B (.01 level of significance).

There was no significant difference between B and A_1.

However, there was a significant difference between A and A_1 (.005 level of significance $A > A_1$).

Thus, repetitions of sounds were influenced by contingent stimulation of tongue protrusions to a very significant extent. Moreover, the reduced rate of the response in the B time segment was maintained in A_1 segment. This is all the more interesting because a similar trend was not seen in contingently stimulated tongue protrusions.

According to the plan, the next day should have involved contingent stimulation of repetitions. PEB_1,(E) graph "post experimental first Base rate session with electrode" makes it clear why it was not done. The reason was that both repetitions and tongue protrusions had a very low rate of responding throughout the session.

There was no significant difference between the segments A and B, B and A_1 and A and A_1 for tongue protrusion response.

Inter session analysis was done to highlight the difference between the experimental session and the PEB_1(e) session. It involved comparison of segment A of the experimental session with segment A of PEB_1(e) session, segment B of the experimental session with segment B of PEB_1(e), segment A_1 of the experimental session with segment A_1 of PEB_1(e). There

There was a significant reduction (.005 level of significance) from the experimental session segments to corresponding segments in PEB_1(e) session.

Intra session analysis for repetitions did not reveal a significant difference between segments A and B, between segments B and A_1 and between segments A and A_1.

Inter session analysis involving comparison between experimental session segments and PEB_1(e) segments were carried out as in the case of tongue protrusion. There was a significant reduction (.025 level of significance) from the experimental session segments to corresponding segments in PEB (e) session.

It was hypothesised that the dramatic decrease of both the responses as being due to neutral stimuli in the experimental situation becoming conditioned punishers. An attempt was made to reestablish base rates in the same room but in a different location on the succeeding two days.

Cumulative graph for tongue protrusions on first of these two days PEB_2 (post experimental base rate without electrode) depicts the dramatic increase in the rate of respond ing of the response.

Intra session analysis revealed significant reduction (.005 level of significance) from A to B. There was no significant difference between B and A_1 and A_1 and A.

PEB_2 cumulative graph for repetitions show similar tendencies. Intra session analysis of the time segments did not reveal significant difference among them.

PEB- (post experimental base rate No. 3 without electrodes) for both the responses show similar tendencies. Intra session analysis for the responses did not reveal a significant difference between the segments.

With the impression that a stable base rate has been re-established for both the responses, the subject was brought back for the continuation of planned experiments. The tendencies of the responses in this session PEB_4(e) (post experimental fourth base rate with electrodes) are revealed in the cumulative graphs There was a dramatic decrease in the rate of responding of both the responses. Hence the planned experiment was not done.

Inter session analysis, carried out as before, between sessions PEB_3 and PEB_4(e) revealed that there was a significant reduction of (at .005 level of significance) tongue protrusion from PEB_3, to PEB_4(e). Repetitions showed similar tendency towards reduction (at .01 level of significance).

At this point the experiment with the subject had to be stopped because he had to go for an examination. The subject reported 50% reduction of stuttering in outside situations. He wanted to continue on this "therapy" later.

Graph III reveals no significant trend in the reading rates in experimental session, PEB_1(e), PEB_2, PEB_3 and PEB_4(e)

when compared to reading rates of base-rate sessions. This establishes the fact that the shock affected only the rate of the responses and not the reading rates.

With the present results,

i) The null hypothesis that the adjustive behaviors are not significantly affected when negatively stimulated was rejected. If one compared the last eight minutes of the segment B with the last eight minutes of the segment a significant reduction was seen from A to B (.01 level of significance).

ii) The null hypothesis that the repetitions of sounds are not significantly affected when adjustive behaviors are punished was rejected. Repetitions of sounds were significantly reduced from segment A to B (.01 level of significance) and this decrement generalised to the adjacent no-shock segment.

The other important findings of this study are

i) Tongue protrusions occurred in rapid succession for two minutes soon after it was punished. There were 16 tongue protrusion responses in the first two minutes of the B time segment and 14 responses in the remaining 8 minutes of the segment.

ii) Frequency of tongue protrusions increased to a greater extent than the frequency of repetitions. In other words, the tendency to maintain the reduced rate was seen more in the response not directly stimulated than in the response which was contingently stimulated.

iii) The repetitions increased in frequency soon after the withdrawal of the punishing stimulus. This fact should be contrasted with the finding that the next day after the experiment both the responses had a very low rate of responding.

iv) Removal of the electrodes and change of location caused significant increase in the rate of responses.

v) Experimental location and the electrodes brought down the rate of responses to a significant low level.

Discussion:

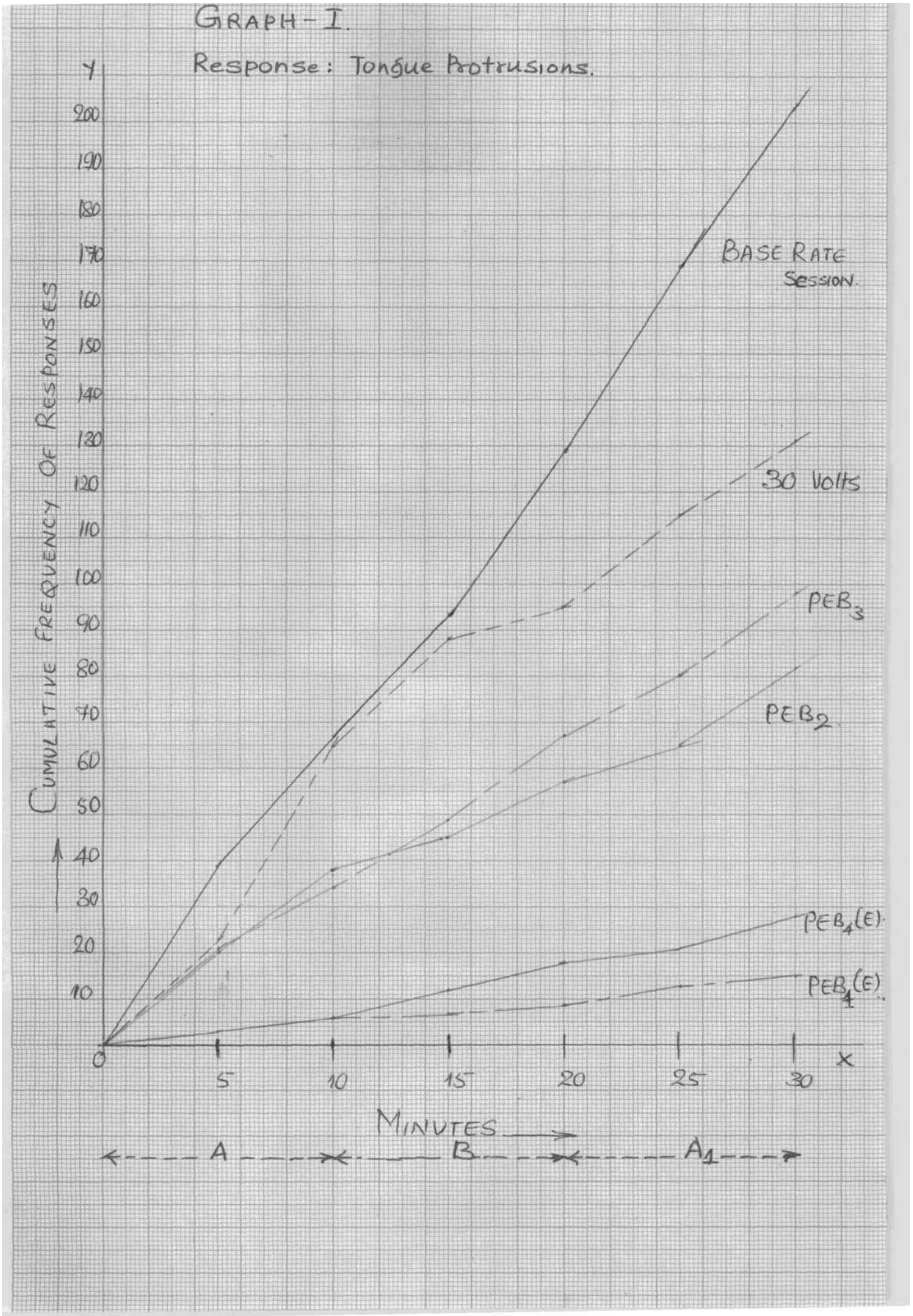
The main findings are generally supportive of the interpretation that stuttering is an instrumental behavior (Goldiamond 1965; Martin et al 1968). The finding that tongue protrusions increased in frequency soon after punishment and then decreased tentatively classifies it as an avoidance behavior (Solomon 1964). Furthermore, the finding

that tongue protrusions and repetitions increased significantly when the subject was taken to a different location experimentally demonstrated that fluency (and hence dysfluency) can be brought under stimulus control. This finding has considerable therapeutic significance and confirm the findings of Martin and Siegal (1966 a) .

The fact that repetitions of sounds decreased when the tongue protrusions were contingently stimulated needs to be explained. One likely explanation is that the responses occurred simultaneously on number of occasions, and therefore, contingent stimulation of one response involved contingent stimulation of the other. Moreover, it is likely that the repetitions were punished on a variable ratio schedule. For example, on an average every second repetition might have been punished. This explanation generates certain test implications:

i) If repetitions are punished on a variable ratio schedule then the reductive effects of punishment should be maintained even after the withdrawal of a punishing stimulus. This was in fact observed in repetitions of sounds maintaining their reduced rates after the withdrawal of the shock.

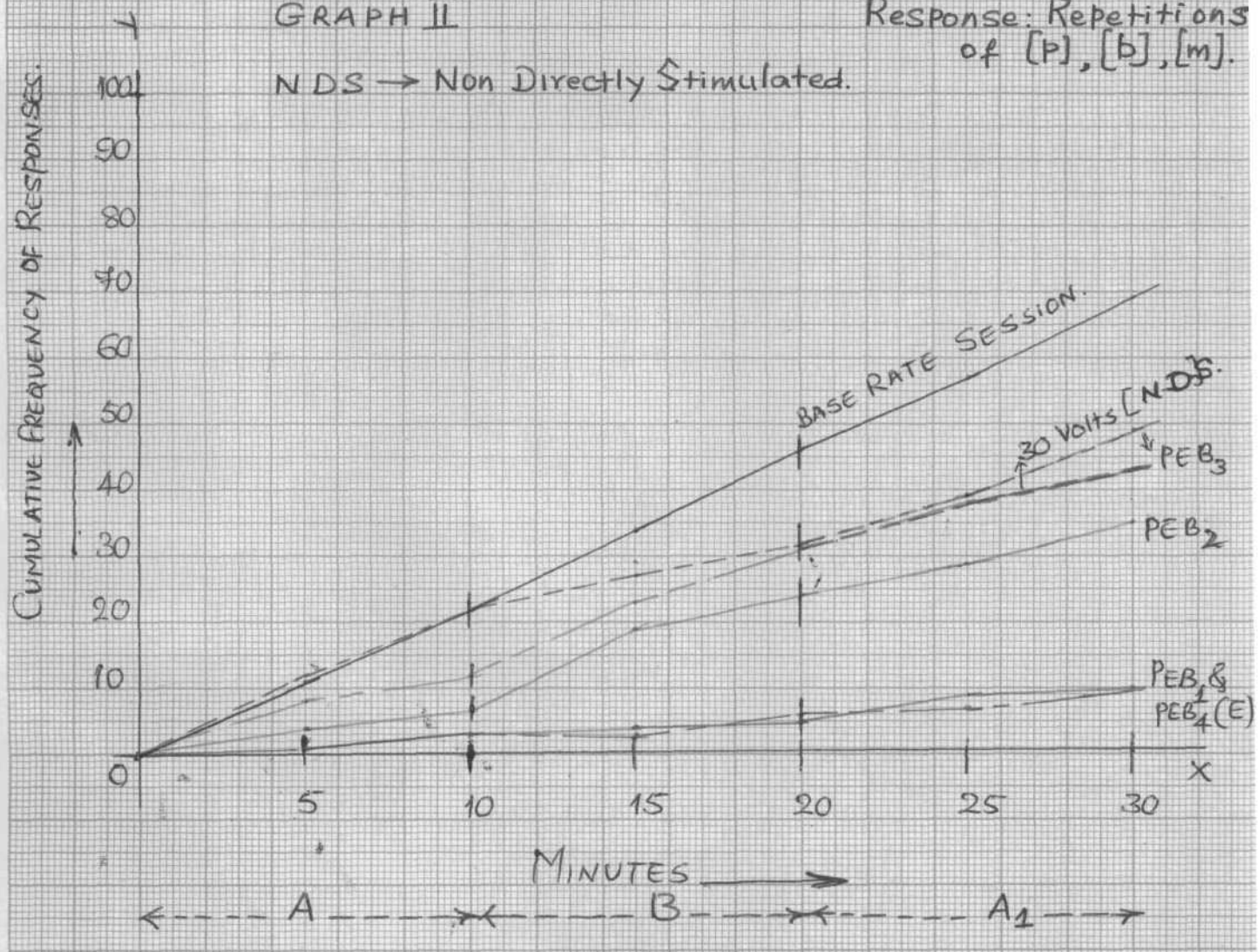
ii) The other test implication is that the Kannada language should have linguistic contexts in which the phonemes /p/, /b/, /m/ precede the phonemes /t/, /d/, /n/, /l/, /θ/, / /. On phonemes /p/, /b/, /m/ repetitions occurred but on phonemes /t/, /d/, /n/, /i/, /θ/, / / tongue


GRAPH - I.
Response: Tongue Protrusions.
Y
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
CUMULATIVE FREQUENCY OF RESPONSES
BASE RATE
SESSION.
30 Volts
PEB3
PEB2
PEB4(E)
PEB1(E)
0
5
10
15
20
25
30
X
MINUTES
A
B
A1

