The Effects Continuos Contingent, Random Contingent and *Random* Negative Stimulation *on* Selected Responses in A *Moment* of Stuttering

A DISSERTATION SUBMITTED IN PART FULFILMENT FOR THE DEGREE OF MASTER OF SCIENCE (SPEECH AND HEARING) OF MYSORE UNIVERSITY—1973

To

My Beloved Grandmother

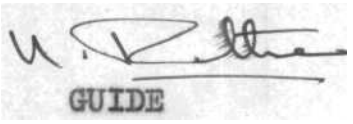
C_E_R T_I_F I C A T E

This is to Certify that the Dissertation entitled "THE EFFECTS OF CONTINUOUS CONTINGENT, RANDOM CONTINGENT AND RANDOM NEGATIVE STIMULATION ON SELECTED RESPONSES 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. 13

Director-in-Charge
All India Institute of Speech and Hearing, Mysore.

CERTIFICATE

This is to Certify that thiS Dissertation has been prepared under my supervision and guidance.



DECLARATION

This Dissertation is the result of my own study undertaken under the guidance of Dr. N.Rathna 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.

Mysore,

Reg.No. 13

Date:11th may 1973

A C K N O W L E D G E M E N T

The Author wishes to express hia gratefulness to Dr.N.Rathna, Professor and Head of the Department of Speech Pathology, All India Institute of Speech and Hearing Mysore, for his valuable guidanoe. The author also wishes to thank him for his constant stimulation and advise without which this study would not have been completed*

He also extends his thanks to Sri G.Puroshotham who helped as Observer-experimenter.

He also wishes to acknowledge the help rendered by Mr. C.H.K. Mishra and Mr. Jayaram of Central Institute of Indian Languages, Mysore, regarding the design of the study and on statistical matters.

Thanks to Mr. N.S.Viswanath and to many other friends for their suggestions and help. specially to Mr. H.S.Satyan, Mr.P.J.Kumar and Mr.M.Jayaram.

C 0 N T E N T S

CHAPTER I

INTRODUCTION

"Speech Pathology ia an applied behavioral Science" (Perkins 1971). There is general agreement that speech is a learnt behaviour (A.M.Bell 1853; Osgood 1953; 1957; Skinner 1953; Mowrer 1951) and that it can be controlled by environmental consequences.

"In recent years the growth of behaviour therapy has exploded into many areas of clinical concern" (Perkins 1971). The impact of this explosion has not spared speech problems. The impact is relatively more in the area of stuttering.

The conception that stuttering is a learnt behaviour is not a new one. It can be dated backto 1700 (Amman 1700). Van Riper writes, "We find concepts concerning stuttering as a learnt behaviour recurring again and again". But the wave of revolutionary emphasis on stuttering as a learnt behaviour, started only a few decades

ago, based mainly on the findings from the learning laboratories. Many theories have been presented. (Wischner 1950; Sheehan 1951; Shames & Sherrick 1963; Brutter and Shoemaker 1967) to explain stuttering behaviour - the onset development and maintenance as well as its treatment - using learning theory principles and constructs. There is agreement among these theorists that learning is basically involved. There is disagreement, however, regarding the beet way of conceptualizing the learning process and of Structuring the treatment. Shames and Sherrick, (1951) for example, adopt the Skinnerian model, Wischner (1950) classical conditioning model whereas Brutten and Shoemaker (1967) opine that classical and operant principles are both involved.

Stuttering behaviour is explained by using the operant model (Shames & Sherrick 1951). Many studies have been reported wherein stuttering behaviour behaved as an operant, favouring this interpretation (Martin & Siegel, 1966a, 1966b, Quist and Martin 1967; Haroldaon, Martin and Starr 1968; Flanagan, Goldiamond, & Azrin 1958; Goldiamond 1960, 1962; N.S.Viswanath 1972). However the adequacy of the operant model in the explanation of stuttering behaviour has been criticised, notably by Brutten and Shoemaker (1967). They write "Although the reinforcement concept is quite

helpful in organizing some of the data related to stuttering, it runs into a major theoretical problem". They point out that existing data related to punishment and stuttering cannot be explained by this theoretical position. The prediction according to the negative law of effect is that the future probability of the occurence of a response decreases when that response is punished. Brutten and Shoemaker (1967) cite several studies which fail to confirm this prediction. After examining the data, they conclude that it is possibly true with regard to certain responses in a moment of stuttering, for example, tongue-protrusion, fingersnapping; but not with others, for example, repetitions and prolongations. There is still the confusion, regarding the relationship between punishment and stuttering, as there are many conflicting studies. (Van Riper 1937b; Frick 1951; Goldiamond 1960, 1962; Martin et al, 1964; Martin and Siegel 1966a, b; Curlee and Perkins 1967; Hegde 1971; Timmons 1966; Webster 1963; N.S.Viswanath 1972).

On the otherhand, Siegel's (1970) critical examination of the data led him to conclude that the studies are in favour of the interpretation of stuttering as an instrumental behaviour.

Siegel (1969) points out that the studies which Brutten and Shoemaker (1967) cite do not employ contingent negative stimulation, which is a significant factor in the control of operant behaviour. Moreover, the findings of Brookshire (1968), Brookshire and Evestage (1969) show that negative stimulation, on a predetermined random sohedale increases the nonfluency. The contingency, ie., the period between the occurence of the response and the reinforcement is an important factor in operant learning (Church 1963; Solomon 1964; Skinner). There is also evidence that the patterning of administering the stimuli contingently has differential effect. (Ferster and Skinner 1957). In general, it can be concluded that contingent negative reinforcement administered on a variable or random schedule is more effective in altering the behaviour than a continuous contingent reinforcement (Fixed ratio 1). The former is also more resistant to extinction.

There is very little data regarding the effect of Random contingent negative stimulation on stuttering. A study by Martin and Siegel (1965) show that stuttering degreases render random contingent negative stimulation.

The present controversy and confusion regarding the effect of punishment on stuttering may be due to a

number of variables which are known to affect the effects of punishment on behaviour (Church 1963; Solomon, 1964; Azrins Holz (1966). The main reasons are probably the contingency Vs non-contingency issue and the problem of definition - definition of stuttering and also of punishment itself. The paucity of data is an another factor. Johnson (1959) stressed the need for continued research in the field of stuttering and it is still true that more studies are needed. The present study is an attempt to add a little more data to the problem.

STATEMENT OF THE PROBLEM

The problem of the present study is to investigate the effects of continuous contingent negative stimulation, Random contingent negative stimulation and Random negative stimulation on selected responses in a moment of stuttering. From the available data on operant learning and stuttering, the following predictions can be made.

1. The selected responses in a moment of stuttering decrease in their frequency when negatively stimulated contingently continuous contingent and random contingent.
2. The selected responses in a moment of stuttering will increase in their frequency of oocurence when negatively stimulated randomly.

3. The reduction in the frequency of occurence of the selected responses in a moment of stuttering render random contingent negative stimulation is greater than thai render continuous contingent negative stimulation.

PURPOSE

The purpose of the present study is to test the above predictions. The following Null hypothesis are put forward. The predictions. The predictions are the alternate hypothesis.

1. Contingent negative stimulation - continuous contingent and random contingent of the selected responses in a moment of stuttering will not alter their frequency significantly.
2. The random negative stimulation of the selected responses in a moment of stuttering will not alter their frequency significantly.
3. The continuous contingent negative stimulation and random contingent negative stimulation of the selected responses in a moment of stuttering will not exert differential effects upon their frequency of occurence,

BRIEF OUTLINE

Eight male stutterers are taken for the study.

All the eight subjects shall receive the three schedules of negative stimulation viz., continuous contingent, random contingent and random negative stimulation on three consecutive days. The order of stimulation is changed for each of the six subjects to cancel out the order effect. The other two subjects shall receive the stimulation in a random order

Bach session consists of 30 minutes. The session is divided into three segments (ABA paradism). First ten minutes is the base rate period,in the second ten minutes, the independent variable was introduced and in the third segment the independent variable was withdrawn.

The balanced Latin Square design is used to cancel out the order effect and to help in the calculation of the residual effects non parametric statistics is used to find out the direct effect. Wilcoxon matched pairs signed Rank test and McNemar test for significance of changes are used to analyse the data.

IMPLICATIONS

1. The study has theoretical implications. It adds some more data to the controversial issue of punishment data related to stuttering.

2. The study has therapeutic value. It may suggest whether to use or not to use shock therapy for the control of stuttering; And if shock is useful, it may also suggest the type of schedule to be recommended,

LIMITATIONS

1. The subjects are not negatively stimulated in each schedule over a large number of sessions. Hence the effects of the continuous use of each echedule could not be assessed.

2. Follow up could not be done for want of time

DEFINITIONS

Definitions vary according to the purpose of the definer. This is true in the field of stuttering. To reduce the ambiguity certain terms need to be defined in the context of the present study.

Stuttering : In this study stuttering is defined as repetitions and/or prolongations of sounds or syllables which may or may not be accompanied by other behaviours like tongue-protrusion, finger snapping, head nodding.

Punishment : For the present study, the definition given by Brutten and Shoemaker (1967) is taken.

They define punishment as an aversive or negative stimulus contingent on a specific response. A negative or aversive stimulus, for theme is a stimulus which an organism will try to escape or avoid when placed in a free choice situation. In the study electric shock is used as the negative stimulus

Schedules of negative stimulation : Schedules of negative stimulation are the patterns of administering the aversive stimulus. Three schedules are used in this study:

a) Continuous contingent negative stimulation:
This is defined as, the contingent negative stimulation of the selected responses, each time it occurs.

b) Random contingent negative stimulation:
This is defined as the contingent negative stimulation of the selected responses in a random fashion, according to a preselected random ratio schedule.In each response is not stimulated but the negative stimulation, whenever it occurs is contingent.

c) Random negative stimulation:
This is defined as that schedule where the negative stimulus is delivered in a random fashion, irrespective of the occurence of the selected response, (according to a random time schedule).

CHAPTER II

REVIEW OF LITERATURE

LEARNING THEORY AND STUTTERING

"The emergence of behaviour therapy as a speciality has greatly revolutionized conceptualization of behavioural problems and their treatment". (Yates 1970). The conceptualization of stuttering is not exempted from this influence.