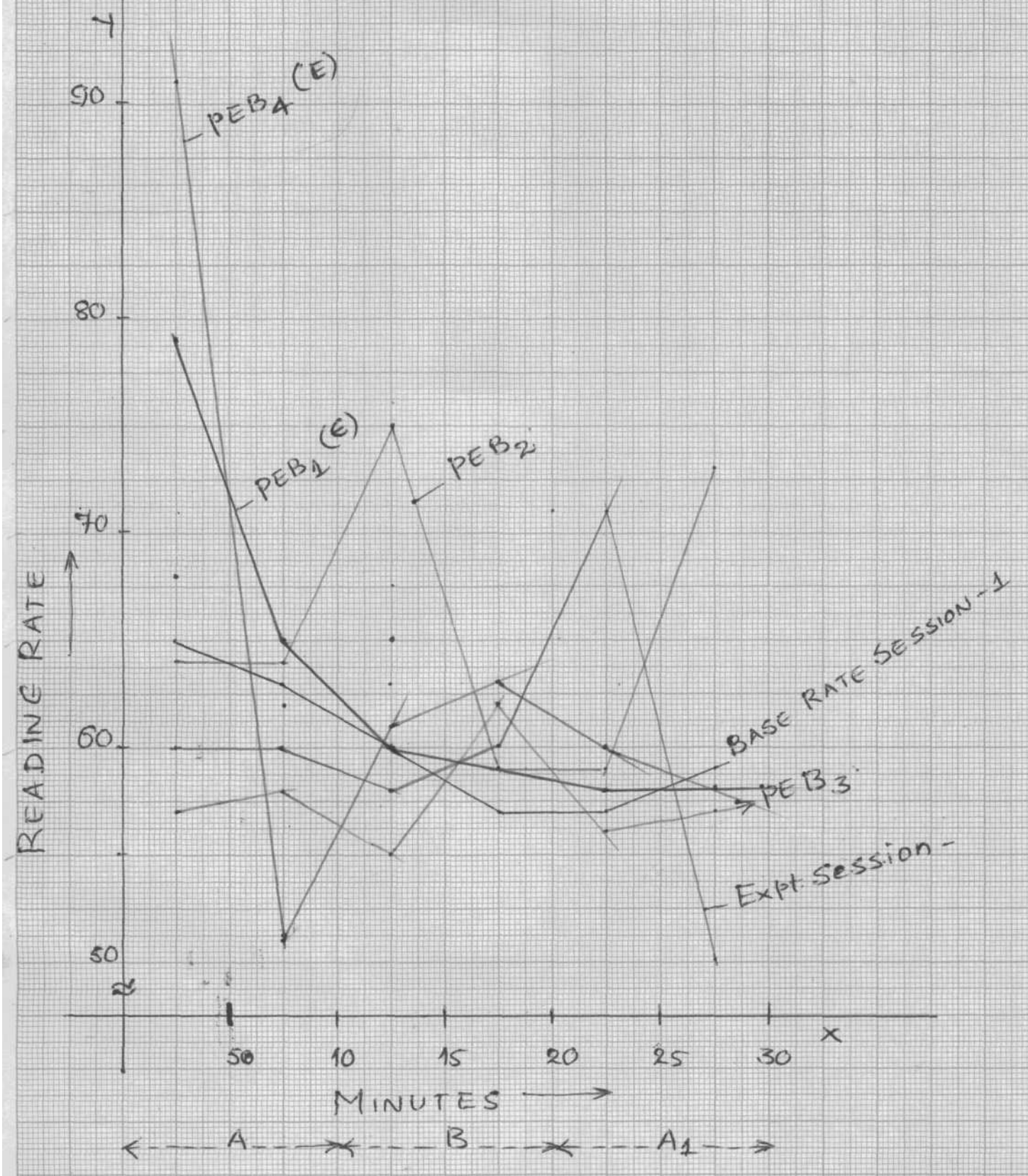
GRAPH II

Response: Repetitions of [p], [b], [m].

NDS → Non Directly Stimulated.



GRAPH - III


Y
90
80
70
60
50
PEB4 (E)
PEB1 (E)
PEB2
BASE RATE SESSION - 1
PE B3
Expt. Session -
READING RATE
X
10
15
20
25
30
MINUTES
A
B
A1

protrusions occurred. This condition is realized in the surface structure of the Kannada language.

In summary the results with the present case support the interpretation that both the selected responses were instrumental in character. Further support for thia interpretation come from the fact that their rates were under stimulus control. It was suggested that the facilitation of tongue protrusion in the first two minutes of the B segment classifies it as an instrumental avoidance behavior. The decrease of repetitions when tongue protrusions were punished was explained as due to the punishment of the former on the basis of variable ratio schedule. Two test implications from this explanation were discussed.

SUBJECT B

Description of the Stuttering behavior:

Subject B's stuttering was primarily characterized by repetitions of [a] , [i] , [e] and [o] sounds. Prolongations of sounds were very rare. Most often [a] sound was repeated before words beginning with [a] sound, [i] sound was repeated before words beginning with [i] sound and so on. Rarely were there sounds repeated before words not beginning with these sounds. It can be said that repetition of these sounds contributed totally to the severity of the subject's problem. The chief reason was that these sounds were repeated several times before the word was finally uttered.

For example, [a] sound repetitions extended on an average for fifteen seconds, sometimes up to thirty seconds. Repetitions of [i] [e] [o] sound were not so extended in time. The utterance of the word after such serial repetition was considered to terminate an "instance".

Selection of the Responses:

Repetitions of a was considered as one class of response, repetitions of [i] [e] and [o] sounds as another class of response, for experimental purposes. Adjustive behaviors as described by Brutten & Shoemaker (1967) were not present in this subject's behavioral repertoire. Hence repetitions of all the above sounds were considered for contingent stimulation. For experimental purposes a response was defined as the first repetition in an "instance". The observer-experimenters were instructed to stimulate immediately after the first repetition.

It is conceivable that shock may have increased or decreased the duration of "instances" without affecting the responses as defined above. However, it is obvious that any such increase or decrease will be reflected in the reading rates. With such an effect reading rates will give information about the effect of shock on stuttering.

Determination of the Shock levels:

The subject detected shock at 10 volts, signalled it to be "painful" at 20 volts and "most painful" at 30 volts. "Painful" and "most painful" level shocks were correlated with

the withdrawal of hand, more forcefully at the later level.

Results:

Cumulative graphs for [a] sound repetitions and [i] [e][o] sounds repetitions in all the experimental sessions held with the case is given in the graph IV and graph V respectively. Appendix B contains four tables. Table I contains the data relating to the frequency of a sound repetitions in the base rate session and the experimental sessions. Table II contains the data relating to the frequency of [i] [e] [o] sounds repetitions in all the sessions. Table III contains the reading rate data in all the sessions. Graph VI contains reading rate information.

There was no significant difference between segments A and B, segments B and A and segments A and A1 in both the base rate sessions.

In the first experimental session a sound repetitions were contingently stimulated with 20 volts.

Significant difference was not observed between segments A and B, segments B and A1 and segments A and A_1.

Not directly stimulated [i] [e] [o] sounds repetitions were not significantly affected.

The next day, in the second experimental session [i] [e] (o] sounds repetitions were contingently stimulated with 20 volts.

Significant difference was not observed between the

segments A and B, segments B and A_1 and segments A and A_1 However, the difference obtained between segments B and A_1, was approaching significance level (.025 level of significance $A_1 > B$).

Significant reduction from segment A to segment B was aeen (at .005 level of significance) for [a] sound repetition.

There was no significant difference between the time segments B and A_1 and the segments A and A_1.

The most striking fact to be noted in this case are two

1) Not directly stimulated a sound repetitions reduced from segment A to B when such a change was not evidenced in the contingently stimulated a sound repetitions;

ii) Withdrawal of shock resulted in increase of the rate of responding of [a] sound repetitions.

Two days later, [a] sound repetitions were considered for stimulation by 30 volts of shock (most painful level). However, as soon as the observer experimenter approached the switch of electro shock apparatus (in the beginning of B segment) the fa] sound repetitions reduced to zero and continued throughout tha session at that level. However, as soon as the experimenter withdraw his hand from the switch (in the beginning of segment A_1) the responses increased in rate slowly.

Statistically, a significant reduction of [a] sound repetitions from segment A to B(.005 level of significance), a significant increase from the segment B to A_1 (.005 level of significance) was seen. There was no significant difference between segments A and A1.

Repetition of sounds [i] [e] [o] showed the tendency of (a) sound repetitions.

There was a significant reduction (at .005 level of significance) from segment A to B, a significant increase (at .005 level of significance) from segment B to A_1.

The next day [i] [e] [o] sound repetitions were contingently stimulated with 30 volts of shock.

There was a significant reduction (.025 level of significance) from segment A to B.

However, there was no significant difference between segment B and A_1 and segments A_1 and A.

[a] sound repetitions did not decrease significantly from segment A to B.

However, more interesting was the fact that there was significant reduction of [a] sound repetitions (at .01 level of significance) when only first seven minutes of the segment A was compared with the first seven minutes of the segment B.

There was no significant difference between B and A_1 for repetitions.

[a] sound./ But a significant increase was seen from the segment B to A_1 when only the first eight minutes of both the segments were considered (.01 level of significance $A_1 > B$).

The most striking fact obtained in this experiment was that [a] sound repetitions which were not directly stimulated decreased to a greater extent than contingently stimulated [i] [o] [e] sound repetitions. The same tendency was observed with 20 volts of shock. Another important fact is that [a] sound repetitions increased significantly in the terminal end of the segment B (last three minutes). The increase in these three minutes was sufficient to make, otherwise significantly different segments A and B, segments B and A_1 insignificant.

Because of the dramatic improvement shown by the case at 20 volts and 30 volts, it was decided to use higher voltage (40 volts) of shock throughout the session on the next day. [i] [e] [o] sounds were stimulated, [a] repetitions were completely absent. [i] [e] [o] sound repetitions were very few as indicated in the graph. The subject stopped reading at the twenty first minute and refused to go any further. In this session he was seen substituting [h] for [a] never repeating it, occasionally prolonging it. Word repetitions occurred on nearly every word in the last ten minutes of this session, considerably reducing the reading rate.

In summary, the results with the Subject B

> Retains the null hypothesis - Repetitions of sounds are not significantly affected when punished - at the "painful" level of shock

(20 volts). However, the hypothesis is rejected (at .025 level of significance and above) at the "most painful" level of shock (30 volts).

In addition other important findings are:

i) Not directly stimulated a repetitions reduced significantly from the segment A to B (.005 level of significance) whereas the contingently stimulated [ij j6J [p] sound repetitions were not significantly affected (the second experimental session).

ii) Withdrawal of the negative stimulus resulted in a significant increase in the rate of the responses.

iii) Approach to the switch of the electro shock instrument and withdrawal from the switch were associated with significant reduction and significant increase (in the rate of responses) respectively.

iv) When 40 volts of shoek was used throughout a session, contingently stimulating [i] [e] [o] sound repetitions, [a] sound was substituted by [h] sound. The substituted sound was never repeated. It was sometimes prolonged. Word repetitions increased considerably in the last ten minutes of the session. The

subject refused to read any further after the twenty first minute.

From Graph VI the following observations can be made:

In the first experimental session, reading rates increased from 24 words per minute to 38 words per minute from segment A to B. Reading rates decreased from 38 words per minute to 17 words per minute from segment B to A_1, when the shock was withdrawn. The increase in the reading rate from segment A to B, suggests that shock was "punishing" by reducing the duration of instances, which waa not reflected in the response as defined.

In the second experimental session the reading rate increased from 25 words per minute to 51 words/minute from segment A to B, and decreased to 20 words/minute in the last segment (A_1). The increase in the reading rate from segment A to B was correlated with reduction in the rate of a sound repetitions, the decrease in the reading rate was correlated with increase in the rate of a sound repetitions.

In the third experimental session reading rate increased from 32 words/minute to 54 words/minute from segment A to B. When the shock was withdrawn the reading rate decreased to 25 words/minute. The increase in the reading rate was accompanied by decrease in the rate of the responses and the decrease in the reading rate waa accompanied by increase on the rate of the responses.

In the last experimental session, reading rate increased from 17 words/minute to 40 words/minute from the segment A to B, decreased to 13 words/minute in the segment A_1 More interesting is the fact that within the experimental segment there was a reduction of reading rate from 52 words/minute in the first five minutes of that segment to 28 words/minute in the second five minutes of the same segment. This "near halving" of the reading rate was accompanied shart in [a] repetition in the terminal portion of this segment.

The present analysis indicates that there was inverse relationship between the reading rate and the rate of the responses.

Discussion:

The observed dramatic decrease in the rate of [a] , [i] [e] [o] sounds repetitions when contingently negatively stimulated support the contention that these responses are governed by the negative law of effect. However, the observed reduction was temporary as evidenced by the increase in the rate of both the responses in the A_1 segment. The temporary effect of punishment on behavior has a parallel in the experimental literature (Azrin & Holz 1966). This has been one of the points raised against use of punishment as a procedure for behavioral control, as it is maintained that punishment merely suppresses a behavior but does not weaken it. However, if one tries to prevent stimuli in, the environment from becoming discriminative stimuli for the onset of or the withdrawal of the punishing stimulus, suppterssion will

be permanent or relatively permanent depending on the intensity of ahock. In the preaent aeriea of experiments, approach to the switch functioned as a discriminative stimuli for the onset of punishment, whereas the withdrawal from the switch, as absence of punishment.

The finding that both the responses decreased in frequency when either one of them was punished with higher intensities of shock needs an explanation. A similar finding has been made with the previous subject (Subject A). The simultaneous occurrence of the responses cannot be invoked as an explanation for the present finding. Because these responses were temporaly separated from each other like this - / a /, / a / (punished), word / i / /ii / or like this - / a /, / a / (punished) / a / / a / word / i //ii or even more, like this - / a / / a / (punished) / a / /a / ..... words / i / / i /- A related finding was that not directly stimulated / a / repetitions decreased significantly when contingently stimulated / i / / e / / 0 / repetitions were not affected significantly (experimental session). The behavior of the Subject under forty volts of shock is yet another finding which needs explanation. The following explanation is advanced tentatively for critical scrutiny.