The idea that stuttering is a learnt behaviour is not a recent one. It was there before the advent of behaviour therapy. Amman (1700) stated that stuttering is a bad habit. Darwin (1800) considered it as conditioned emotional interruptions of motoric speech. Many workers, in the early decades of the nineteenth century (J.Frank 1818; M.Leish 1825) were of the opinion that stutters required training to break the bad habit. The idea that stuttering is a bad habit gradually strengthened. A.M. Bell (1853) strongly criticized the organic approach and viewed that, since speech is learnt, so must be its defects.

"Speaking is an artificial process - an acquirement, not a natural instinct and its defects can only be amended by the same means through which its exercise is first obtained". Similar ideas have been expressed by many others (Wyneken 1868; Denhardt 1890; Sandow 1898; Dunlap 1932).

However, the rigorous application of learning principles to explain stuttering came in the middle part of this century, closely following the growth of behaviour therapy. Several theories have been presented, (Wiscuner 1950; Sheehan 1953; Shamus and Sherrick 1963; Brutten and Shoemaker 1967). There are studies both in favour of and against each of these theories. Though the approach of these theorists is different, the basic principle is the same "There is thus essential agreement among theorists that stuttering is more accurately construed as a behavioral response. They also agree that acquisition of stuttering behaviour is not a unique process; stuttering is acquired in accordance with the same learning principles as other responses. These theorists believe therefore that, the learning and maintenance of stuttering depend on some form of reinforcement " (Brutten and Shoemaker 1967). Though the orientations including that of Brutten and Shoemaker (1967) are similar, the models they adopt to explain the behaviour vary. For example Wischner adopts

the classical conditioning model, whereas Shamus and Sherrick (1963) use the operant model. Brutten and Shoemaker (1967), on the other hand, use a combination of both the models.

Unfortunately no stuttering theory is accepted by all or even most of the workers in the field as a satisfactory explanation of the onset development and maintenance of stuttering or as leading to effective treatment. "Neither classical nor operant conditioning nor their combination (as in Brutten and Shoemaker's two factor theory) are completely explanatory. Each of these accounts for some of the phenomena of stuttering but not for all" (Van Riper 1971). This may probably be due to the existing confusion in the field of learning theory itself. Van Riper says, "... the present state of behavioral science as it applies to learning and unlearning still leaves much to be desired" And the same author writes, "....the situation with regard to stuttering merely reflects the confused state of current learning theory which has been in great flux". "No learning theory as yet seems to account for all the facts of learning, so we should not be surprised to find different explanations of how stuttering is learned, shaped and maintained".

However, one of the problems,that the present theories are facing, is the punishment data related to stuttering.

Punishment and Stuttering :

The existing data regarding the effect of punish-meat on stuttering is equivocal and confusing. The studies available in general show two types of results.

i) that stuttering or certain aspects of stuttering increases, when punished and

ii) that stuttering or certain aspects of stutterin decreases, when punished

The effects of punishment has been studied.

i) On stutterers

ii) On normal dysfluencies of normal speakers

The effect of punishment on stuttering

"The literature is rite with case reports indi-cating that rejection and ether penalties increase the frequency and severity of stuttering" (Van Riper 1971). The first study available on the effects of punishment on stuttering is by Van Riper (1937b). He used shock as the punisher. Sixteen stutterers were used for the study.

The electrodes were attached to the neck. Each stutterer read a passage six times. After the third reading a sample of shock was given. The subjects were told that they would receive one shock for each stuttered word in the fourth reading after its completion. After the end of the fifth reading they were told that, after the completion of the sixth reading they would receive shock for each stuttering that had occurred during the initial reading . in the series. In all the subjects stuttering increased from the fourth reading to the fifth reading except one. A similar increase was found from fifth to sixth reading in fewer subjects. However, the increase was of lesser magnitude. The shocks were actually not given as informed. Van Riper (1971) reports that a reversal of adoptation effect was found during the reading in which shock was threatened.

The next study came after a lapse of about 14 years. Frick (1951) divided his forty-eight stutterers into four groups and they were assigned to each of the following conditions. The stutterers read single words.

I Condition (control):Shock was not delivered or threstened

II Condition (Experimental) Shock was delivered contingent upon each stuttered word.

III Condition (Experimental)	:	Shock was threatened per stuttering moment and was delivered at the conclusion of the reading.
IV Condition (Control)	:	Shock was delivered for each word, whether stuttered or not.

Frick found no significant differences among any of the four conditions, in the initial analysis. However, the data was reanalysed by combining the scores for the three shock conditions (II, III, IV). When the combined scores were compared with that of the control group (I), it was found that there was a significant difference between the two conditions. Stuttering was more in the shock condition than in the non-shock condition.

In Frick's study conditions III is similar to Van Riper's (1937b), but the results do not support Van Riper's findings. But according to Sheehan (1958), the results were supportive of Van Riper's findings. It is not a replication of Van Riper's study and also it is interesting to note that the contingent shock condition (II) did not decrease stuttering (Siegel 1970).

There was not much controversy on the effect of punishment on stuttering at that time. It lead them to

the conclusion that punishment increases stuttering. However, as more studies came out with equivocal results on the effect of punishment on stuttering, the present confusion began.

Flanagon, Goldiamond and Azrin (1958) did a series of experiments to modify stuttering within the operant framework. Their extensive research has been summarized by Galdiamond (1965). They used either white noise Flanagon et al, (1958) or DAF (Goldiamond 1960; 1962) as punishers. There were two conditions in these experiments. In one condition, a one second blast of 105 db tone of 6000 H_2 was delivered contingent upon the stuttering response. The responses decreased under this condition. When the condition was removed stuttering reappeared. The second experiment was an "escape condition", wherein a 105 db tone was continuously delivered through the subjects earphones and was removed for five seconds immediately after each stuttering response stuttering was found to increase. Similarly, when DAF was made contingent upon the response, stuttering decreased as expected. However, in the "escape condition", stuttering did not increase. In these experiments stuttering behaved like an instrumental response. Goldiamond et al (1965) based on these findings concluded that stuttering is an instrumental behaviour.

A series of studies came out from the Minnesota laboratory, conducted by Martin, Siegel and their associates. These studies, in general, support Goldiamond et al (Siegel 1970). All these studies were on the Skinnerian model using single subjects. The stuttering behaviour was defined in various ways. It was either narrowly specified as eyeblinking, nose wrinkling, or prolongation (Martin & Siegel 1966a), repetition, prolongation, ah (Quist and Martin 1967) or specified broadly as "moments of stuttering. (Martin and Siegel 1966a; 1966b; Haroldson, Martin and Starr 1969). Electric shock waa used by Martin and Siegel (1966a), verbal punisher "No Good" was used by Martin and Siegel (1966b), "Wrong" by Quist and Martin (1967). Haroldson et al (1967) used "Time out" as a punisher and Martin et-al (1971) used response cost. The responses were punished contingently.

In general these studies show that stuttering responses specified, either molarcy or interns of molecular components, decrease in their frequency, when punished contingently. But when the punishing condition is removed, stuttering reappears. Martin & Siegel also found that stuttering can be brought under discriminative stimulus control. In one of the studies by Martin and Siegel (1966b) fluency was rewarded and stuttering was punished

contingently. They conclude reward may not be essential to the decrease in stuttering.

Biggs & Sheehan (1969) used a 108 db high frequency tone as an aversive stimulus. The stimulus was presented in three conditions, delivered contingently on a moment of stuttering, delivered randomly and removing the contingent noise whenever stuttering occurred. Stuttering decreased in all the three conditions. Brady (1967) made hie subjects to read a 1000 word passage and presented shock contingently for each moment of stuttering contingently and found that stuttering decreased. Ryan (1964) found a marked decrease in stuttering in an alternated positive and negative reinforcement contingency. The decrease was maintained later in an anrelnforced situation. Gross and Holland (1965) found that contingent punishment (Shock) decreased its frequency. They also found that shocking the listener for stuttered moment decreased stuttering. Gross (1968) found some reduction in stuttering when the stuttering moment was punished by taking away the coinse given to them.

Similar results were obtained by N.S.Viswanath (1972) where contingent shock resulted in a decrease of stuttering. Stuttering was defined narrowly as tongue

protrusions, repetitions, "silent exaggerated posture for the production of (i) prefacing the word and the like. He also found that the other responses which were not punished contingently also decreased in their frequency. In some subjects, the fastening of the electrodes to the wrist, served as a discriminative stimulus resulting in a reduction of statterring.

The studies on the effect of punishment on signalled expectancies of stuttering show that contingent punishment decreases both signalled expectancies and stuttering. (Curlee and Perkins 1967; Da&y and Prick; 1968).

Cooper et al (1970) found a decrease in stuttering when the words "wrong", "right" and "tree" were made contingent upon stuttering,

Bearss (1951) found a reduction in stuttering when the stutters were shocked randomly.

In contradistinction to these studies, there are studies which show that stuttering did not vary significantly. Timmons (1960) did not find any significant increase or decrease, when the word wrong was used contingent upon stuttering. Stevens (1903) found no significant change by giving a sample shock first and then making it contingent

upon the response. Similar results were cbtained by Daly and Cooper(1967), and Daly (1968).

There are also many other studies the findings of which are contradictory to the findings of the above studies. They show that stuttering or certain aspects of stuttering increase when punished. Frederick gave a contingent on stuttering. He found an increase in stuttering. Martin et al (1964) found that response contingent shock supressed the nonverbal(nose wrinkling) and verbal behavior(ah-ah) but also suppressed the word output. Thus the decrease in the response may be due to the decreased word output. And they also found that prolongations increased. Webster's (1968) subjects differentially defined two classes of stuttering behaviour as "Voluntary and "involuntary". He found

that the word "wrong" contingent on stuttering decreased "Voluntary" behaviour and increased the "Involuntary" behaviour. Stark weather (1969) and Hegde (1971) also found similar results.