It has been posited by some workers (Mowrer 1960; Dinsmoor 1954, 1955; Solomon 1964) that punishment training is a type of avoidance training. Specifically, punishment training ia hypothesized to be passive avoidance conditioning

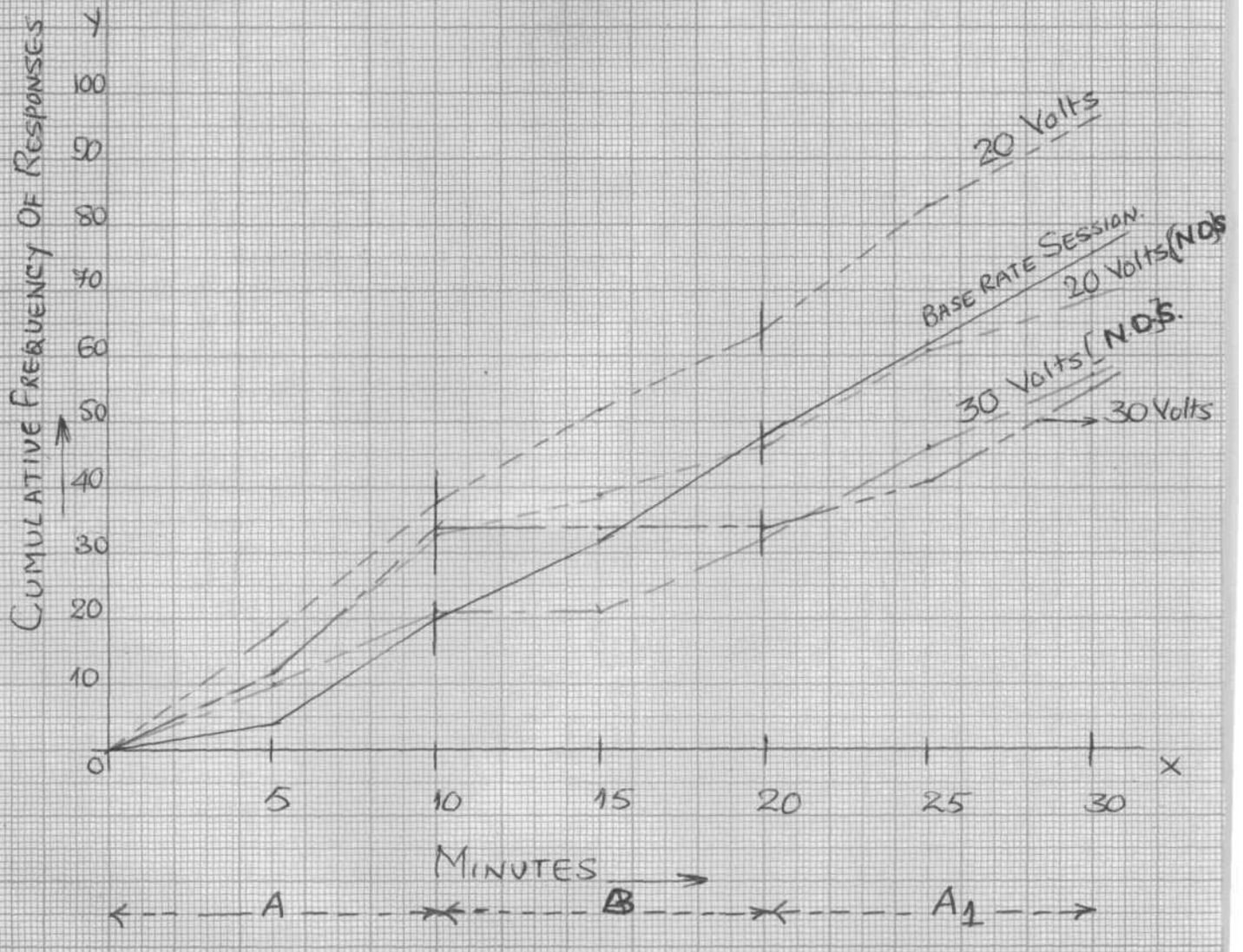
(the organism learns an alternative response, "not to respond") in contrast to active avoidance conditioning (the organism learns an active alternative skeletal response). In passive avoidance conditioning the response which produces aversive stimulus is clearly defined but in active avoidance conditioning it is not (Solomon 1964). Thus, in the present case approach to switch (which had acquired aversiveness) was not contingent on any specified behavior, it was time bound phenomenon and hence can be construed to be similar to active avoidance conditioning. Within this framework, the behavior of the subject with 40 volts shock in the last session can be explained. In other words, substitution of [h] sound for [a] sound, word repetitions were active alternative avoidance skeletal behavior. However, this type of theorizing cannot explain the absence of alternative skeletal response(a) in the third and fourth experimental session involving stimulation with 30 volts. These sessions also involved aversive stimulation (approach to the switch) as a time bound phenomena. One can hypo* theaize existence of alternative skeletal responses in an abbreviated form, or argue that observed fluency is an active avoidance behavior.

The inverse relationship between the repetitions of these sounds and the reading rates should not come as a surprise. Repetitions in this subject were in general "time consuming" and hence reduction of repetitions increased

GRAPH - IV.

Response: Repetitions of [a].

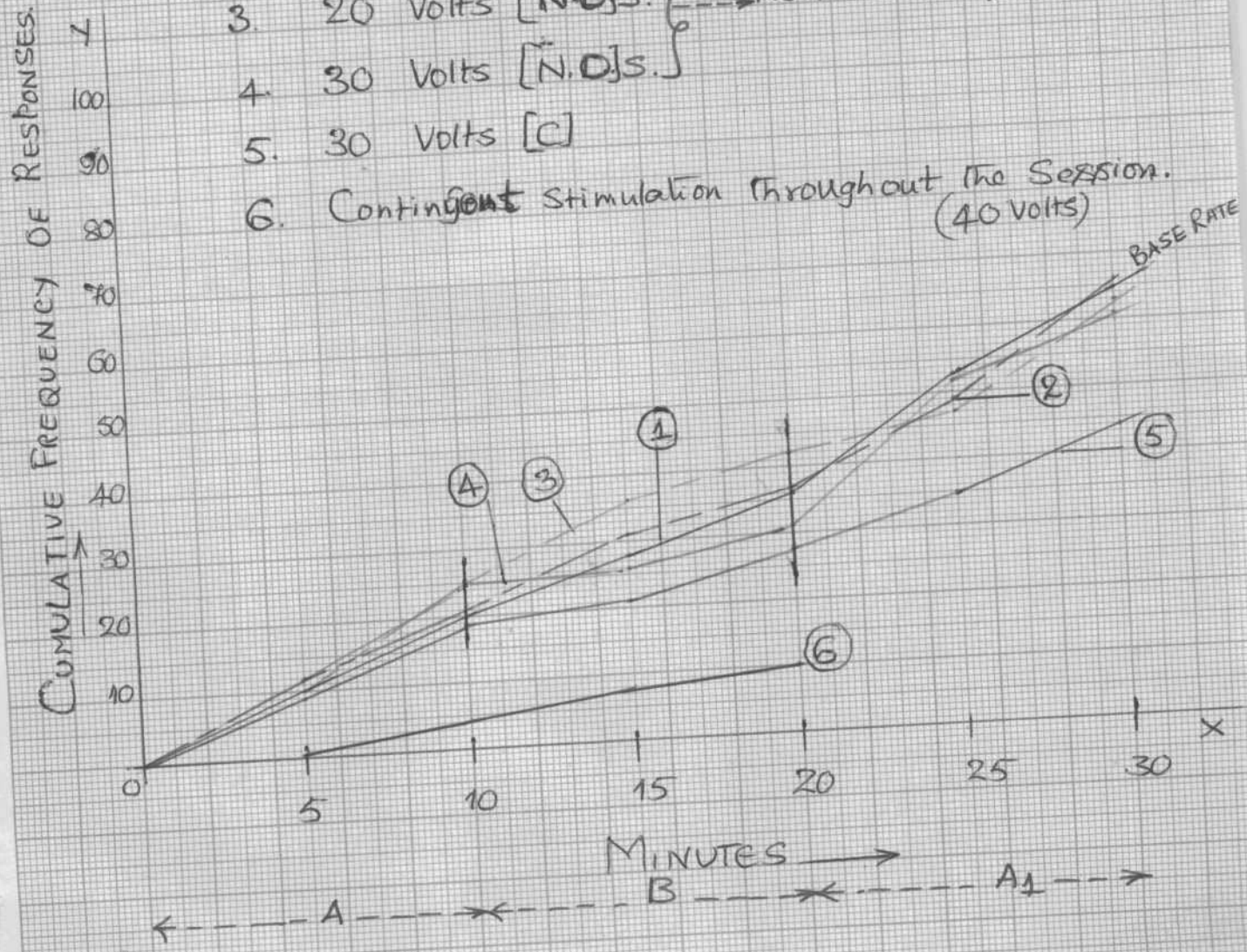
N D S → Non Directly Stimulated.



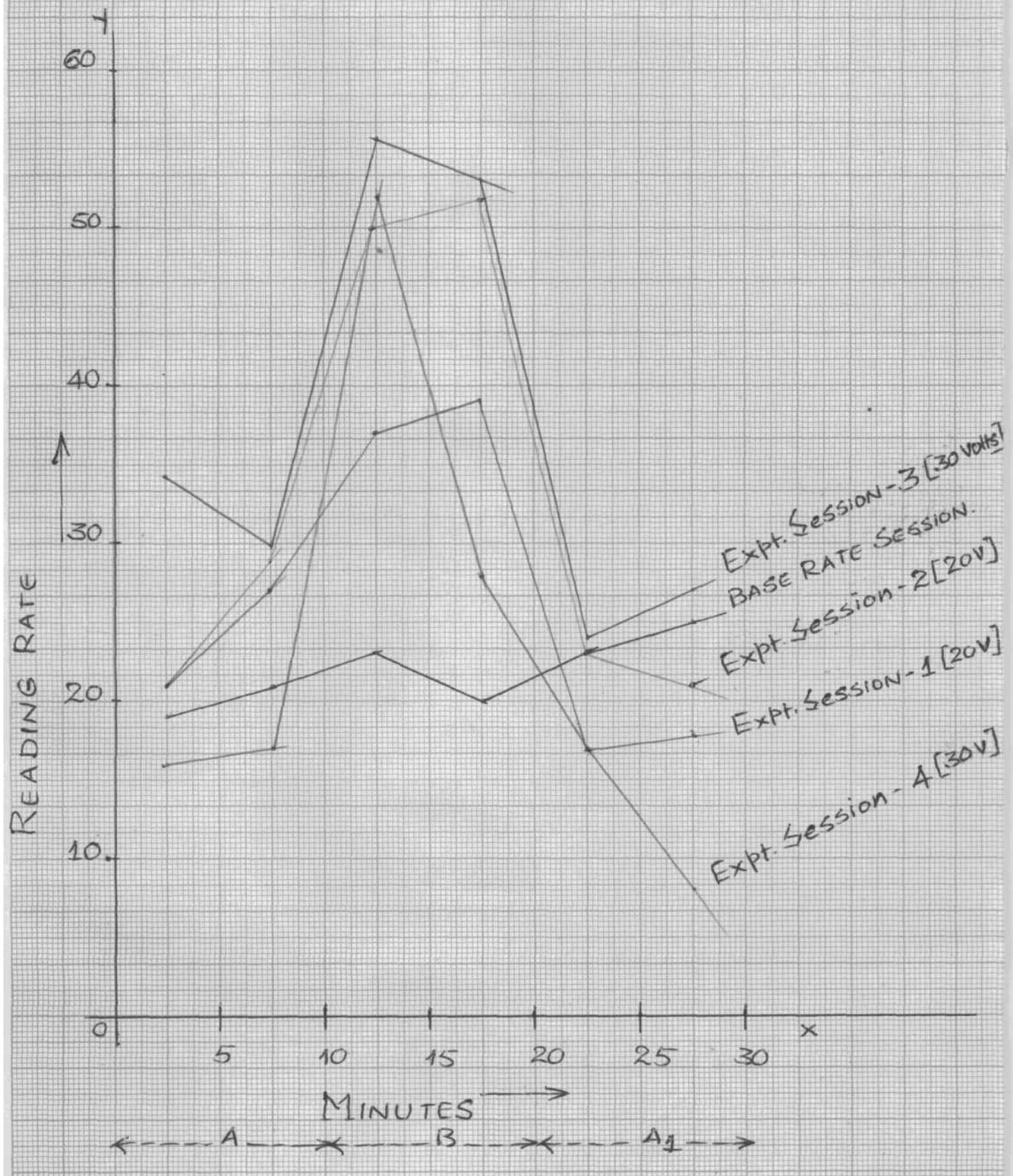
GRAPH - V.

Response: Repetitions of [i], [e], [o].

1. Base rate Session
2. 20 Volts [C]
3. 20 Volts [N.O]s. } ---> Non Directly Stimulated.
4. 30 Volts [N.O]s. }
5. 30 Volts [C]
6. Contingent Stimulation throughout the Session. (40 Volts)



GRAPH - VI.


Y
60
50
40
30
20
10
0
READING RATE
5
10
15
20
25
30
X
MINUTES
A
B
A1
Expt. Session - 3 [30 Volts]
BASE RATE SESSION.
Expt. Session - 2 [20V]
Expt. Session - 1 [20V]
Expt. Session - 4 [30V]

word output. In the first experimental session, though there was no significant decrement of responses from segment A to B, there was a considerable increase in word output. This can be explained as due to the reduction in the duration of "instances" of [a] sound repetitions.

In summary, the findings that chosen responses decreas when punished can be interpreted as supporting the interprets tion of stuttering as an instrumental behavior.

A tentative explanation for the behavior of the subjec with 40 volts shock has been given within active avoidance conditioning paradigm.

SUBJECT C

Description of the Stuttering behavior:

His stuttering behavior was characterized by repetitions of sounds and syllables [a] [i] [E] [he] [a] [l] and [hw) silent posture for the production of [a] sound which used to preface nearly every word he read. This sometimes "broke" into an audible [aj sound. Silent posture for production of [a] sound and audible a sound used to follow each other in one of these sequences:

a) Silent posture --->audible [a] ---> word

b) silent posture--->audible [a]----> silent posture ----> audible [a] or word

c) audible [aj sound ---> silent posture --> audible [a] sound.

Selection of the Responses:

As silent posture for the production of [a] sound an adjustive response was easily identifiable, being stretche in time, it was chosen as a response. Repetition of sounds and syllables, being very few in number, were observed and recorded at the highest intensity of shock but not contingent; stimulated.

Determination of the shock levels:

The subject signalled shock as being "painful" at 10 volts, "moat painful" at 20 volts. "Painful" level of shock was not correlated with the hand withdrawal movement, whereas "most painful" level of shock was. However, later the subjec agreed for an increase of shock voltage up to 40 volts.

Results:

Graph VII is the cumulative frequency of the silent posture for the production of [a] sound. Graph VIII gives the information about the reading rates in all the sessions held with the case. Appendix C has two tables. Table I contains raw score (frequency of occurrence) of the silent posture for the production of a sound. Table II contains the reading rates in the various sessions.

There was no significant difference between the segments in the two base rate sessions for the subject.

In the first experimental session the chosen response was stimulated with 10 volts of shock. There was no significant difference between the segment A and B, segment

B and A_1 and segments A and A_1. However, it is interesting to note that A segment of the base-rate session and A of segment of experimental session are nearly overlapping, but diverge after the tenth minute. Thus there appears to be a slight facilitation of the responses, though not approaching significant level.

Five days later the response was stimulated with 20 volts of shock. There was a significant reduction from the segment A to B (.01 level of significance), and a significant increase from segment B to A_1 (.005 level of significance). At this point, the subject consented for further increase in voltage and hence it was decided to try 25 volts, 30 volts and 40 volts.

Two days later the response was again stimulated with 25 volts of shock. There was a significant reduction from the segment A to B (at .005 level of significance) and a significant increase from the segment B to A (at .005 level of significance).

With 30 volts, four days later, similar results were obtained. It is interesting to note that responses in B segment with this voltage shock is more than with 25 volts of shock.

Two days later, the response was contingently stimulated by 40 volts of shock. There was significant reduction in the number of responses from segment A to B (at .005 level of significance), a significant increase from segment B to A_1

(at .005 level of significance) a significant difference between segment A_1 and A (at .005 level of significance $A > A_1$). For the first time in these series of experiments considerable reduction in the number of responses occurred in the segment A_1 when compared to A. Repetitions Of sounds and syllables did not show significant increase as shown in the cumulative graph VII.

Graph VIII gives information about the reading rates. Reading rates in the segment A and B of experimental session was generally higher when compared to the corresponding segments in the base rate sessions. However, reading rates in the segment A_1 in the experimental sessions showed tendency towards reduction to the level of base-rate session reading rate in that segment. Only in two sessions reading rate increased from segment A to B - sessions which involved 25 volts of shock and 40 volts of shock. With 25 volts of shock it increased from 96 words per minute to 124 words per minute, and with 40 volts it increased from 95 words/minute to 130 words/minute.

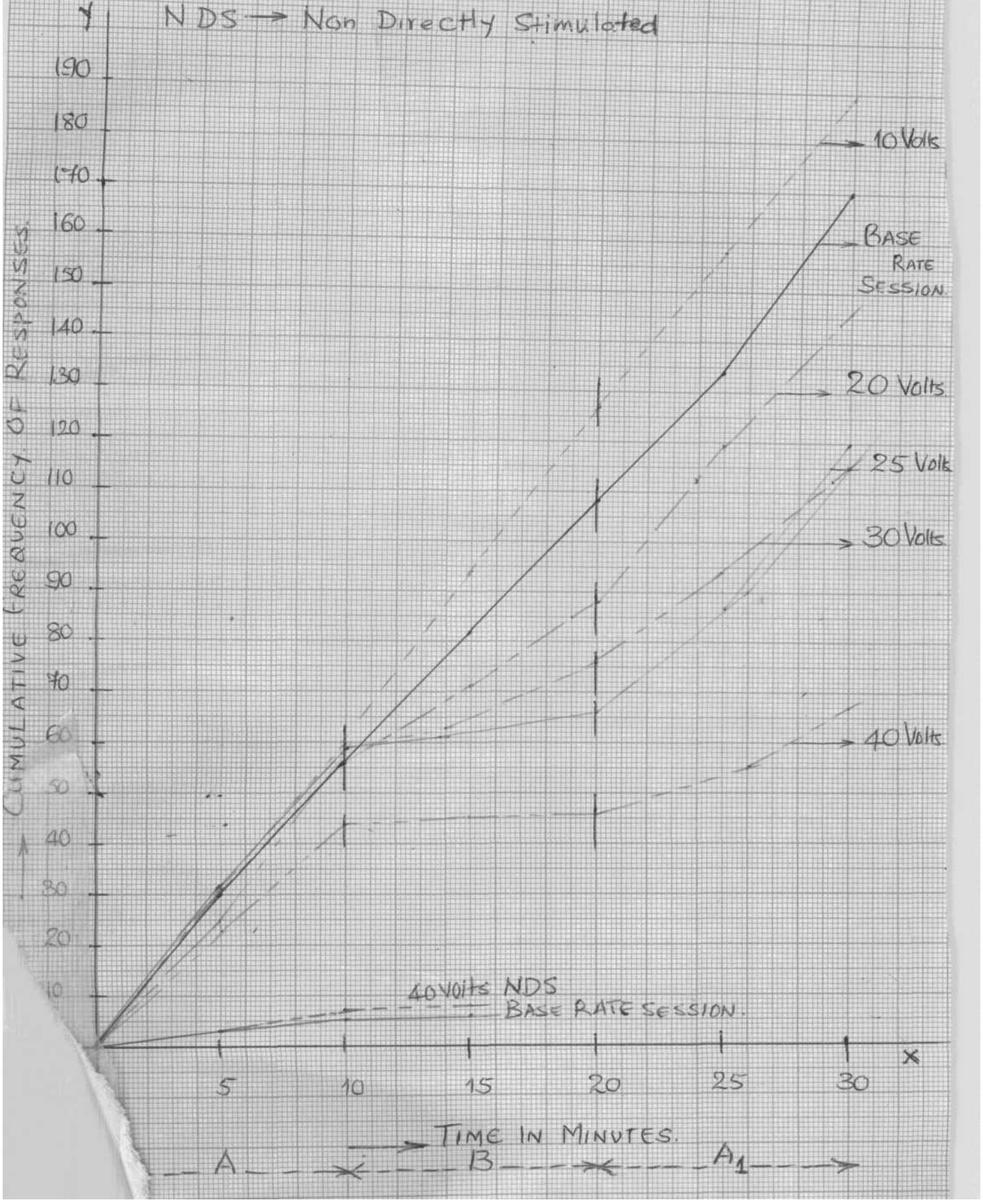
Discussion:

The finding that the posture for the production of a sound decreased significantly supports both Martin et al (1968) and Brutten & Shoemaker position (1967). Both these group of workers recognize this response as an instrumental response. Brutten A Shoemaker recognise it (1967) more

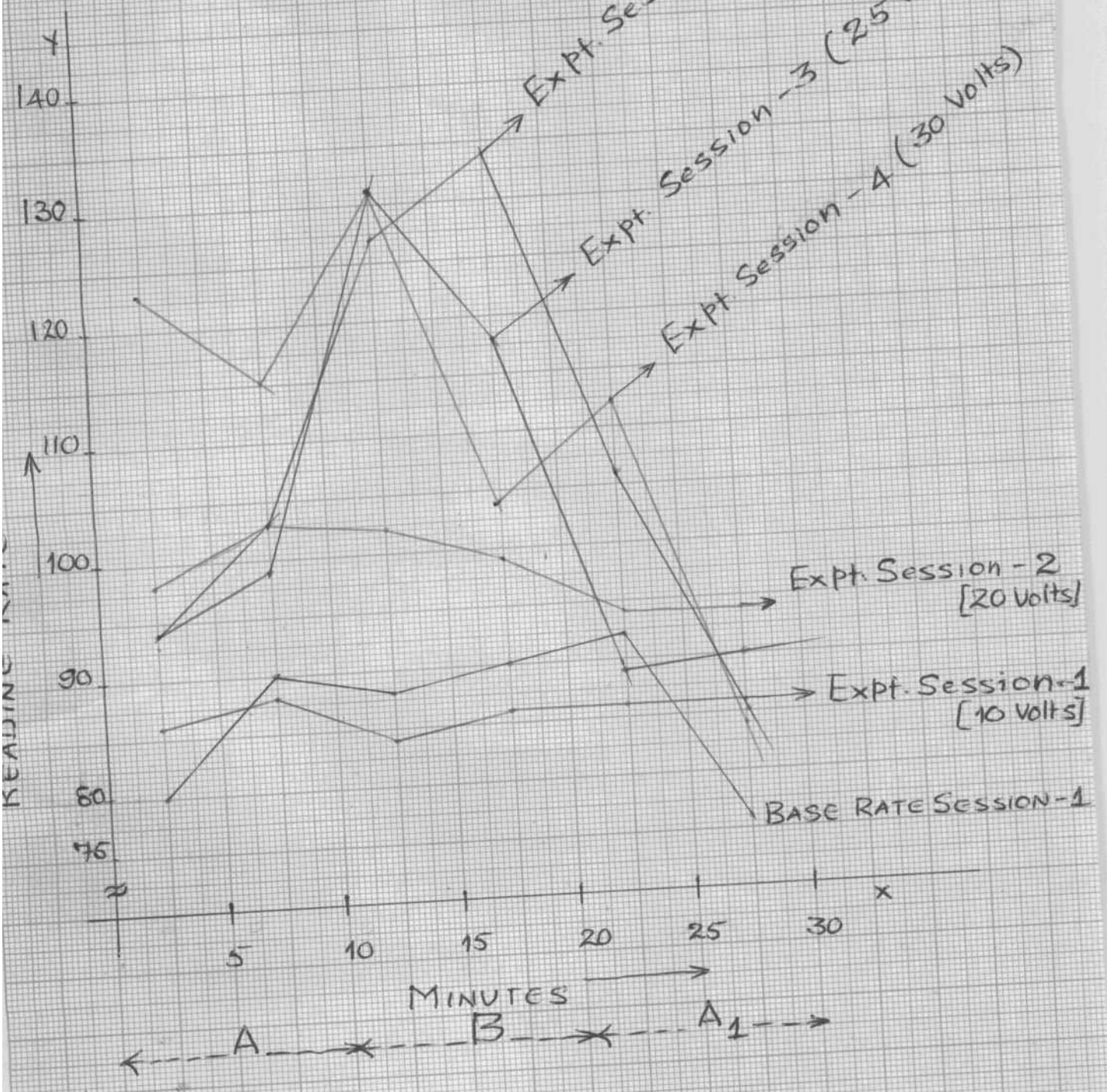
GRAPH VII.

Repetitions.

NDS → Non Directly Stimulated



GRAPH-VIII


Y
140
130
120
110
100
90
80
75
Expt. Session - 5 (40 volts)
Expt. Session - 3 (25 volts)
Expt Session - 4 (30 volts)
Expt. Session - 2 [20 volts]
Expt. Session - 1 [10 volts]
BASE RATE SESSION - 1
5
10
15
20
25
30
X
MINUTES
A
B
A1

specifically as escape or avoidance behavior. The finding that increasing the intensity of shock resulted in greater suppression accord with the laboratory findings of the effect of increasing the intensity of punishing stimuli on instrumental behaviors (Azrin & Holz 1966). The finding that repetitions did not show significant increase when the posture was stimulated does not accord with Brutten & Shoemaker's (1967) theoretical expectation. More specifically repetitions should have increased because of increase in hypothesized negative emotion. This expectation was not borne out.

SUBJECT D

Description of the Stuttering behavior:

Subject D's stuttering behavior was mainly characteriz by repetitions of sounds and syllables [t] [k] [a] [n] [p] [b] [m] [ni] [te] Repetitions of these sounds occurred . on words beginning with them. Another response class which prominently featured in his stuttering behavior involved 'conversion' of the alveolar sounds [θ], [ ] [n] [l] into "tongue bite" sounds. Prolongation of sounds and syllables were present but very rare. The subject did not stutter while reading, but stuttered severely when speaking spontaneously. Hence he was asked to speak spontaneously in the sessions.

Selection of the respose classes:

(1) Repetitions of sounds andsyllables and (2) conversion of alveolars into "tongue bite" shounds, were considered for contingent negative stimulation.

Determination of the shock levels:

The subject detected shock at 10 volts, signalled it to be "painful" at 30 volts and "most painful" at 40 volts. The "painful" level of shock and the "most painful" level of shock were correlated with hand withdrawal movements. At 40 volts the withdrawal was more forceful.

Results:

Graphs IX and X give cumulative frequency of the responses (1) Repetition of sounds and syllables and (2) conversion of alveolar sounds into "tongue bite" sounds respectively. Graph XI gives the speaking rate of the subject in three experimental sessions. Appendix D has three tables. Table I gives the raw scores for repetitions of sounds and syllables; Table II gives the raw scores for the response of converting alveolars into "tongue bite" sounds and Table III gives the speaking rate in three experimental sessions.

For the two responses, there was no significant difference between segments in the first base rate session. In the second base rate session there was no significant difference between segments for "tongue bite" response. Repetitions did not vary significantly from A to B, B to A_1 but showed

significant difference between segment A and A_1 (.025 level of aignificance $A_1 > A$).

In the first experimental session "tongue bite" response were contingently stimulated by 20 volts of shocks. The response decreased significantly (at .005 level of significance from segment A to B. It increased less significantly from B to A., (at .025 level of significance).

There was a significant difference between the segment A and A_1, (at .005 level of significance $A > A_1$).

Repetitions of sounds and syllables reduced significantal (at .005 level of significance) from segment A to B.

There was no significant difference between segment B and A_1. However, if a comparison was made only between first eight minutes of the B segment with first eight minutes of A_1 segment, significant difference was seen (at .005 level of aignificance). Thus the rate of response continued to decrease in A_1 segment to increase suddenly in the last three minutes.

Hence there was a significant difference between the segment A and A_1, (at .005 level of significance $A > A_1$).

The next day repetition of sounds and syllables were contingently stimulated with 30 volts.

Both the responses reduced significantly from segment Ato B (at .005 level of significance).

Both the responses continued to decrease in the A_1 aegment. Hence there was no significant difference between B

and A_1 but there was significant difference between A and A_1 (at .005 level of significance).

The next day "tongue bite" responses were contingently stimulated with 40 volts of shock. There was a significant reduction of "tongue bite" response from segment Ato B, A to A_1 (at .005 level of significance).

Repetitions of sounds and syllables showed a similar trend reducing significantly from the segment A to B from segment A to A_1 (at .005 level of significance).

A similar trend on the part of both the responses was seen the next day when "tongue bite" sound was contingently stimulated with 40 volts.

This remarkable degree of suppression of the responses motivated the investigator to use 40 volts of shock throughout a session. Hence it was decided to contingently stimulate "tongue bite" responses after a few days. The results were remarkable. There were five repetitions throughout the session, and "tongue bite" responses were absent. These remarkable suppression of the responses were not without "cost". It was observed that the subject was moistening his lower lip often (3 times per minute) by protruding his tongue.

Graph XI gives the reading rate for three experimental sessions. The total number of words were counted directly from the tape and therefore it was not possible (for want of labour) to collect speaking rates for all the sessions held

with the subject. The speaking rates in all these sessions were higher in B segment than A segment.