PUNISHMENT AND NORMAL NONFLUENCY

The effect of punishment on normal nonfluencies has been studied by many workers. The data is again controversial as in the case of stuttering. The studies by Hill (1954), Bilger and Speaks (1959) and Stassi (1961) show that nonfluency increases under punishment, Hill (1954) using the classical conditioning framework, conditioned normal speaking subjects by pairing shock and red light during speech activity. He found an increase in nonfluency. Stassi (1961) found normal speakers became more diffluent under preprogrammed introduction of "Wrong" contingent and randomly on the dysfluencies than the preprogrammed introduction of the word "Right". They also found that males showed more disorganisation of speech than females. Bilger and Speaks (1959) paired green light and a 100 db tone contingent upon the dysfluencies of normal speakers along with a noncontingent D.A.F. They found more dysfluencies under contingent tone but not with DAF. Savoye (1959) also found similar results using shock.

In contrast to these studies the results of the studies from the Minnesota University show that nonfluency in normals decrease significantly under contingent punishment. (Siegel and Martin 1965a; 1965b; 1966; 1967, 1968, 1969, Martin and Siegel 1969; Brookshire and Martin 1967; Brookshire 1968; Brookshire and Evescage 1969).

Some of tha studies have attempted to find the effects of both contingent and random punishment. Siegel and Martin (1965a) found no change, under random contingent whereas contingent stimulation resulted in decrease in the frequency of occurence of the dysfluencies. But the random presentation of "wrong" produced higher dysfluencies than the control group.

Brookshire (1968) studied the effects of contingent and random presentation of 105 db noise of 0.75 seconds duration on the dysfluencies of 20 normal subjects divided into two groups. The first group of 10 subjects received contingent noise first and then in the second session the random noise. The order was reversed for the second group He found that the results were influenced by the order effect. In the random noise condition, the dysfluencies increased for both the groups. In the contingent noise condition, dysfluencies decreased in the group which received the contingent noise first, but it did not in the secound

group for which the contingent presentation was administered after the Random condition.

In order to determine whether the order effect found in the Brookshire's study (1968) was also true for two different stimuli Brookshire and Eveslage (1 9 6 9) studied the effects of random noise and contingent "No" on the dysfluencies of normal speakers. They found that in the random noiae condition, dysfluencies increased, but decreased under the contingent "No" condition. The effect of random noise did not appear to have affected the effect of contingent "No".

Cooper et al (1970) used the words "Right", "Wrong" and "Tree" contingent on interjections, part word repetitiona and word repetition. They found a decrease in the dysfluencies in all the three conditions.

After going through all these studies it is apparent that the frequenoy of stuttering and normal nonfluency decreased under contingent negative stimulation, and stuttering and normal nonfluency increased when the negative stimulation was not contingent upon the response, but waa given in a random fashion.

Siegel (1970) has critically examined the data related to punishment and stuttering,

He concluded that "the available evidence does not support the belief that stuttering is somehow increased by punishment, and is thereby exempted from the law of effect". Regarding the differences among the studies he says that "the most plausible explanation for the difference between these sets of results related to the relationship between the presumably punishing stimulus and the response. For the most part, the feature of contingency between the punisher and the response was not maintained in early experiments. The Savoye and Hill experiments were not designed as tests of punishment, but they are sometimes cited as "punishment" experiments, apparently because intuitively unpleasant stimuli such as electric shock were involved. However, such stimuli are not invariably punishing. Reviews by Solomon (1964), Azrin and Holz (1966), indicate that the effects of a stimulus shock will vary according to such factors as the magnitude of shock, the temporal interval between the stimulus and the response to be punished, the abruptness with which the stimuli is presented, the availability of alternate responses etc.".

In the Minnesota experiments (Siegel and Martin 1965a, 1965b, 1966, 1967, 1968; Martin and Siegel 1969; Brookshire and Martin 1967) and in other studies (Cooper et al 1970) contingent stimulation by a variety of stimuli ("shock", "door buzzer", words like "wrong", "Right", "Tree" resulted in a decrease in dysfluency indicating a punishment effect. Siegel (1970) offered an alternate explanation by using the concept of "highlighting". He said "the unique feature of dysfluencies appear to be that virtually any event that highlights or brings these responses to the speakers attention will cause their reduction". Highlighting can be done in one of the two ways 1) making some conspicuous environmental change contingent on the response as in the case of buzzer and 2) through explicit instructional.

Schedules of Reinforcement :

In operant control of behaviour variables like timing of reinforcement and intensity and others affects the effect of reinforcement. The effect of reinforcement also varies depending on the schedules of reinforcement. different patterning of reinforcement produces different types of performance. (Ferster and Skinner Camp et al 1968; Ferraro 1967). There are a variety schedules of reinforcement, each yielding a characteristic response pattern.

They range from variable and fixed interval and ratio schedules to schedules for differential reinforcement. Ratio schedules may be fixed ratio or variable ratio. It has been found that a variable schedule of reinforcement is more effective in altering the behaviour than any other schedule (Ferster and Skinner,1957) and is also more resistant to extinction. In a variable ratio schedule, every response is not reinforced, but in a random fashion around a mean value.

It can be seen that the controversial issue of punishment is not yet settled. The problem of contingency and non-contingency still remains. The present study is an attempt to investigate the effects of contingent and non-contingent (Random) negative stimulation on stuttering. Also the study attempts to investigate the effects of random contingent negative stimulation on stuttering.

CHAPTER III

METHODOLOGY

SELECTION OF THE SUBJECTS

Eight stutterers were chosen for the study. The age range was from 12 - 35 years. The subjects selected satisfied the following criteria -

1. The subjects should be willing to take part in the experiment.
2. They should be above 9 years of age.
3. They should have repetitions and/or prolongations in their response repertoire.
4. They should Se able to read or talk spontaneously for half an hour.

OBSERVER-EXPERIMENTER

One undergraduate student of speech and hearing, from The All India Institute of Speech and Hearing, Mysore was taken as the Observer-Experimenter. He was given

practice in identifying the specified response and in delivering the shocks as per schedules. An independent Observer-Experimenter was used to avoid a probable investigator bias, The observer-experimenter was kept in darkneas as far as was possible regarding the expectations of. the 3tudy.

SELECTION OF THE PUNISHING STIMULI

An ideal punisher should have the following characteristics. (Azrin and Holz, l966.)

1. The physical dimension of the stimuli should be precisely specifiable.
2. Broad variations in its value should be possible.
3. Replications of the punishing conditions should

Electric shock which has the above characteristics was used as the punisher. The escape/avoidance criterion used in the definition of punishment was easily demonstrated.

DESCRIPTI0N OF THE ELECTRO SHOCK APPARATUS

The electro shock apparatus used in the study has been described elsewhere (N.S.Viawanath 1972), It has

the following provisions built into it:

1. dial which enables stepwise increase (in steps of 5 volts) in the voltage of the shock to be delivered. The voltage being delivered can be read on a voltameter in the instrument* The voltage can be varied from 0 volt to 120 volts. The needle is reset at sero when the voltage level is increased beyond the upper limit.

2. An ammeter, graduated in milliamcuperes, indicates the current flowing between the two applied electrodes. The ammeter is not sensitive below 20 volts.

3. A press button system when activated delivers shock of one second duration.

4* A counter counts the number of shocks delivered.

5. Two steel electrodes with watchstraps to hold the electrodes tight on the forearm.

DESCRIPTION OF STUTTERING BEHAVIOUR

Stuttering behaviour was observed by the observer-experimenter and the investigator in a fifteen minute reading (or spontaneous speech) session. All the observed responses were catalogued and described. There were

instances of disagreement upon specifying a response which was clarified by discussion.

SELECTION OF THE RESPONSE

Only one response was chosen for the experiment In all the subjects except one the response chosen was repetition. In that one subject, it was hesitation. The response which was most frequent in occurence and which could be identified easily was selected.

EXPERIMENTAL SITUATION

The study was conducted in a room at the All India Institute of Speech and Hearing. The subject was seated in a chair infront of a table. A tape-recorder and the electro shock apparatus were present on the table throughout the experiment. The observer-experimenter sat directly infront of the subject across the table. The investigator was seated by the side of the table.

DESIGN OF THE STUDY

A combination of non-parameting statistics and balanced Latin square design was used in the study.

In this study, three schedules of the same

stimulus, shock were used on three consecutive days. Hence there may be a possibility of order effects depending upon the order of presentation of the three schedules. The schedule given on the first day may have an inference on the effect of the schedule given on the second day. Brookshire (1968) found the order effects operating in a study of Random noise and contingent noise on normal dysfluencies of normals. Residual effects might also be present. This refers to the continuing effect of the schedule administered in the first session to the second session. Hence to cancel out the order effects and to facilitate the calculation of residual effects, Balanced Latin square design was used. In this design treatments are so arranged that each treatment precedes and follows the other two treatments. Six subjects were used in this design. The blocks were arranged in the following manner.

	SEQUENCES					
Schedules	I	II	III	IV	V	VI
	A	B	C	A	B	C
	B	C	A	C	A	B
	C	A	B	B	C	A

The analysis of variance was done to calculate the residual effects.

Non parametrics statistics were used to find the effects of each schedule and to compare their effects.

The single case study model ABA design was used for each subject. In this design the control and experimental data can be obtained on the same subjects and different schedules of the independent variable can be administered on the same subject.

The letters ABA represents three succeeding time segments in a session. The first letter A refers te the control segment where the independent variable is not introduced. This is the pre-experimantal base rate session which permits comparison with that of the experimental segment. The independent variable is introduced in the time gegment B. In the last segment A (here onwards A') the independent variable is withdrawn, a condition similar to A. The effect of the independent variable on the response is determined by the differences between B and A' segments- and A and A' segments.

All the sesaiona in the present study were of 30 minutes duration each. Each session was divided into three segments ABA'. Each of the three segments were of 10 minutes duration each.

BASE RATE SESSIONS

In the base rata sessions the independent variable shock waa not introdaced. A minimum of 5 base rate aesaions were need on consecutive days. One subject had a days break. The last two base rates were with electrodes fastened to the forearm. The level of shock to be adminiatered to each was determined on the day previoua to the baserole placement of the electrodes.

The inherent unsystematic variance in the rate of responding from A to B, B to A' and A to A' can be known from these base rate sessions.