The results with the subject leads to the following conclusions:

i) The null hypothesis that repetitions of sounds and syllables are not significantly affected by contingent negative stimulation is rejected. There was a significant reduction of the response from segment A to B in all the sessions (at or above .025 level of significance).

ii) The null hypothesis that the adjustive behaviors are not significantly affected by contingent negative stimulation is rejected. There was significant reduction of tongue bite response from segment A to B (at and above .025 level of significance).

iii) The null hypothesis that contingent negative stimulation of repetitions of sounds and syllables will not affect significantly adjustive behaviors is rejected. "Tongue bite" responses decreased significantly from segment A to B in the sessions which involved contingent negative stimulation of repetitions of sounds and syllables (at or above .025 level of significance).

iv) The null hypothesis that contingent negative stimulation of adjustive behaviors will not

affect significantly repetitions of sounds and syllables is rejected. Whenever "tongue bite" response was contingently negatively stimulated repetitions of sounds and syllables reduced significantly from segment A to B.

v) Reading rates and rate of responses were influenced in different directions by contingent negative stimulation. Thus there is a tendency toward an increase relationship.

Discussion:

The result with the present subject confirms findings of Martin (1968) and Goldiamond (1965) and thereby lends support to the identification of these responses as instrumental response*. Significant decrease of repetitions of sounds and syllables when contingently stimulated by shock goes against the expectations from Brutten & Shoemaker's (1967) theoretical position. Their specific expectation is that repetitions will increase when cnntingently negatively stimulated.

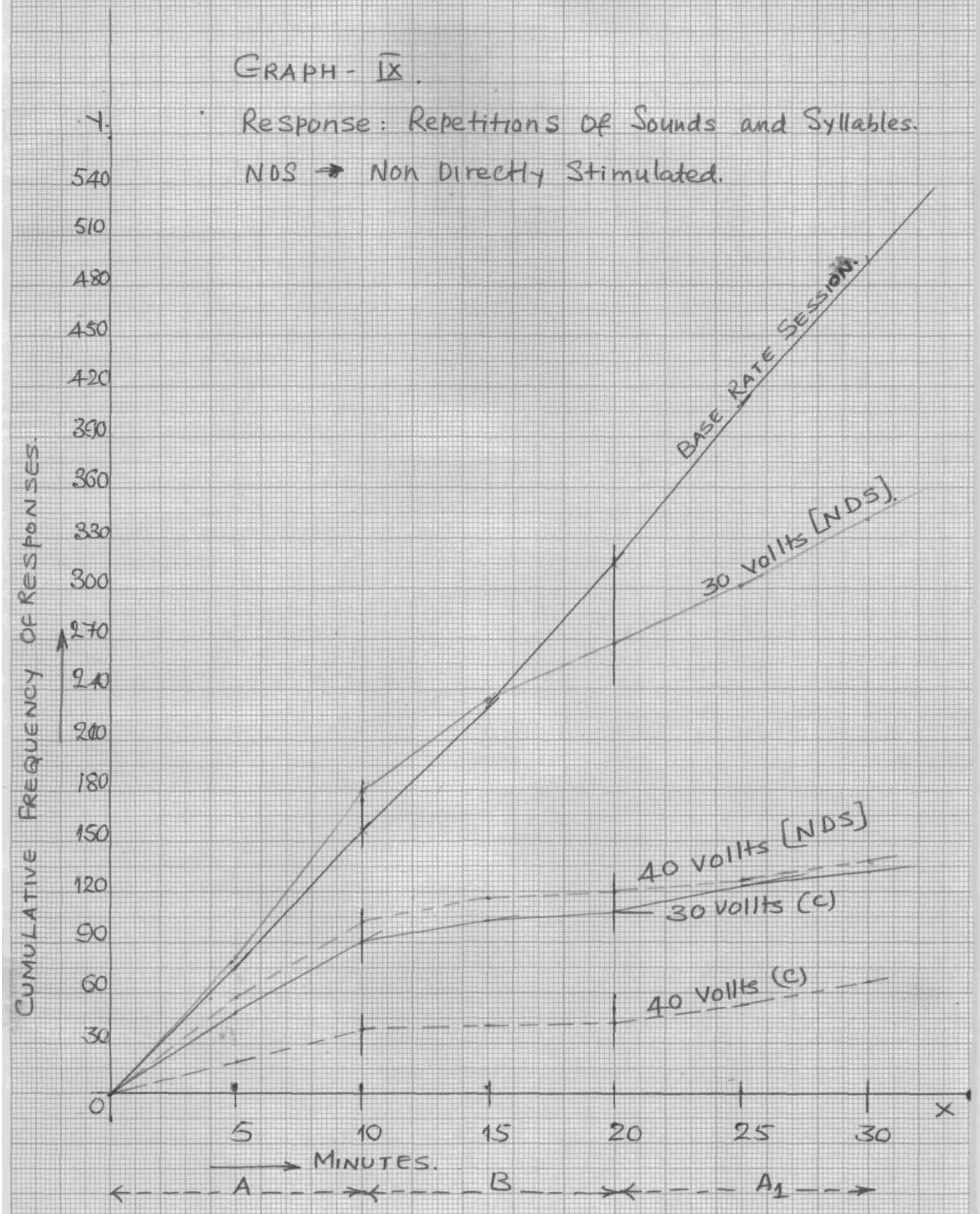
The finding that the "tongue bite" sounds decrease accord with Brutten & Shoemaker (1967) theoretical expectations. This behavior can be classified under the category - adjustive behaviors as recognised by them. The responses in this category are predicted to decrease when punished.

The finding that both the chosen responses were increasingly suppressed by increasing voltage of shock in the

GRAPH - IX.

Response: Repetitions of Sounds and Syllables.

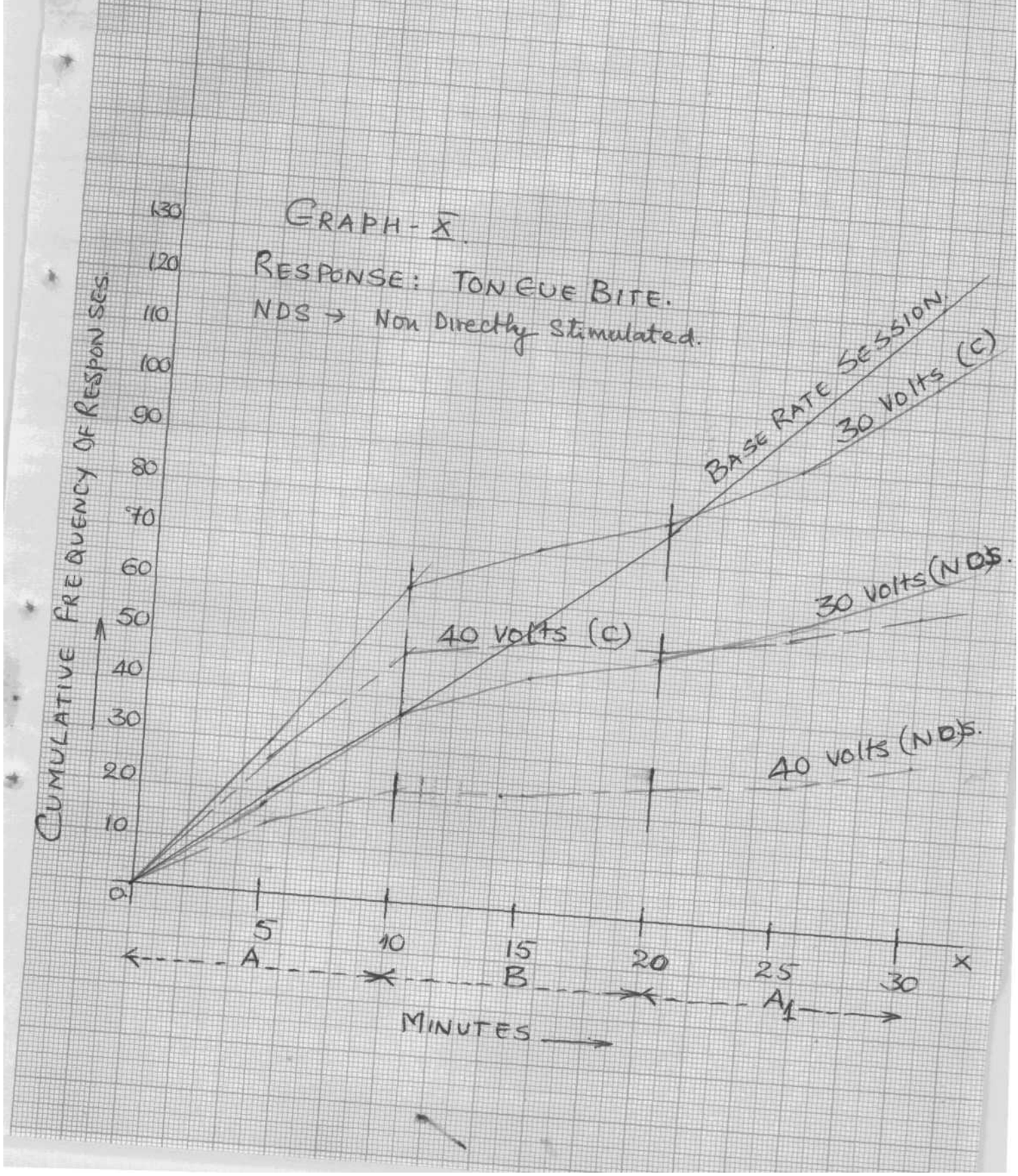
NDS → Non Directly Stimulated.

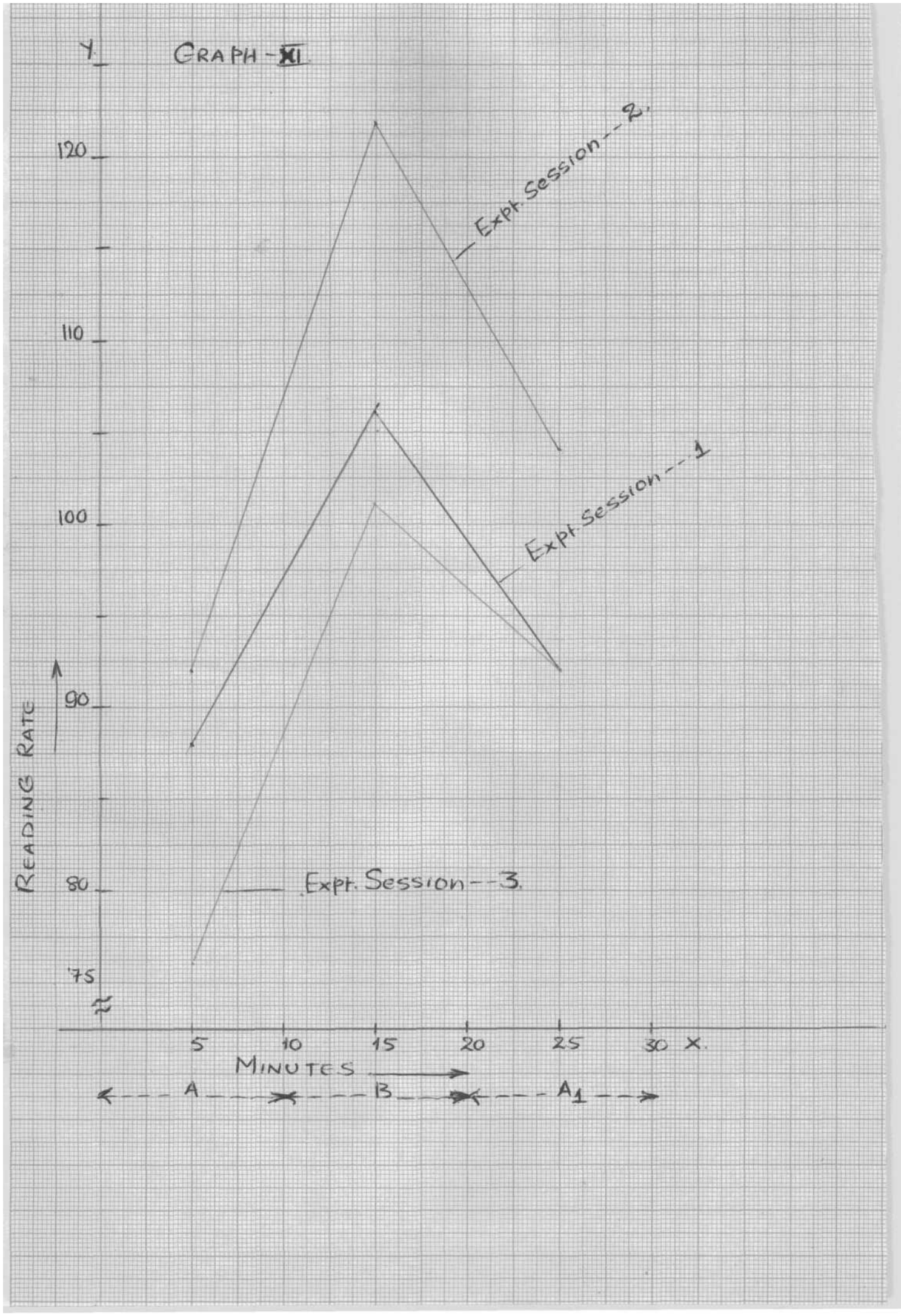


GRAPH - X.

RESPONSE: TONGUE BITE.

NDS → Non Directly Stimulated.




Y
GRAPH - XI
120
110
100
90
80
75
READING RATE
Expt. Session -- 2.
Expt. Session -- 1
Expt. Session -- 3.
5
10
15
20
25
30
X.
MINUTES
A
B
A1

experimental session establishes the presence of yet another characteristic of an instrumental response (Azrin & Holz, 1966) in the chosen response.

Simultaneous reduction of both the responses in all the experimental sessions can be assumed to be due to their proximity in time. Hence shock contingent on one response is also (sometimes) contingent on the other. This is an explanation similar to the one given with the subject A.

The finding that the subject started moistening his lower lip by protruding his tongue is of considerable theoretical significance. In this session the shocks were not in fact delivered ([i] [e] [o] repetitions were absent.) The observed behavior has a parallel in the subject B. This subject started substituting [h] sound for [a] sound, never repeating the substitute sound, sometimes prolonging it. Increased word repetitions were also seen. Active avoidance paradigm was invoked to explain this behavior. The same explanation can be presented for the finding with this subject.

In summary, the result with the present subject was considered to support the interpretation that the responses in a moment of stuttering are instrumental in character (Martin & Siegal 1968). A theoretical explanation was given to the finding that the subject frequently moistened his low lip by protruding his tongue in one of the sessions.

SUBJECT E

Description of Stuttering behavior:

Subject E's stuttering was mainly characterized by

i) silent, exaggerated posture for the production of [i] sound, prefacing nearly every word. These silent postures were maintained from a few seconds to a minute. This decreased the word output considerably.

ii) repetitions of [k] [t] [m] sounds occurred on the words beginning with them. Repetitions of [s] sound were also seen, but inconsistently.

Silent exaggerated posture for the production of [i] sound was sometimes followed by repetitions of sounds.

Selection of the responses:

The above response classes were considered for contingent negative stimulation. Silent, exaggerated posture for the production of [i] sound belonged to the category adjustive behaviors and repetitions to the category stuttering as defined (Brutten & Shoemaker, 1967).

Determination of the shock levels:

The subject detected the shock at 10 volts, found it "painful" at 20 volts and "most painful" at 30 volts. Both the "painful" and the "moat painful" levels of shock were accompanied by forceful withdrawal of the hand.

Results:

Graphs XII and XIII are cumulative graphs for the

reaponaes repetitions of sounds and silent exaggerated posture for the production of [i] sound respectively. Graph XIV gives the information about reading rates in the various sessions. Appendix E contains, Table No. I which gives the raw scores for repetitions in all the sessions held with the subject. Table II gives the raw score for silent exaggerated posture for production of [i] sound and Table III which contains information about reading rates.

There was no significant difference between segments in the base rate session.

In the first experimental session repetitions of sounds were contingently stimulated with 20 volts of shock. There was no significant difference between the segment A and B, segments B and A_1. segments A_1 and A. However, not directly stimulated "silent exaggerated posture for [i] sound production" reduced significantly from segment A to B (at .005 level of significance) and increased significantly from segment B to A_1 (at .005 level of significance.

One day later, exaggerated posture for the production of [i] sound prefacing words were punished. There was a significant reduction (at .025 level of significance) from segment A to B, there was a significant increase (at .01 level of significance) from segment B to A_1. Repetitions of sounds were not affected significantly.

In these two experiments the subject withdrew his hand forcefully every time the shock was delivered. Because of

these overt painful reactions it was decided to stimulate the responses only with 20 volts in the next two experimental sessions.

The next day repetitions of sounds were contingently stimulated. There was no significant difference between the segments A and B. However, if a comparison was made between the first nine minutes of segment A with the first nine minutes of the segment a significant reduction (at .005 level of significance) was seen from A to B. There was significant difference between A and A_1 (.01 level of significance $A > A_1$. The sudden increase in repetitions in the last minute of B segment is interesting. (There were five repetitions). But for this increase, there was a general decrement from the beginning of the segment B to the end of

Posture for production of [i] sound reduced significantly from segment A to B (significant at .005 level) but increased significantly from B to A_1 (significant at .005 level).

The next day, when the posture for production of [i] sound was contingently stimulated it decreased significantly (at .005 level of significance) from A to B and increased significantly (at .005 level of significance) from B to A_1. Repetitions of sounds were not significantly affected by this indirect stimulation.

The present results, leads to the following interpretations:

i) The null hypothesis that adjustive behaviors are not significantly affected by contingent negative stimulation is rejected. Silent exaggerated posture for the production of [i] sound reduced significantly when punished (at or above .025 level of significance) from segment A to B.

ii) The null hypothesis that contingent negative stimulation of repetitions will not significantly affect the adjustive behaviors is rejected. Silent exaggerated posture for the production of [i] sound reduced significantly (at or above .025 level of significance) in all the sessions which involved contingent stimulation of repetation sound.

iii) The null hypothesis that frequency of repetitions of sounds will not be affected by contingent negative stimulation is rejected. There was a significant reduction from segment A to B in the second session.

Graph XIV reveals the tendency of reading rates in the experimental segments of the experimental sessions. In general in the first three experimental sessions reading rates were reduced from the segment A to B. In all these sessions, the

subject sat silently for more than a minute after one of the deliveries of shock. Therefore, in the fourth experimental session the subject was specifically instructed to read continuously. In this session reading rate in the segment A is comparable to the reading rate in the segment B.

Discussion:

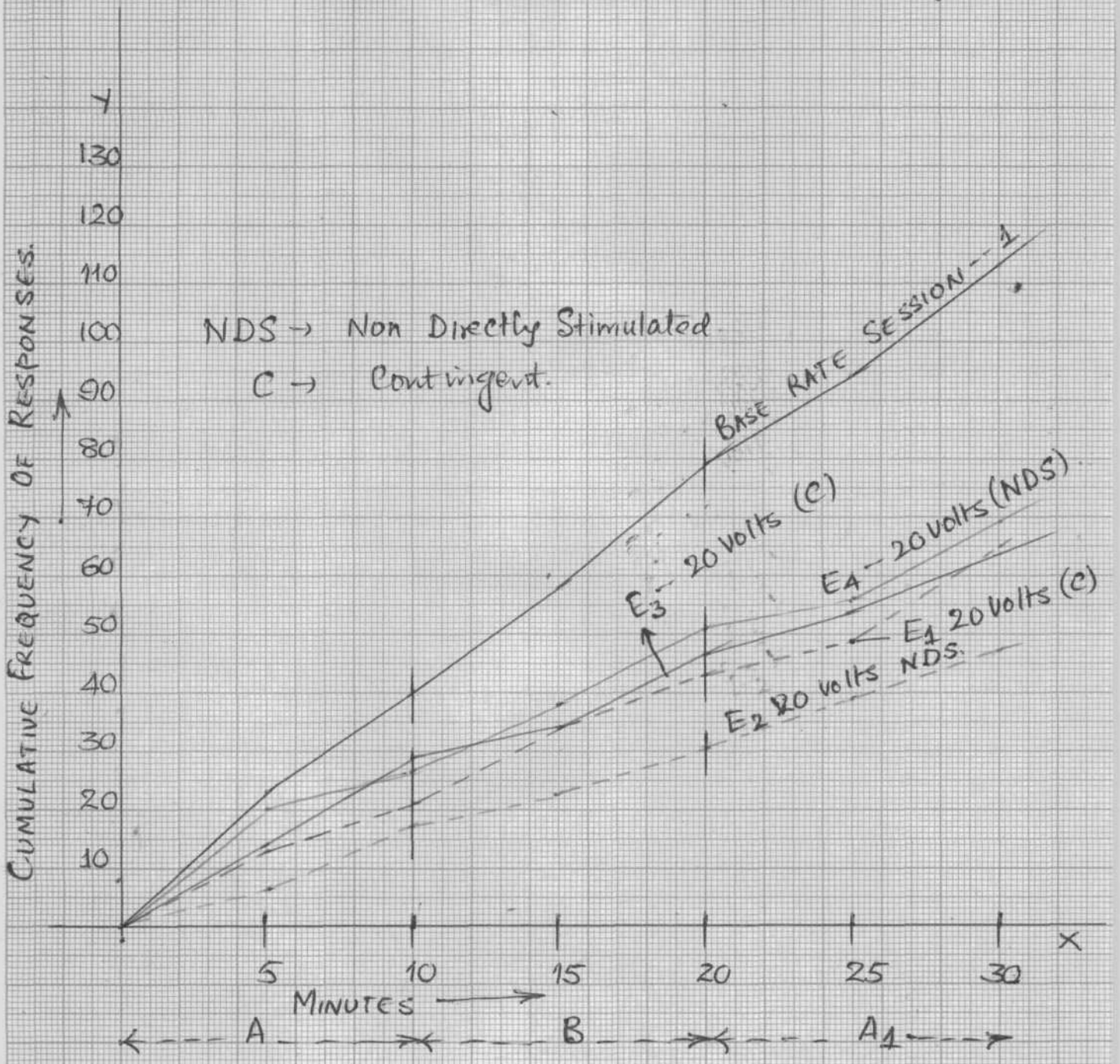
The findings with the present subject corroborates the findings with the subject A, B, C and D. Repetitions of sounds and syllables and the "silent exaggerated posture for the production of [i] sound prefacing word", significantly reduced from segment A to B.

Decrement of the posture is predicted from Martin's (1968) position and Brutten & Shoemaker's (1968) position. Both categorise this response within the set instrumental behavior. However, decrement of repetitions of sounds and syllables does not accord with Brutten & Shoemaker's (1967) position.

However, this subject provides a special problem which may mean the revision of the above conclusions. The decrement of the posture in the experimental sessions (1, 2 and 3) and decrement of repetitions of sounds and syllables (in the experimental session 3) were accompanied by decreased word output. This decrease was largely attributable to the subject becoming silent (for one minute or more than one minute) after one of the deliveries of shock. It can be argued that significant decrement of responses is partly or

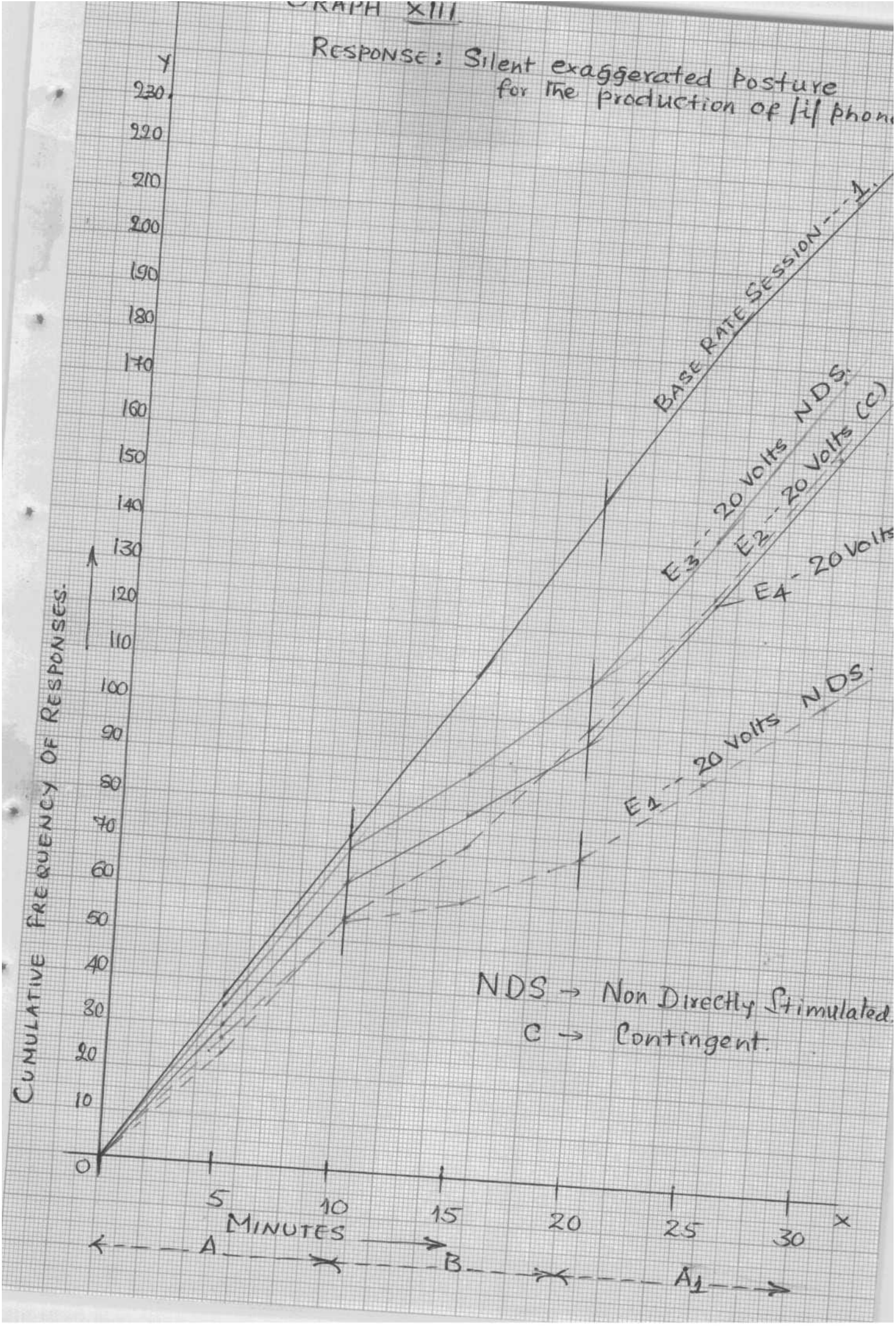
GRAPH - XII

RESPONSE: Repetitions of Sounds and Syllables.

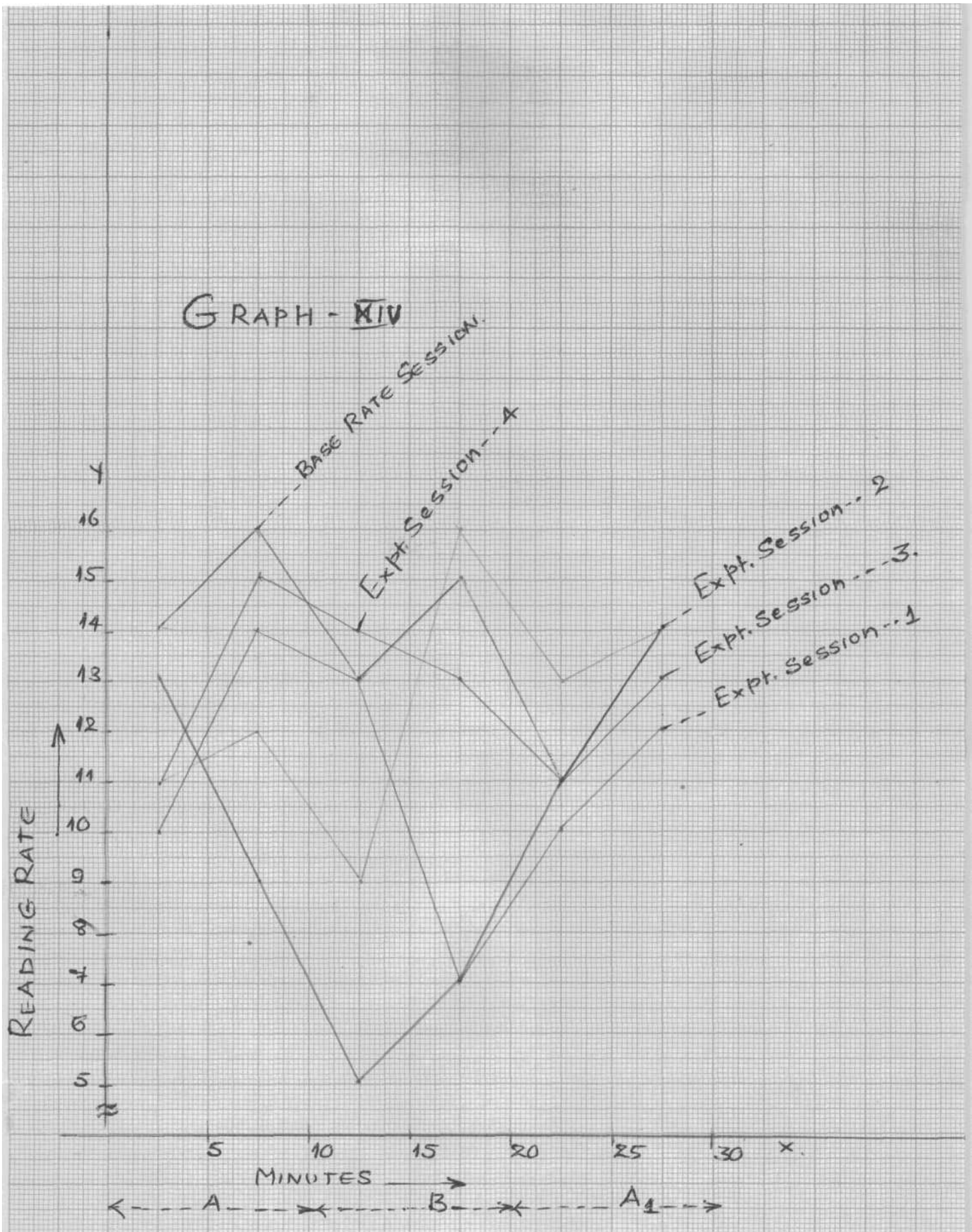


GRAPH XIII

RESPONSE: Silent exaggerated posture for the production of /i/ phon



GRAPH - XIV


Base Rate Session.
Expt. Session - 4
Expt. Session - 2
Expt. Session - 3.
Expt. Session - 1
READING RATE
17
16
15
14
13
12
11
10
9
8
7
6
5
5
10
15
20
25
30
x
MINUTES
A
B
A1