PROCEDURE

Electrode Placement: The two steel electrodes were fastened on the dorsal surface of the left forearm. Electrode paste which served to decrease the resistance was applied before fastening the electrodes. One electrode was fastaned on to the wrist and the other at fixed distance from it, for each subject. The diatance was maintained throughout the base rate and experimental sessions. for each subject.

Determination of the level of shock: After fastening the electrodes, the subjects were given gradually increasing

levels of shock. They were asked to signal when the shock delivered became i) detectable and ii) painful. The painful level of shoch was correlated with the withdrawal of hand. This level of shock was used in the experiment. The voltage for painful level varied from 10 volts to 45 volts for different subjects.

Stimulus Material : All the subjects except one were reading. Only one subject spoke spontaneously in English because he had very little stammering in reading. For the subjects who were reading stimulus material were chosen from Kannada magazines and novels. The subject who spoke, spoke about his college texts. He had the text in his hand and referred to it occasionally.

Word Output : Word output was calculated for all the subjects in the base rate and the experimental sessions. The subjects were asked to put a mark on the passage, when they were given the signal agreed upon,after every five minutes. For the subject who spoke spontaneously, speech was recorded and word output for every five minutes were counted on the tape. A signal similar to that in reading was given every five minutes. The word out put for five minutes was used to calculate the reading rate per minute.

Schedules of negative stimulation : Shock was delivered to

each subject according to the three schedules: Continuous contingent schedule (C), Random contingent schedule (RC) and Random schedule (R). In the (C) schedule, shock was contingent upon every occurence of the selected response. In the (RC) schedule, shock was contingent, but was delivered according to a predetermined random ratio schedule. In the schedule (R) the shock was delivered according to a pre-determined random time schedule. It was not made contingent on the stuttering response. However, the Random shock might have on occasions became contingent on the chosen stuttering response or any other stuttering response. The random orders for the schedules (RC) and (R) are given in the Appendices X and Y respectively.

Sequences of Schedules : The sequences of the three schedules of negative stimulation, (C), (RC) and (R) were varied in six subjects, used in the balanced Latin Square design. The sequences were arranged according to the design. The following are the sequences of the three sequences.

SEQUENCES

Experimental SESSIONS	I	II	III	IV	V	VI
1	C	RC	R	C	RC	R
2	RC	R	C	R	C	RC
3	R	C	RC	RC	R	C

The remaining two subjects received shock in the sequences C, RC, R and R, RC, 0 respectively.

Experiment : After fastening the electrodes the electro shock apparatus was tuned on. The tape-recorder was also switched on for the subject who spoke. The subject was given the stimulus material to read and a pencil to mark at the five minutes signal. The shock level was set at the previously determined level. The subject was instructed to start reading (to start speaking). Khan the subject started reading (speaking) a atop watch was simultaneously started. The observer-experimenter delivered the shock in the schedules (C) and (RC). In the schedule (R) the investigator delivered the shock, because it was felt that, it was difficult for the observer-experimenter to note down the chosen response and to deliver shock by looking into th stop watch and the Random time table given. There might be errors in recording the responses or in delivering the shock according to the schedule. The investigator bias can be ruled out as the shock in this schedule is given according to a time schedule and the subjects manner of speaking is not taken into consideration in delivering the shock. The three schedules were given on three consecutive days, for all the subjects.

ANALYSIS OF THE DATA

1. The residual effect of the independent variable shock for the group of six subjects in the Balanced Latin Square design were calculated by the analysis of variance for the group.

2. Non-parametric statistics was used to analyse the data -

    i) Wilcoxon matched pair signed rank test was used to find the differences between A and B segments and between B and A' segments.

    ii) McNemar test for significance of changes was used to find out the differences between segments A and A'.

The effects of shock on the response was assessed by comparing the time segments A and B. The comparison of the segment B with A' gave information about the ongoing effects of shock, after its withdrawal. The after treatment effects was obtained by comparing the segment A with the segment A'.

CHAPTER IV

RESULTS AND DISCUSSION

The following were the results obtained on the effects of three kinds of negative stimulation on the selected responses.

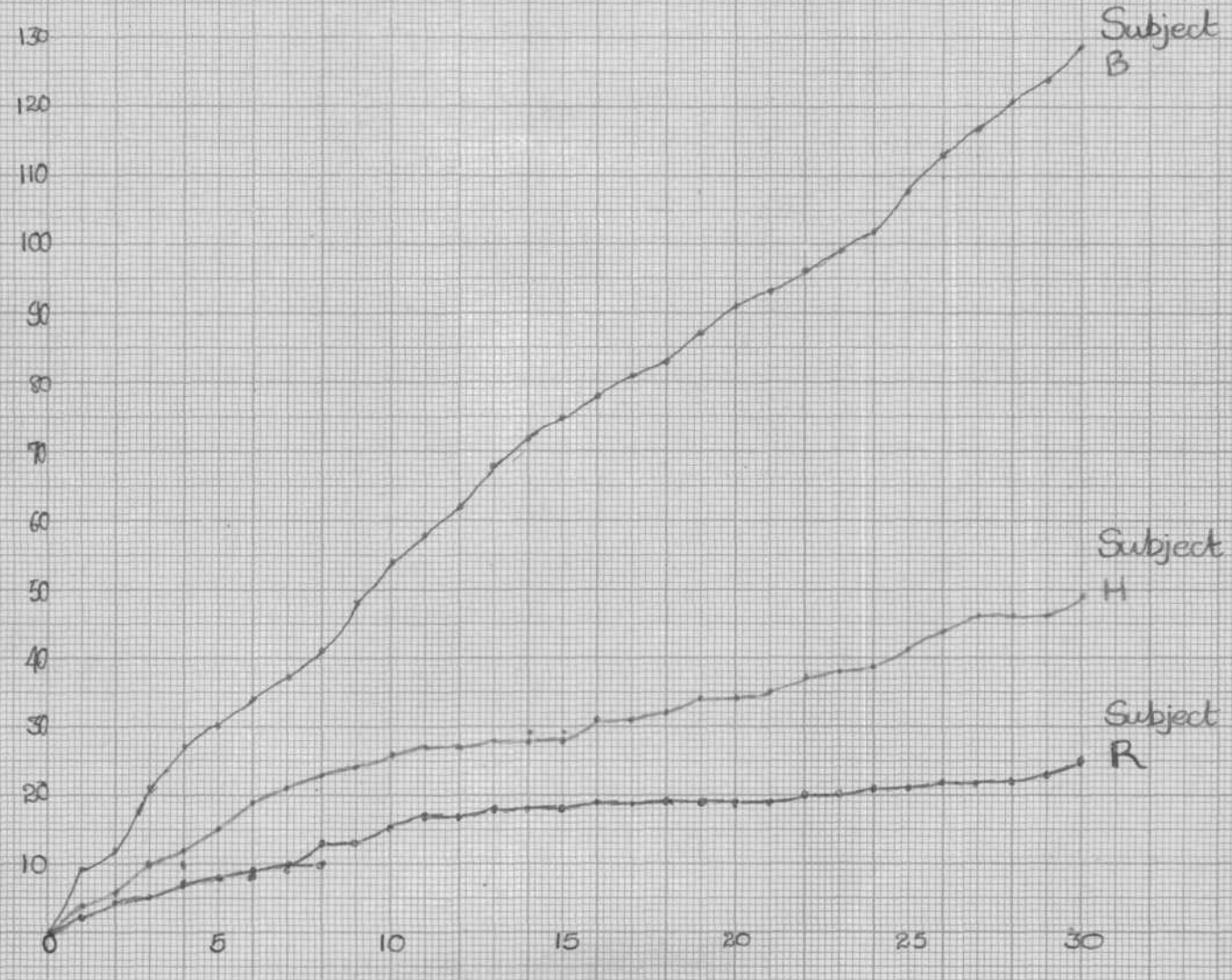
I. Continuous Contingent Negative Stimulation:

There was a significant reduction in the frequency of occurence of the responses from time segment A to B (Significance at 0.05 level). In otherwords when shock was given contingent upon every occurence of the selected response, there were significantly fewer responses than there were in the preshock base rate session for the whole group.

The number of responses in time segment A' was significantly greater than the number of responses in time segment B. (at 0.025 level of significance).

This indicates that the frequency of occurence of the responses which was reduced in the shock segment,

GRAPH I (A)


130
120
110
100
90
80
70
60
50
40
30
20
10
0
5
10
15
20
25
30
Subject B
Subject H
Subject R