completely attributable to the decreased word output. However when the word output in the segment B was made comparable with the segment A (through the instruction to read continuously), there was still significant decrement of the contingently stimulated posture but not of repetitions of sounds and syllables. Thus repetitions of sounds and syllables appeared resistent to change. The proposed revision of the conclusion is that the posture decreased significantly with the level of shock used but not repetitions of sounds and syllables.

In summary the silent exaggerated posture for the production of [i] sound decreased significantly when punished. Repetitions of sounds and syllables appeared to be resistent to change with the level of shock used.

CHAPTER V

SUMMARY AFP CONCLUSIONS

The effect of punishment on stuttering behaviour is a controversial issue (Siegal 1970; Brutten & Shoemaker 1970). It was pointed out in Chapters I and II that the controversy between two group of workers, Martin et al (1968) and Brutten & Shoemaker (1970); has provided specific hypothesis which could be readily tested. The controversy can be summarised thus. Martin et al hold that stuttering defined molarly as dysfluency or in terms of molecular components (repetition and prolongation of sounds and syllables) will decrease according to the negative law of effect. However, Brutten & Shoemaker maintain that different molecular responses in molar moment have different courses under punishing conditions. More specifically they state that repetitions and prolongations of sounds and syllables increase in frequency when they are punished but other responses decrease according to the negative law of effect. This is because repetitions and prolongations are hypothesised to be directly caused by conditioned negative emotion (which increase under punishing condition) whereas the other behaviors are hypothesized to be escape or avoidance instrumental behavior. Thus the crux of the controversy is with regard to the predicted effect of punishment on one class of responses - repetitions and prolongations of sounds and syllables. Whereas one group recognises

them to belong to a special class of response (Brutten & Shoemaker 1967) the other (Martin et al 1968) recognize them to be like any other responses. It was also pointed out that supportive evidence for either position was meagre and conflicting. In addition to the paucity of data the definitional postures of the workers were seen to contribute in some measure to the present equivocal state of knowledge.

The present study was designed explicitly to test these positions. Contingent shock stimulation experiments were carried out with five subjects.

The important findings of this study were:

1) There is a general tendency for the chosen response to decrease in frequency when contingently negatively stimulated. In no subject was any increase of the chosen responses seen from segment A to B.

In Subject A, repetitions of sounds and tongue protrusions decreased significantly in the experimental session and the post experimental base rate sessions.

In Subject B, repetitions of sounds [i] [e] [o] and repetitions of [a] sound dramatically de-ereased under contingent negative stimulation condition.

In Subject C, the silent posture for production of [al sound prefacing words decreased

significantly with 20, 25, 30 and 40 volts of shock.

In Subject E, the exaggerated posture for production of [i] sound decreased significantly. Repetitions of sounds and syllables decreased significantly, but this decrement in part could be due to decreased word output. And,

In Subject D, repetitions of sounds and syllables and tongue bite responses were significantly affected by contingent negative stimulation.

2) Reading rates or speaking rates were affected in different manner with different subjects.

Subject A's reading rate was not significantly affected by contingent negative stimulation.

Subject B's reading rate increased significantly from the segment A to B, paralleled with the decrease in rate of response chosen. In this case an inverse relationship was seen to exist between reading rate and response rate.

Subject C's reading rate in general increased from session to session in the segments A and B but decreased in the segment A...

Subject E's reading rates showed a tendency

towards decrease in the first three experimental sessions. The decrease was attributed to the subject becoming silent after a delivery of the shock. When the subject was instructed to read continuously (without becoming silent) the reading rates in the segment A and B became comparable.

Subject D's speaking rate was high in B segment than A segment in all the experimental sessions.

3) In three subjects both the chosen responses decreased when only one of them was contingently stimulated.

Subject A's repetition of sounds [p] [b] [m] decreased significantly when only tongue protrusions were punished.

Subject B's [a] sound repetition decreased significantly when repetitions of sounds [i] [e] [o] were contingently stimulated. Repetition of sounds [i] [e] [o] in turn decreased significantly when [a] sound repetition were contingently stimulated.

Subject D's 'tongue-bite' response decreased significantly when repetitions were punished. Repetition decreased significantly when tongue bite responses were punished.

4) In all the subjects fluency or dysfluency were brought under stimulus control.

Subject A's repetitions of sounds and tongue protrusion were demonstrated to be under stimulus control. When base-rate was reestablished in the experimental location with electrode on subject's hand, both the responses decreased to a low level, but when the base rates were established in a different location response increased in frequency significantly.

Subject B's repetitions of sounds [a] [i] [e] [o] were clearly demonstrated to be under stimulus control. Approach to the switch of the electro shock apparatus reduced repetitions of these sounds significantly. Withdrawal from the switch occasioned significant increase.

Subject C's silent posture for production of [a] sound prefacing words was seen to increase significantly after the withdrawal of shook. Thus withdrawal of shock or absence of shock was discriminative stimulus which set the stage for increased emission of the response.

Subject E's exaggerated posture for production of [i] sound increased significantly from segment A to B. Withdrawal or absence of shock functioned as discriminative stimuli for the increased rate of the response.

Subject D's repetitions of sounds and syllables and tongue-bite responses were shown to be under stimulus control in the last session. The last session was planned to involve contingent stimulation of tongue-bite responses with 40 volts from the beginning. In fact, no shock was delivered in this session because tongue-bite responses were absent. The observed suppression could be attributed to the "finger on the switch of electro shock" apparatus.

5) With increasing intensity of shock there was increasing suppression of the chosen responses. Subjects C and E support this conclusion.

Two Subjects (B and D) evidenced emergence of new responses and/or accentuation of already existing responses when 40 volts of ahoek was used throughout a session.

Subject B, substituted [h] sound for [a] sound, never repeating the substitute sound, sometimes prolonging it. He was also seen to increase word-repetitions in the last ten minutes of the session.

> Subject D moistened his low lip often by protruding his tongue throughout the session. This occurred in spite of the fact that shock was not delivered in the session.

In conclusion, it can be said the data of the present series of experiments is more in support of Martin's (1968) position than Brutten & Shoemaker's (1967) position. The selected responses decreased significantly when punished* Repetitions of sounds and syllables did not exhibit tendency towards increase when punished. They either decreased or were unaffected. The finding that they decreased identifies repetitions more as instrumental responses than "involuntary disruptions caused by conditioned negative emotion (Brutten & Shoemaker (1967).

The findings of the present study that stuttering responses decrease when punished has far reaching theoretical consequences. Most of the theories of stuttering (Johnson, 1967; Van Riper, 1954; Wischner, 1950; Blood Stein 1958) accord trauma, or social disapproval or punishment an important place in the genesis of stuttering. Moreover, the same factors are held to aggravate stutteringa. The results of the present series of experiments seem to question these very basic assumptions of these theories.

Recommendations for further research:-

1. The effect of punishment on stuttering defined molarly as dysfluency or molecularly (as repetitions and prolongations of sounds and syllables) should be explored more intensively

and extensively. Single subject experiments ensure intensiveness, greater number of subjects ensure extensiveness. Such intensive and extensive studies will result in

i) arriving at the most valid theory of stuttering, and

ii) the most effective therapeutic strategy.

2. The experiments should be done in a two room situation. It will minimise the contribution of dlscrimlnative stimuli (like the approach to the swith, etc.) to the changes observed in the specified responses. Determination of Independent effect of the punishing stimulus is the desirable consequence of such an arrangement.

3. The response punished and all other responses in a moment of stuttering should be kept track of during the experiments. The hypothesis that different responses (not necessarily repetitions and prolongations of sounds and syllables) in a moment of stuttering have different conditioning history can be then more meaningfully tested*:

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SUBJECT A

1. Case history file No. 5060
2. Age: 16 years
3. Sex: Male
4. Age of onset: 6 years
5. Family history: Nil significant
6. Therapies given: i) Prolongation
   ii) Electro-shock therapy
7. Subject's opinion about electro-shock therapy:

   Has reduced my stuttering by fifty per cent after one session. I am ready to take greater intensities of shock if it will abolish my stuttering completely.

APPENDIX A

TABLE I - (Raw scores for the Response: Tongue Protrusion)

Minute	Base rate 1			Base rate 2			E_1 30 volts (C)			PEB$_1$ (e)			PEB$_2$			PEB$_3$			PEB$_4$ (e)		
	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1
1	4	5	9	7	7	3	2	10	4	1	0	0	5	1	3	1	4	1	1	0	1
2	12	6	8	8	9	5	5	6	2	0	0	1	4	0	1	5	4	3	0	3	0
3	12	4	9	7	6	5	2	3	4	0	0	0	4	4	0	7	2	2	0	1	0
4	6	6	8	5	8	8	4	2	5	0	0	1	5	1	2	6	5	4	1	1	1
5	5	5	6	3	14	12	10	2	5	2	1	2	2	1	2	2	0	3	1	1	1
6	7	3	3	9	8	8	7	1	0	8	0	0	4	4	3	6	7	5	0	1	2
7	7	a	7	9	8	9	8	2	0	1	0	1	5	3	3	1	3	6	2	0	0
8	5	7	10	9	10	15	9	1	8	1	0	1	3	2	4	3	2	1	0	1	1
9	4	5	9	4	10	8	7	2	3	1	1	0	5	1	4	1	4	3	0	3	1
10	5	13	6	8	5	7	11	1	5	0	1	0	1	2	3	2	2	3	1	1	3

E_1 = Experimental session 1

C = Contingently stimulated

PEB_1(e)= Post experimental base rate session N6.1 with electrode

PEB_2 | = Post experimental base rate session Nos. 2 and 3 without electrodes

PEB_3|

PEB_4(e)= Post experimental base rate session No. 4 with electrode

APPENDIX A

TABLE II - (Raw scores for repetitions of sounds [p] [b] [m]

Minute	Base rate session 1			Base rate session 2			E_1 30 volts (NDS)			PEB_1 (e)			PBB_2			PEB_3			PEB_4 (e)		
	A	B	A_1	A	B	A_1	A	B	A	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1
1	0		0	2	2	3	3	0	0	0	0	0	0	3	0	2	0	0	0	0	1
2	2	4	3	2	5	2	2	1	1	0	0	0	0	2	2	1	2	1	0	1	1
3	3	2	3	1	3	4	3	1	0	0	0	1	1	2	1	2	2	0	1	0	1
4	3	0	1	4	2	5	2	1	1	t	0	0	1	0	1	1	2	3	0	0	1
5	3	3	4	4	2	2	2	2	0	0	0	1	2	3	1	2	3	3	0	0	0
6	1	3	2	3	2	2	3	1	1	0	0	0	0	1	2	2	2	0	0	0	0
7	2	1	4	2	2	1	1	1	1	0	1	0	1	1		1	2	0	1	0	0
8	3	t	1	2	2	2	2	0	1	0	0	0	0	2	2	1	2	2	0	1	1
9	4	3	3	4	3	4	2	1	2	1	0	0	0	1	1	0	1	2	0	0	0
to	1	2	2	3	5	3	2	2	0	1	2	2	2	0	0	2	1	1	1	0	

E_1 - Experimental session 1

NDS = Not directly stimulated

PEB_1(e)= Post experimental base rate session No. 1 with electrode

PEB_2 = post experimental base rate session Nos. 2 and 3 without electrodes
PEB_3

PEB_4(e)= Post experimental base rate session No. 4 with electrode

APPENDIX A

TABLE III - (Reading rates)

SI. No.	Seaaion	I	II	III	IV	V	VI
1	Base Rate 1	65	63	60	57	57	59
2	Base Rate 2	61	53	65	52	61	53
3	Experiment	60	60	M	60	71	50
4	PBB-1(e)	79	65	60	59	58	58
5	PEB-2	64	64	75	59	59	73
6	PBB-3	57	58	55	62	56	57
7	PEB-4(e)	91	51	61	63	60	58

I = 1at five minute
II = 2nd five minute
III = 3rd five minute
IV = 4th five minute
V = 5th five minute
VI = 6th five minute

PEB-1(e)= Post experimental base rate aession No.1 with electrode
PEB-2 = Post experimental base rate session No.2 without electrode
PEB-3 = Post experimental base rate aession No.3 without electrode
PEB-4(e) = Post experimental baae rate session No.4 with electrode

APPENDIX B

SUBJECT B

1. Case history file No. 997
2. Age: 19 years
3. Sex: Male
4. Age of onset:
5. Family history: Nil significant
6. Therapies given:
   i) Prolongation
   ii) Shadowing
   iii) Click noise
   iv) Electro-shock
7. Subject's opinion about electro-shock therapy:

   It has considerably reduced my aerial repetitions of a sound. I know my stuttering is completely reduced (to zero) when under shock.

The problem of generalization of the effect of contingent shock stimulation needs to be tackled with this case.

APPENDIX B

TABLE I - (Raw scores for the Response: [a] sound repetitions)

Minute	Base rate 1			Base rate 2			E_1 20 volts(C)			E_2 20 volts(NDS)			E_3 30 volts(C)			E_4 30 volts(NDS)		
	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1
1	1	2	4	4	0	3	4	2	2	1	0	3	1	0	1	1	0	3
2	2	2	2	3	3	4	3	4	3	1	0	7	4	0	1		0	3
3	0	5	3	2	4	1	2	4	7	2	2	2	1	0	0	4	0	3
4	1	2	3	3	3	1	3		2	5	1	2	4	0	3		0	3
5	0		2	5	3	4	6	3	5	3	3	1	2	0	2	3		2
6	3	3	3	4	3	6	7	0	2	1	2	2	6	0	0	2	1	0
7	4	8	4	2	2	5	4	3	3	6	4	3	3	0	4	4	0	3
8	4	3	1	4	2	0	2	5	4	3	1	2	5	0	4	2	4	5
9	3	2	2	1	4	4	3	4	1	4	0		5	0	5	2	4	
10	2	0	4	5	3	3	4	0	3	7	0	0	3	0	1	1	2	2

E_1 = Experimental session 1
E_2 = Experimental session 2
E^3= Experimental session 3
E_4 = Experimental session 4
NDS = Not directly stimulated
C = Contingently stimulated.

APPENDIX B

TABLB II - (Raw scores for [i] [e] [o] sound repetitions)

	Baaw rate 1			Base rate 2			B^ 20 volta (NDS)			E- 20 volta (C)			B- 30 volta (NDS)			E- 30 volta (C) .?		
	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1
1	2	1	1	4	4	0	1	3	2	3	1	2	4	0	5	3	0	1
2	2	4	3	3	2	1	1	1	0	2	0	1	1	0	6	1		0
3	2	0	3	5	0	2	5	2	1	3	4	2	1	0	2	2	0	1
4	1	2	5	4	1	5	1	4	2	1	3	3	3	1	5	2	1	1
5	3	1	1	1	0	2	2	1	0	3	2	4	3	0	3	1	0	3
6	0	1	4	1	1	1	1	1	3	3	2	3	0	0	3	2	1	1
7	2	0	4	1	0	1	4	1	2	2	1	1	5	1	1	1	2	1
8	1	3	3	1	3	4	4	1	3	1		3	2	1	1	2	1	1
9	3	1	4	6	1	1	2	0	4	2	1	5	3	3		2	2	4
10		3	1	3	2	2	4	3	4	1	1	5	3	0	4	3	1	2

NDS = Not directly stimulated
C = Contingently stimulated
E_1 = Experimental session 1
E_2 = Experimental session 2
E_3 = Experimental session 3
E_4 = Experimental session 4

APPENDIX B

TABLE III - (Reading rates)

Sl.No.	Session	I	II	III	IV	V	VI
1	Base Rate - 1	19	21	23	20	23	25
	Base Rate - 2	26	15	18	16	19	19
3	Experiment - 1	21	27	37	39	17	18
4	Experiment - 2	21	29	50	52	18	21
5	Experiment - 3	34	30	56	53	24.	27
6	Experiment - 4	16	17	52	28	17	8

I = First five minute
II = Second five minute
III = Third five minute
IV = Fourth five minute
V = Fifth five minute
VI = Sixth five minute.

APPENDIX C

SUBJECT C

1. Caao history file No* 4748
2. Age: 23 years
3. Sex Male
4. Age of onset: 20 years
5. Family history: Nil significant
6. Therapies given: i) Shadowing
   ii) Click noisE
   iii) Electro-shock therapy
7. Subject's opinion about electro shock therapy:

   It has reduced my stuttering. I prefer to stay on this rather than to be transferred to some other type of therapy.

The problem of generalization of the effect of contingent shock stimulation was present with this case.

APPENDIX C

TABLE I - (Response: Silent posture for production of [a] sound prefacing words.

Minute	Base rate session 1			Base rate session 2			E_1 (10 volts)			E_2 (20 volts)			(25 volts)			(30 volts)			B5 (40 volts)		
	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1
1	7	4	3	10	11	6	6	6	5	6	4	5	7	1	4	4	0	2	4	0	1
2	5	6	5	8	8	8	6	3	6	9	2	6	6	1	3	6	0	4	5	0	1
3	5		4	9	7	11	7	8	8	5	4	7	7	0	6	5	0	5	3	1	3
4	7	6	7	8	8	9	8	7	6	7	3	6	5	0	6	4	2	4	6	0	
5	6	4	7	9	9	10	4	10	6	4	2	7	7	0	5	6	2	3	5	0	
6	5	5	8	7	8	9	4	9	5	8	2	5	4	2	3	4	2	1	2	0	1
7	6	7	7	10	9	9	7	5	7	5	3	5	5	1	7	7	4	0	3	1	2
8	4	3	6	9	10	8	5	5	7	5	4	6	6	t	5	8	2	7	6	0	5
9	7	4	9		9	10	6	8	6	5	5	5	7	0	6	6	2	5	6	0	3
10	4	5	6	7	11	8	7	6	6	2	3	6	5		4	9	3	3	4	0	3

E_1 = Experimental session 1
E_2 = Experimental session 2
E_3 = Experimental session 3
E_4 = Experimental session 4
E_5 = Experimental session 5

APPENDIX C

TABLE II - (Reading rates)

Sl.No.	Session	I	II	III	IV	V	VI
1	Base Rate - 1	80	90	88	90	92	76
2	Base Rate - 2	74	76	68	70	72	70
3	Experiment - 1 (10 volts)	86	88	84	86	86	86
4	Experiment - 2 (20 volts)	98	103	102	99	94	94
5	Experiment - 3 (25 volts)	94	99	131	118	89	90
6	Experiment - 4 (30 volts)	123	115	131	104	112	84
7	Experiment - 5 (40 volts)	93	103	127	134	106	35

I = First five minute
II = Second five minute
III = Third five minute
IV = Fourth five minute
V = Fifth five minute
VI = Sixth five minute

APPENDIX D

SUBJECT D

1. Case history file No* 3431
2. Age: 23 years
3. Sex: Male
4. Age of onset: 3 years
5. Family history: Nil significant
6. Therapies given: i) Shadowing
   ii) Electro-shock therapy
7. Subject's opinion about electro-shock therapy:

> The therapy has considerably reduced my stuttering. It is better than prolongation technique. The 'tension' I used to feel in the neck while speaking is absent. I am more fluent when I talk about movies (the subject used to talk about movies in the sessions) than any other subject. I am ready to continue on this therapy.

APPENDIX D

TABLE I - (Repetitions of sounds)

Minute	Base rate session 1			Base rate session 2			BL 30 volts (NDS)			Eg 30 volts (C)			EL 40 volts (NDS)			E, 43 volts (C)			EL 40 volts ' (NDS) throughout		
	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1
1	15	13	20	18	17	17	15	10	9	6	4	4	12	6	0	4	0	1	0	0	0
2	13	17	21	17	16	17	16	10	6	11	3	2	10	2	2	4	0	2	0	0	0
3	17	16	17	15	16	17	23	15	5	11	3	4	13	2	2	4	1	2	0	1	1
4	12	16	18	16	20	17	13	9	8	11	1	2	10	3	1	2	0	3	0	0	0
5	18	14	19	12	16	26	23	11	6	9	1	3	13	1	2	5	0	3	0	0	0
6	19	14	19	14	15	18	14	7	6	8	3	4	11	2	3	4	0	2	0	0	0
7	16	16	15	17	16	23	25	11	10	8	0	2	6	0	3	7	1	4	0	0	1
8	17	16	16	13	20	20	21	6	8	12	2	0	6	0	2	2		2	1	0	0
9	15	17	17	15	17	16	17	5	7	8	0	0	13	0	3	4	0	1	0	0	0
10	14	20	17	19	17	17	22	4	8	6	1	2	8	2		3	0		1	0	0

E_1 = Experimental session 1
E_2 = Experimental session 2
E_3 = Experimental session 3
E_4 = Experimental session 4
E_5 = Experimental session 5
NDS = Not directly stimulated
C = Contingently stimulated.

APPENDIX D

TABLE II - (Raw scores for "tongue bite" responses)

Minute	Base rate session 1			Base rate session 2			E1 30 volts (C)			E2 30 volts (NDS)			E_3 40 volts (C)			E4 40 volts (NDS)			EL 40 volts(C) throughout the session		
	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1	A	B	A_1
1	5	2	3	6	6	6	6	2	3	1	1	1	6	2	0	1	0	0	0	0	0
2	3	3	4	7	8	6	8	2	5	3	2	2	6	1	2	3	1	0	0	0	0
3	3	5	6	5	5	3	5	2	1	5	3	2	7	0	0	2	0		0	0	0
4	4	6	6	3	8	5	7	1	2	4	2	2	5	0	1	2	0	1	0	0	0
5	5	3	5	6	4	4	4	2	1	5	1	1	3	1	1		0	0	0	0	0
6	2	5	3	5	5	3	8	2	3	1	2	1	4	0	0	2	1	0	0	0	0
7	3	3	4	3	5	6	6	2	3	4	1	3	4	0	0	4	2	2	0	0	0
8	4	5	5	8	9	7	7	1	5	4	2	2	5	0	2	2	0	1	0	0	0
9	4	4	5	3	7	7	6	2	4	5	0	2	5	0	1	3	0	1	0	0	0
10	4	3	7	10	6	8	5	0	3	5	0	2	4		3	2	0	2	0	0	0

E_1 = Experimental session 1
E_2 = Experimental session 2
E_3 = Experimental session 3
E_4 = Experimental session 4
E_5 = Experimental session 5
C = Contingently stimulated
NDS = Not directly stimulated

APPENDIX D

TABLB III - (Speaking rates.)

Sl.No.	Session	I	II	III
1	Experimental session - 1 (30 volts)	88	106	92
2	Experimental session - 2 (40 volts)	92	122	104
3	Experimental session - 3 (40 volts)	76	101	92

I = First ten minute
II = Second ten minute
III = Third ten minute

APPENDIX E

SUBJECT B

1. Case history file No. K-2265
2. Age: 24 years
3. 3ex: Male
4. Age of onset: 10 years (The subjects is reported to have had high fever for 3 days. He was unconciousfor 3hours. The problem is reported to have stilted after this incident).
5. Family history: Nil significant.
6. Therapies given: Electro-shock therapy.
7. Subject's opinion about electro-shock therapy: -

The subject did not come back after the fourth experimental session. Follow up letter has been sent.

APPENDIX E

TABLE I - (Raw scores for repetitions of sounds and syllables)

Minut	Base rate session 1			Base rate session 2			E1 20 volts (C)			E2 20 volts (NDS)			E3, 20 volts (C)			E4 20 volts (NDS)		
	A	B	A_1	A	B	A1	A	B	A_1	A	B	A_1	A	B	A_1	A	B	
1	5	2	3	5	1	2	4	2	1	1	0	2	4	0	0	3	1	
2	5	4	3	3	2	2	2	2	0	2	1	1	2	1	3	2	1	0
3	4	4	1	1	1	2	3	5	2	2	2	1	3	0	2	8	0	
4	3	5	5	3	1	0	2	2	2	1		2	1	2	1	3	4	1
5	6	3	3	3	0	0	2	2	1		1	2	4	2	1	4	5	2
6	5	4	6	2	3		1	0	2	4	2	1	3	2	2	3	1	3
7	4	3	3	1	2	5	1	1	4	2	1		3	2	1	1	1	2
8	4	5	4	0	1	1	1	3	1	3	2	3	4	2	3	1	2	1
9	2	2	2	1	2	0	1	4	4	1	3	1	1	5	1	1	2	4
10	2	7	4	3	2	3	4	1	2	0	0	2	2	0	3	1	7	3

E_1 = Experimental session 1
E_2 = Experimental session 2
E_3 = Experimental session 3
E_4 = Experimental session 4
C = Contingently stimulated
NDS = Not directly stimulated

APPENDIX E

TABLE II - (Silent exaggerated posture for the production of [i] sound)

Minute	Base rate session 1			Base rate session 2			20 volts (NDS)			20 volts (C)			E3 20 volts (NDS)			E4 20 volts (C)		
	A	B	A1	A	B	A1	A	B	A1	A	B	A1	A	B	A1	A	B	A1
1	6	5	8	5	6	4	4	2	2	5	1	5	7	3	6	4	1	4
2	5	8	9	6	5	5	6	0	3	3	1	8	6	6	6	4	4	8
3	7	8	9	8	5	9	5	0	5	5	6	7	7	1	6	7	4	7
4	10	9	5	6	8	7	7	2	.2	6	4	6	7	3	8	8	4	7
5	9	6	7	9	7	8	5	2	6	5	5	4	8	5	7	7	3	6
6	6	7	5	8	6	6	6	2	5	8	6	6	9	5	7	8	3	8
7	8	10	9	7	6	7	5	3	5	6	5	6	3	5	8	9	2	5
8	8	8	6	7	7	9	4	1	6	6	6	7	7	3	7	6	4	7
9	6	7	6	5	6	7	6	1	7	5	6	8	7	4	6	5	4	6
10	8	8	4	9	7	7	6	4	5	6	4	7	9	4	8	5	4	7

E_1 = Experimental session 1
E2 = Experimental session 2
E3 = Experimental session 3
E4 = Experimental session 4
C = Contingently stimulated
NDS = Not directly stimulated

APPENDIX E

TABLE III -Reading Rates

Sl.No.	Session	I	II	III	IV	V	VI
1	Base-Rate 1	14	16	13	15	11	14
2	Base Rate 2	15	16	17	20	14	19
3	Experiment-1	10	14	13	7	10	12
4	Experiment-2	11	12	9	16	13	15
5	Experiment-3	13		5	7	11	14
6	Bxperiment-4	11	15	14	13	11	13

I = First five minute
II = second five minute
III = Third five minute
IV = Fourth five minute
V = Fifth five minute
VI = Sixth five minute

APPENDIX X

STUTTERING DATA SHEET

Experimente:. . . . . Date . . . . . .

Subject. . . . . Age. . . . . .

Time Reaponses(tally)	No.R	cum R	Time Responses(tally)	No.R	cum R
Time to 1st R					

Description of the specified Response

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