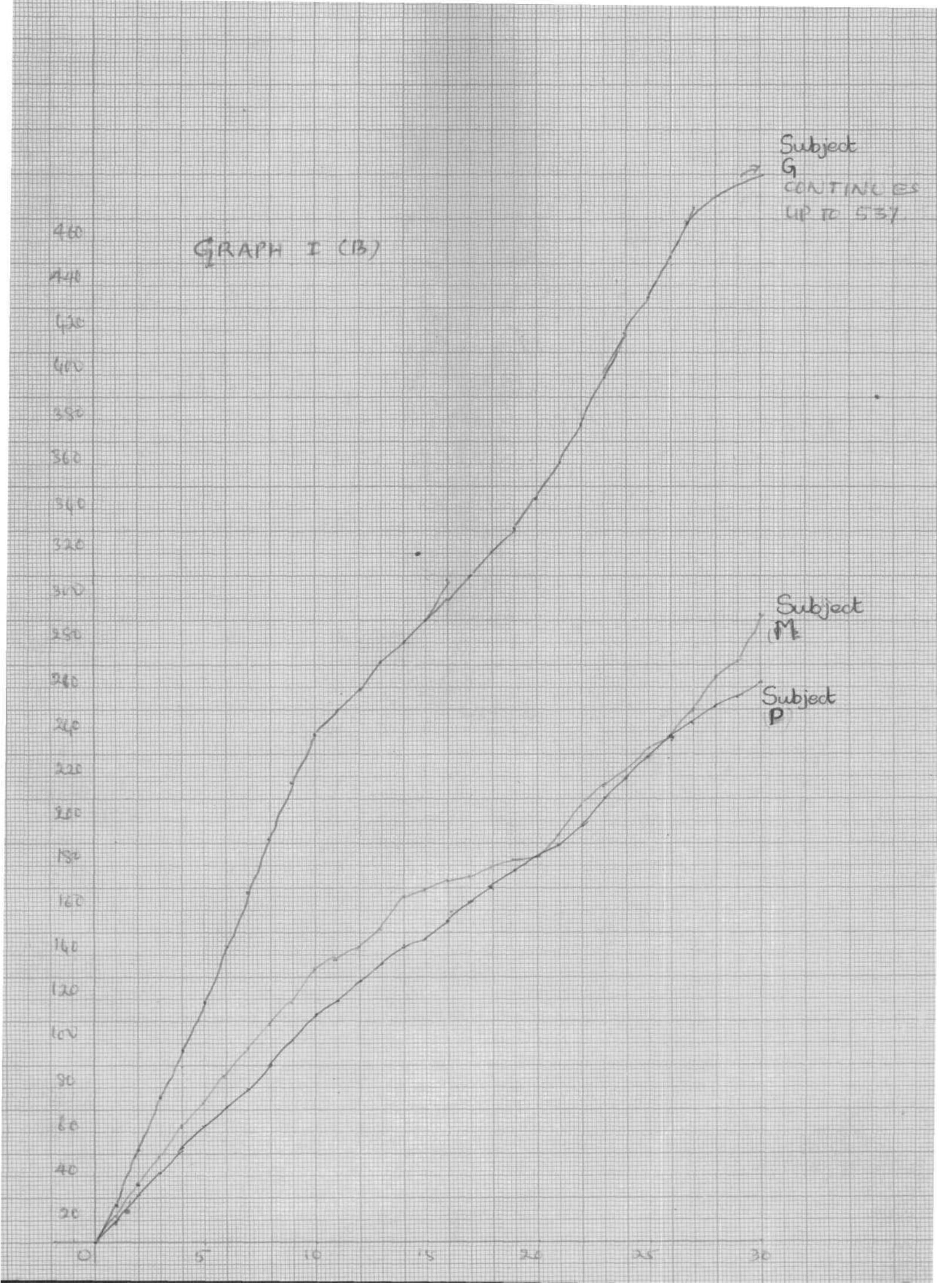
increased again in the post shock segment following the withdrawal of shock.

But the comparison between time segment A' and segment A shows that A is significantly greater than A' (at 0.05 level of significance). This shows that, though the response rate increases following the withdrawal of shock, it is significantly less than the response rate in the preshock base rate session. This indicates that the effect of shock was still continuing even after the withdrawl of shock,

Cumulative frequency graphs for the frequency of occurence of the selected responses for the six subjects included in the balanced latin square design is given in Graph I. The other two subjects who were included for statistical purposes are discussed later.

Descriptions of stuttering behaviour, level of shock and details about the sequences of presentation of the schedules of negative stimulation, base rate and experimental sessions are given in the Appendices for all the eight subjects.

Continuous contingent negative stimulation resulted in a significant reduction in the number of responses in all

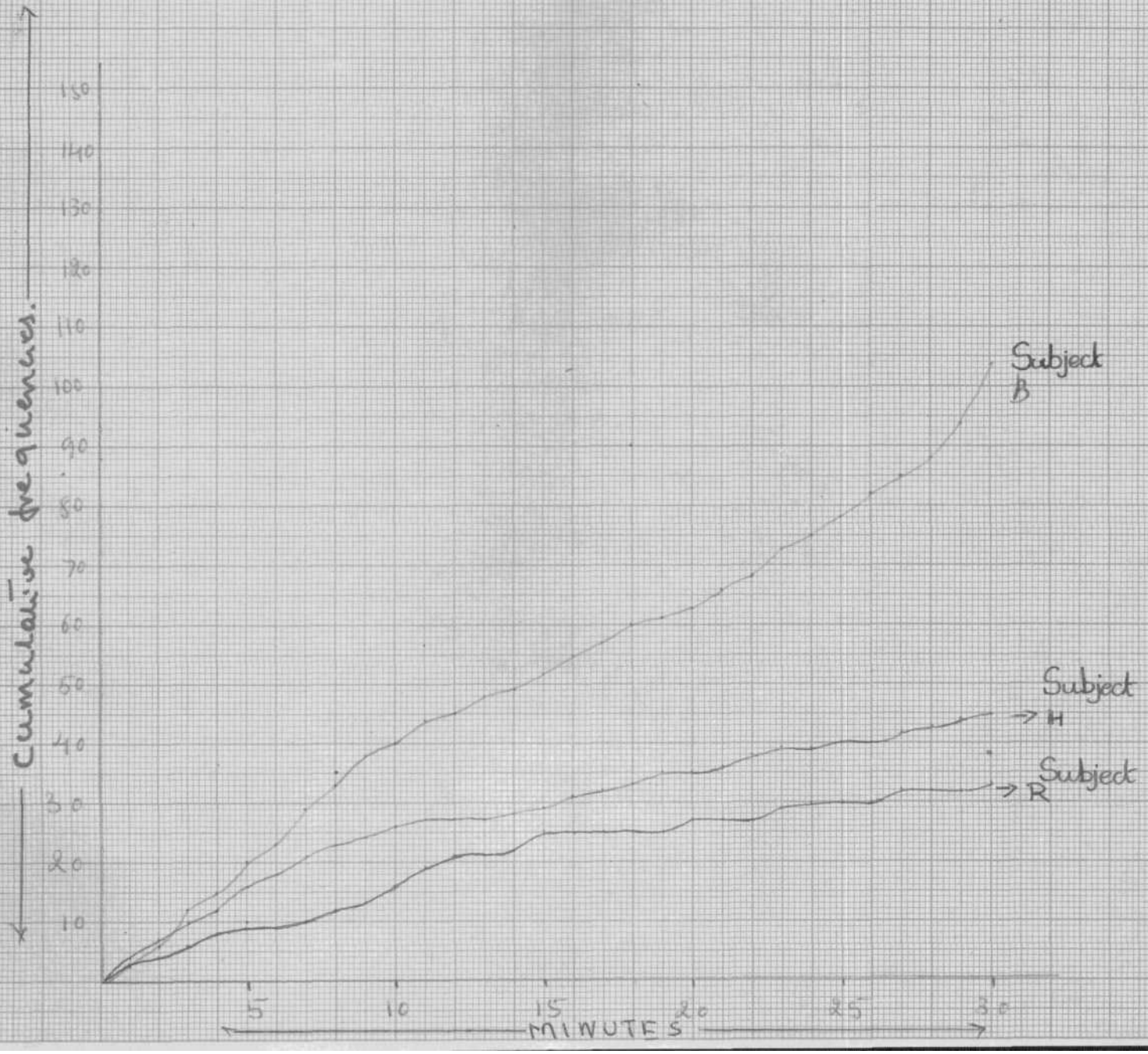

GRAPH I (B)
Subject G
CONTINUES UP TO 53Y
Subject M
Subject P
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
5
10
15
20
25
30

the six subjects. (R, B, M, P, G and H). The responses punished contingently in subjects. P, G, H, R, B were repetitions. In subject H, the response punished was hesitation. The graphs indicate that all the subjects followed a similar pattern.

The number of responses increased when the shock was withdrawn in five subjects B, M, P, G and H. In subject R, the differences was only . However the comparison between the post shock base rate period shows that the effect of contingent shock was still going on even-though the shock was withdrawn and the responses in post shock were significantly greater than they were in the shock segment.

In subject H the first experimental session had to be discontinued. The subject received random contingent shock in the first session according to the sequence assigned. In the 16th minute (6th minute of the shock segment), the session was terminated as the subject reported that he could not continue reading. The number of responses were reduced in these six minutes compared with the preshock base rate period. The experiment was repeated on the next day. The number of responses were less in the preshock period than that in the preshock period of the previous session. However, introduction of the shock reduced the stuttering

GRAPH II[A]


Cumulative frequencies.
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
5
10
15
20
25
30
MINUTES
Subject B
Subject H
Subject R

response further. The "discomfort" felt by all subjects and so strongly by this subject emphasized the aversive nature of the shock stimulus.

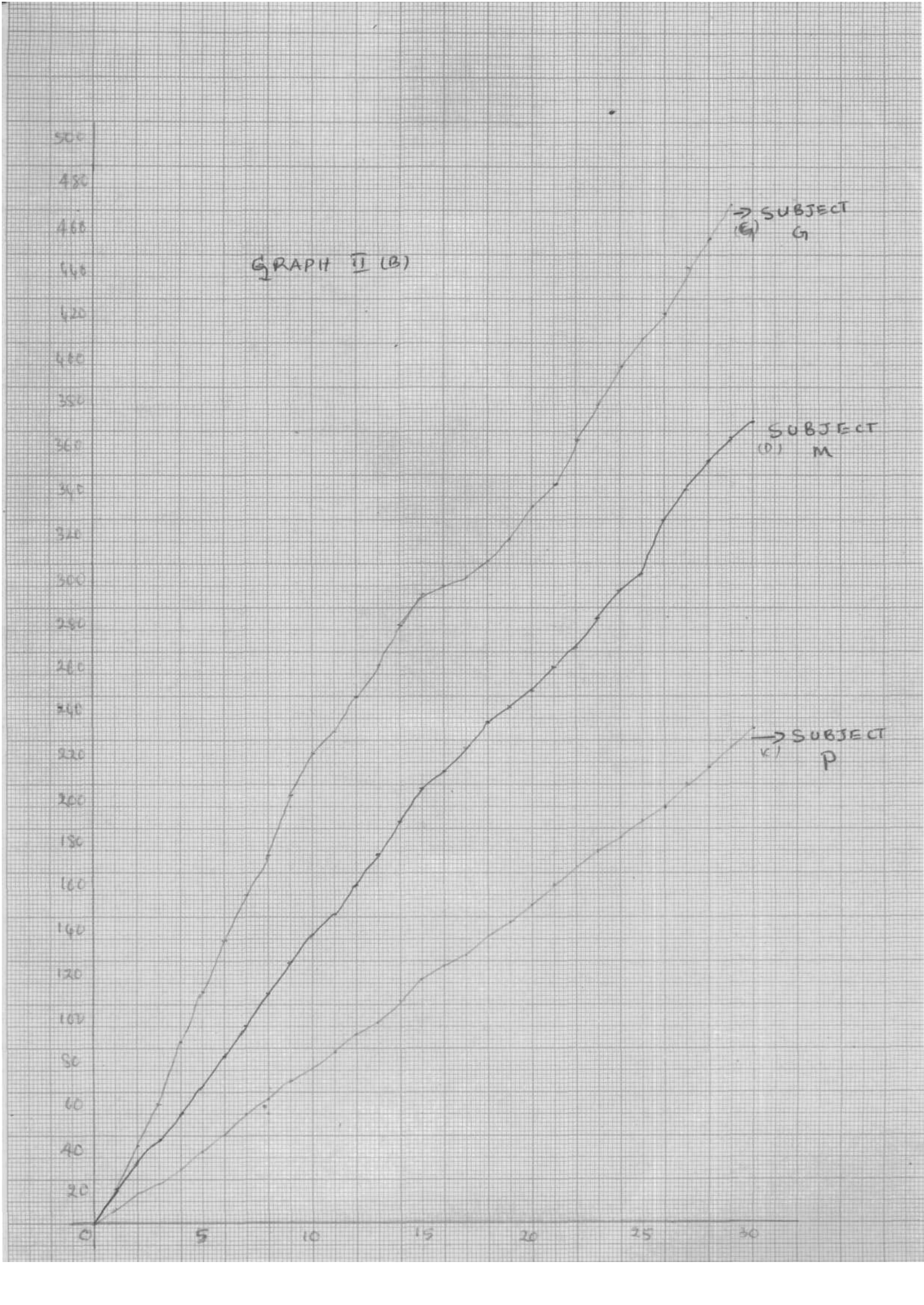
II. Random Contingent Negative Stimulation:

There was a significant reduction in the number of responses from segment A to B (at 0.025 level of significance). That means that, when the shock was given contingent upon the selected response on a predetermined random ratio schedule, there were significantly fewer stuttering responses than there were in the pre shock base rate period for the whole group.

There was a significant increase in the number of responses in the time segment A' than in the time segment B. (at 0.01 level of significance). This indicates that the response rate which was reduced in the shock segment of the session increased significantly in the post shock base rate session, after the withdrawl of shock.

There was a significant reduction in the number of responses in A' when compared to A. (at .05 level of significance). The number of responses in the post shock segment was less than that in the preshock segment, indicating that the suppressing effect of shock was still there,

GRAPH II (B)


500
480
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
5
10
15
20
25
30
→ SUBJECT (G) G
SUBJECT (D) M
→ SUBJECT (K) P

though the responses were significantly reduced when compared with the shock segment.

The findings under this schedule were similar to what happened under the continuous contingent condition.

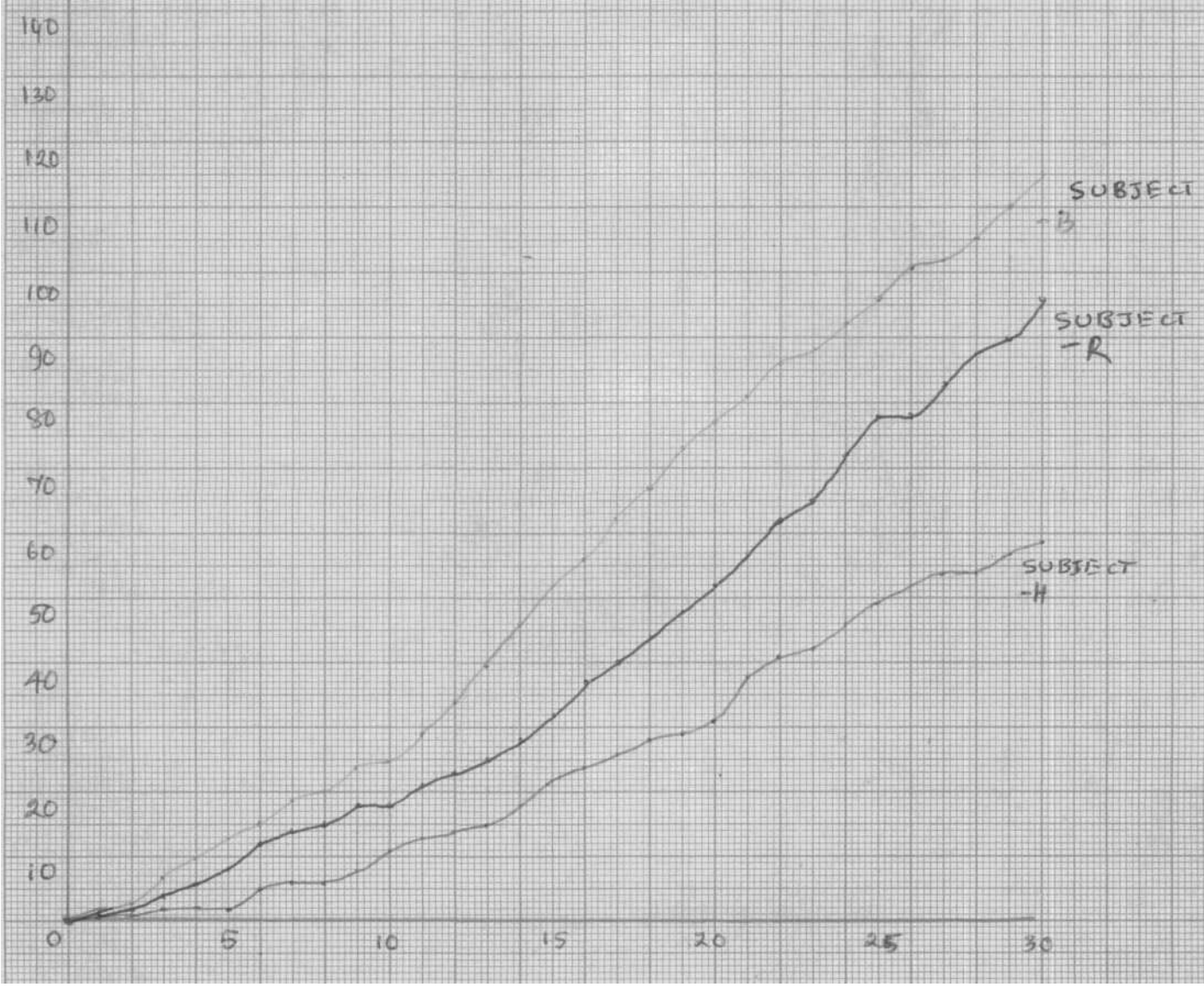
Cumulative frequency graphs of the responses of the six subjects are given in Graph II.

Out of six subjects five subjects, (B, G, R, M and H) show a decrease in the response from the preshock segment to the shock segment. In subject P there was a slight increase in the rate of responding. The tendency to increase continued in the last segment when the shock was withdrawn. In the same subject continuous contingent shock resulted in a reduction in the response in the shock segment. In all the five subjects who showed reduction, the responses increased after the removal of shock. In one subject M, it came exactly to the level of the pre shock segment. However, comparisons between time segments, A, the preshock segment and A', the post shock segment reveals that the effect of shock was still continuing, though the shoch was not delivered.

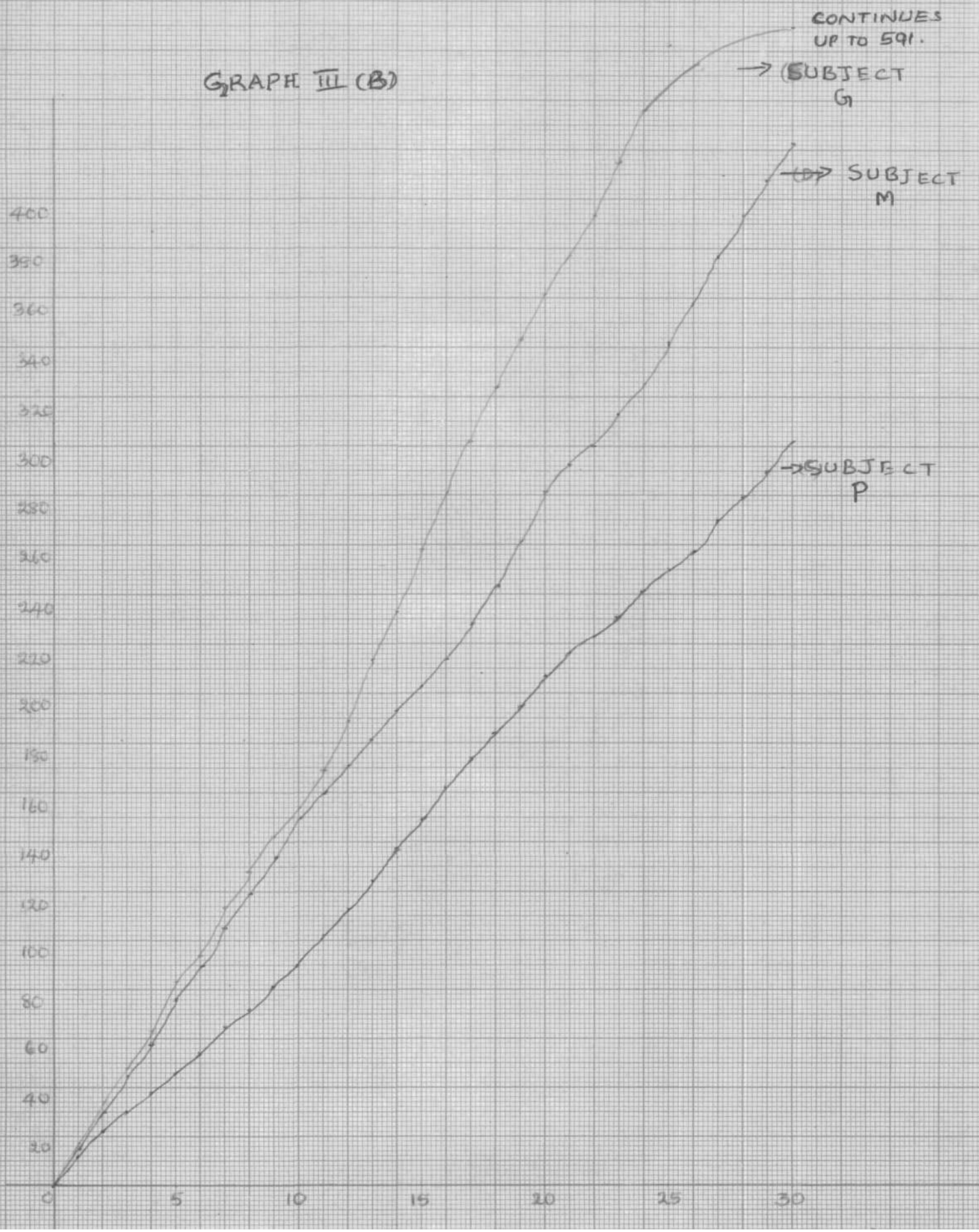
III. Random Negative Stimulation:

There was no significant difference in the frequency

GRAPH III (A)


140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
5
10
15
20
25
30
SUBJECT -B
SUBJECT -R
SUBJECT -H

GRAPH III (B)


CONTINUES UP TO 591.
SUBJECT G
SUBJECT M
SUBJECT P
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
5
10
15
20
25
30

of occurence of the selected responses between time segments A and B. In otherwords, the random (at 0.025 level) delivery of shock, did not increase the selected responses significantly, for the whole group. However, there was a tendency towards increase in six subjects and towards decrease in two subjects.

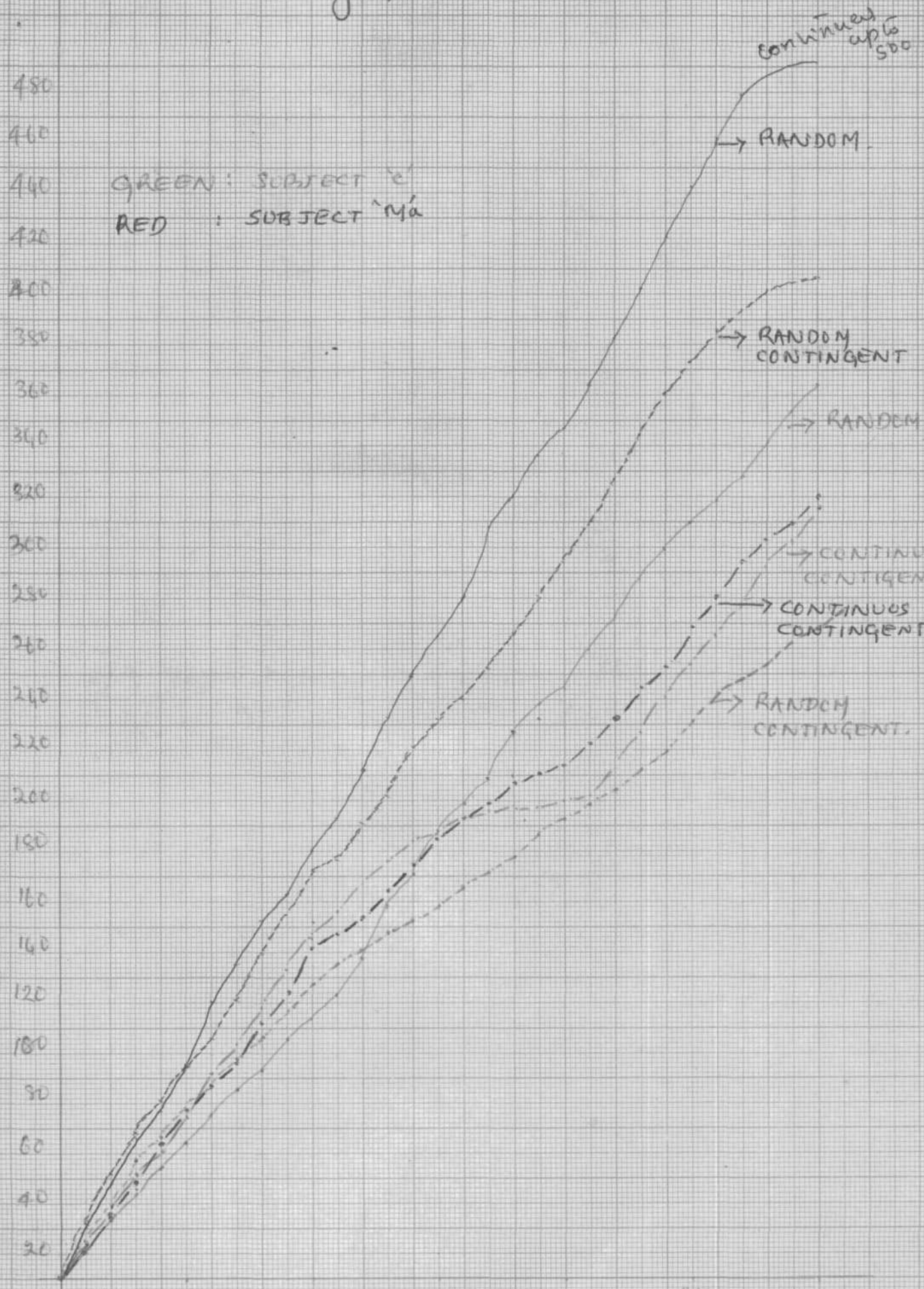
There was significant difference in the frequency of occurence of the responses between time segments B and A'. ie., between shock segment and the post shock segment.

However, the frequency of occurence of the responses was greater in the time segment A' than in the time segment A. This indicates that the random delivery of shock resulted in an increase in the selected responses. But the increase was not significant between the preshock and shock segments and shock and post shock segments but it was significant between the preshock and post shock segment.

Cumulative frequency graphs for the six subjects are given in Graph III.

Five (B, G, P, R and H) subjects showed a tendency towards an increase of the stuttering responses, In subject M, the response decreased render random negative stimulation. The frequency of occurence of the response in

Graph-IV


continued upto 500
RANDOM
GREEN : SUBJECT 'E'
RED : SUBJECT 'MA'
RANDOM CONTINGENT
RANDOM
CONTINUOUS CONTINGENT
CONTINUOUS CONTINGENT.
RANDOM CONTINGENT.
480
440
400
360
320
280
240
200
160
120
80
40
0
5
10
15
20
25
30

the post shock segment varied in two ways. In subjects B and P, the responses, after an increase in the shock segment decreased, when the shock was removed. In subjects G, R and H, the responses tended to increase, even after the removal of shock. The subject M who showed a decrease in the number of responses in the shock segment also showed an increase in the number of responses after the withdrawl of shock.

The results of the remaining two subjects (Ma and C), in general are similar to the findings of the other six subjects, under continuous contingent schedule and random contingent schedule. Cumulative Graphs for the responses of these two subjects under the three schedules of negative stimulation are given in Graph IV.

Similar results were obtained in these two subjects render the random negative stimulation. In subject C; the response tended to increase even after the removal of shock and in subject Ma it tended towards a decrease after the withdrawl of shock.

Reading Rate:

The reading rate increased in the shock segment, when compared with the base rate segment, for the whole group under continuous contingent and random contingent

negative stimulation, the reading rate decreased during the shock segment, for the whole group.

Reading rates for each subject are given in the appendices. In two subjects C and P the reading rate reduced in all the three schedules, in the shock segment.

Other Observations:

It was observed that in some subjects the rate of responding for the other responses were also varied. In subject C, is was observed that number and duration of hesitations increased. The interjection of the sound (a) between two words increased. In subject, H, tongue thrust and lip smacking were reduced. In Subject R, hesitations reduced. One subject P showed an increase in the number and duration of hesitations. These were observed render continuous contingent and random contingent negative stimulation.

It must, however, be stated that these variations in the frequency of occurence of the responses were observed but not recorded.

Residual Effects:

Analysis of variance showed that there was no significant residual effect at 5% level. The table given

below shows the responses under the three schedules used for the analysis of variance.

Experimental Sessions	SEQUENCES I	II	III	IV	V	VI
1	C 71	RC 112	R 131	C 37	RC 9	R 35
2	RC 75	R 207	C 40	R 52	C 8	RC 11
3	R 117	C 92	RC 110	RC 23	R20	C 4

C = Continuous contingent schedule
RC = Random contingent schedule
R = Random schedule

The numbers under each session is the total number of selected responses occured during the shock segment.

The two schedules of negative stimulation continuous contingent and random contingent were compared. The comparison revealed that there is no significant difference in the number of responses between the shock segments of both the schedules. This indicates that there was no significant difference in reduction of number of responses under continuous contingent and randomly contingent schedules. Similar results were obtained when the post shock base rate segments of both the segments were compared.

With the present results -

i) The Null hypothesis that contingent negative stimulation - continuous contingent and random contingent of the selected responses in a moment of stuttering will not alter their frequency significantly was rejected. The alternate hypothesis that contingent negative stimulation - continuous contingent and random contingent decreases the frequency of occurences of the selected responses was accepted.

ii) The Null hypothesis that random negative stimulation of the selected responses in a moment of stuttering will not alter their frequency significantly was accepted.

iii) The Null hypothesis that the continuous contingent negative stimulation and random contingent negative stimulation of the selected responses in a moment of stuttering will not exert differential effects on their frequency of occurence was accepted.

DISCUSSION

The findings of the present study are in agreement with most of the previous studies (Martin and Siegel 1966b; Goldiamond 1962; Quist and Martin 1967; Harolson et al 1969). They demonstrate that stuttering can be modified aa any other operant behaviour. Both the continuous contingent negative stimulation and random negative stimulation

resulted in a decrease of the punished responses in general. However, the decreased response rate tended to increase when the aversive contingency was removed which was again in agreement with the previous studies (Martin and Siegel 1966a; 1966b; Goldiamond et al 1958; Goldiamond 1960; 1962 N.S.Viswanath 1972).

However, there was no significant differences in the reduction of responses under the continuous contingent punishment and the random contingent punishment. Both were equally effective in suppressing the response. Probably, the limited number of sessions (one session/ for each schedule) was not sufficient to reveal the differences, if there were any.

But the finding that stuttering can be manipulated as any other instrumental does not imply that it is learnt as an instrumentally learnt behaviour, "....certain of the overt nonfluent or struggle behaviours emitted during stuttering are susceptible to experimental manipulation in much the same way as other operant behaviours. This does not necessarily mean, ofcourse, that stuttering behaviours are originally instated by means of instrumental operant conditioning. It is possible and indeed probable that the early acquisition and development of stuttering behaviour involve both classical and instrumental conditioning (Martin 1966).

We can only say that stuttering can be manipulated as any other operant behaviours can be manipulated.

In some studies stimuli like "tree", "right" (Cooper et al 1970) and a door buzzer (Martin and Siegel contingent upon the response resulted in a reduction in the frequency of occurence of the responses. The study of Cooper etc. (1970) involved both stutterers and nonflueny normal speakers, and Martin and Siegel (1966) normal non-fluent speakers. It is difficult to explain these findings in terms of the effects of punishment. Siegel (1970), in an attempt to account for the results hypothesized that "any event that highlights or brings these responses into speakers attention will cause reduction" He also suggested that the reduction in the stuttering responses following contingent shock might have been due to "highlighting" but not to the punishing effects of shock. The reduction in the responses in this study can be attributed to the punishing effects of shock but not merely to highlighting, for the following reasons

1. The shock was delivered at a level which was described as "painful" by the subjects.

2, The withdrawl of hand movement was observed at this painful level. Hence the shock level delivered was in accordance with the definition of aversive stimuli (Brutten & Shoemaker 1967).

1) The reduction was found when the shock was contingent upon the response. This fits into the definition of punishment given by Brutten and Shoemaker (1967).

The reduction in the frequency of occurence of the responses in this study, therefore, is aatisfactorily attributed to punishment. Whether punishment itself does the function of "highlighting" is not yet clear.

The random negative stimulation did not increase the responses significantly. But there was a tendency for increase in the number of responses. This supports the findings Martin & Siegel (1965b) that random negative stimulation tends io increase the frequency of occurence of the response but not Bearss (1957). Bearss found that random - shock resulted in a reduction of stuttering. The results of the present study, also indirectly reinforces the idea that the contingency of negative stimulation is an important factor in the reduction of stuttering behaviour.

found

Brookshire (1968)/that the order of presentation of the two schedules, Random noise and Contingent noise influenced the results obtained. He found that random noise increased the nonfluencies. The present study tends to support this finding. But Brookshire also found that the contingent noise did not resulted in a reduction of

nonfluencies, when preceded by the random noise schedule, but reduced the nonfluencies when it was first in the order of presentation. The findings of the present study do not support this finding. Continuous contingent negative stimulation resulted in a reduction of stuttering behaviour . (selected responses) irrespective of the order or presentation. Similar results were obtained under random contingent schedule except in one subject, where there was a tendency towards increase. However, in this subject, this schedule was preceded by continuous contingent schedule but not by random schedule.

Random negative stimulation decreased the selected response in one subject. This nay be due to a possible accidental and unrecognized contingency of shock on stuttering. Shook in that condition wag delivered at a predetermined random intervals without reference to the subjects speech. It is also possible that this accidental contingency may have been on a stuttering response other than the one selected and the effect of this might have been generalized to the response of concern. It has been found that the contingent punishment of one response may also decrease the frequency of occurence of other responses (N.S.Viswanath

There were no significant residual effects of the

three schedules upon each other. The results, under each schedule was not affected by the effect of the preceded schedule/schedules.

The different subjects in this study did not behave in a similar manner in certain aspects. The responses of two subjects under random negative stimulation tended to increase even after the withdrawl of shock and in the other cases it tended to decrease. Even under contingent condition, in two subjects it was observed that the other responses which were not punished decreased and in two subjects it tended to increase.

These individual differences in the effects of negative stimulation, contingent and random, may be explained by the possibility of accidental contingency when contingency was not intended. However, such an explanation cannot function in the other condition. The other possible explanation to account for all these differential reactions to punishment may be that the stutterers were different from each other. It may be that all stutterers cannot be lumped together on the basis of some aspects of stuttering alone, This possible differences among stutterers may also explain the varied findings of the studies using punishment

CHAPTER V

SUMMARY AND CONCLUSION

The punishment data related to stuttering is controversial. The earlier studies (Van Riper 1937b; Frick 1951) indicated that punishment increases stuttering. On the otherhand recent studies (Goldiamond 1963, 1965; Martin and Siegel 196 ; N.S.Viswanath 1972) show that stuttering responses decrease.

Siegel (1970) has pointed out that one of the reasons for the discrepancy ia that the earlier studies did not employ contingent negative stimulation. In general, the studies employing contingent negative stimulation indicate that stuttering decreases.

The different types of schedules produce different; types of performances (Ferster and Skinner1957). It has been found that the variable ratio schedule is more effective in altering the behaviour than any other schedule.

The present study attempted to investigate the effects of three schedules of negative stimulation on 8 stutterers. The three schedules were continuous contingent. Random contingent and Random negative stimulation. The random schedules were predetermined. The responses stimulated were repetitions in seven subjects and hesitation in one subject. Balanced Latin Square design was used to cancel out the order effects and to help in the calculation of residual effects of the three schedules on each other. Six subjects were used in the Balanced Latin Square Design. Residual effects were obtained by the analysis of variance for the group.

Non-parametric statistics were used to find out the direct effects and to compare them. Wilcoxon matched pair signed rank test and McNemar test for the significance of changes were used to analyse the data.

The results of the study were :

1. There was no significant residual effect.
2. Both the continuous contingent and random contingent negative stimulation decreased stuttering.
3. Random negative stimulation did alter the stuttering responses significantly.

4. There were no significant differences between the effects of continuous contingent and random contingent negative stimulation.

The following conclusions were drawn :

1. Contingent negative stimulation - Continuous contingent and random contingent - of the selected responses in a moment of stuttering decreases the responses significantly.

2. Random negative stimulation will not alter the frequency of occurence of the response significantly.

3* The continuous contingent and random contingent negative stimulation will not exert any significant differential effect on the frequency of occurence of the selected responses.

LIMITATIONS:

The following limitation was recognized after the study, in addition to those mentioned in the introduction.

1. Some of the subjects had been under other therapies before the experiment and hence that might have affected the test results.

RECOMMENDATIONS FOR FURTHER RESEARCH :

1. The effects of different levels of shock contingent upon stuttering responses may help to test the "highlighting".

2. Bilingualism and Stuttering.

3. Discriminative Stimulus control of stuttering behaviour.

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APPENDIX - X

Table for Random Contingent Schedule

1	3	2	4	1	4	2	1	4	2	3	2
4	3	1	1	5	4	6	3	1	2	3	1
1	5	3	4	2	1	1	1	4	4	1	2
7	4	2	1	6	1	2	2	5	2	8	2
3	8	2	1	3	4	1	4	5	2	3	1
1	2	4	4	1	2	3	5	2	2	5	2
5	6	7	2	1	2	1	1	5	6	2	2
5	1	2	6	6	2	1	2	5	3	6	4
5	1	1	3	2	3	6	1	4	2	3	2

The number indicate the responses to be punished.

APPENDIX - Y

Table for Random Schedule- in seconds.

I	9	17	21	27	28	35	42	50	57	60		
II	6	8	16	26	29	35	36	39	48	55	60	
III	1	10	16	20	29	33	40	47	53	54	55	59
IV	1	5	14	18	26	35	37	38	41	50	58	
V	7	14	17	29	32	33	43	45	52	54	57	
VI	8	12	15	17	23	38	39	44	47	48	56	
VII	4	12	17	19	20	30	34	38	46	47	57	
VIII	1	10	17	23	30	33	41	42	45	47	55	59
IX	9	11	20	34	33	40	49	58				
	2	3	6	10	13	23	26	41	43	52	57	

APPENDIX - A

Subjects : R

Sex : Male

Age : 25 years

Age of onset : 9 years

Previous History : He irritated his cousins stuttering

Therapy taken : 1. Shadowing

Description of Stuttering Behaviour :

Stuttering is very mild in reading. It is more in speaking. Stuttering is characterized by repetitions and hesitations. Eye closure and movement of the head towards right side abserved associated c repetition.

Response chosen : Repetition

Shock level :

Detectable level : 5 volts

Painful level :20 volts

Sequences of Schedules :

1. Random
2. Random contingent
3. Continuous contingent

APPENDIX - A

Table 1 (RAW SCORES FOR THE SELECTED RESPONSE : REPETITIONS)

Minute	Base Rate Session 1			Base Rate Session 2			E_1R			E_2RC			E_3C		
	A	B	A′	A	B	A′	A	B	A′	A	B	A′	A	B	A′
1	6	2	1	2	2	2	1	3	5	3	3	0	2	2	0
2	2	5	3	2	2	1	1	2	5	1	2	0	2	0	1
3	4	3	5	1	1	3	2	4	3	2	0	2	1	1	0
4	3	2	3	1	1	0	2	3	7	2	1	1	2	0	1
5	2	4	2	2	2	1	2	4	6	1	3	0	1	0	0
6	1	1	3	3	2	2	4	5	0	0	0	0	1	1	1
7	2	2	0	0	1	2	2	3	5	1	0	2	1	0	0
8	0	2	3	4	2	2	1	4	5	2	0	0	3	0	0
9	0	2	2	2	2	0	3	4	2	1	0	0	0	0	1
10	2	0	3	1	2	2	0	4	6	3	2	1	2	0	2

E_1R = Experimental Session 1 : Random Negative Stimulation

E_2RC = Experimental Session 2 : Random Contingent Negative Stimulation

E_3C = Experimental Session 3 : Continuous Contingent Negative Stimulation

APPENDIX - A

Table II : Reading Rates

Sl. No	Session	I	II	III	IV	V	VI
1.	Base rate	88	91	95	88	90	92
2.	Experiment(R1)	97	95	76	88	82	85
3.	Experiment(RC2)	95	94	99	100	98	103
4.	Experiment(C3)	95	98	102	100	110	108

C = continuous Contingent Negative Stimulation
RC = Random Contingent Negative Stimulation
R = Random Negative Stimulation

I = First Five minute
II = Second Five minute
III = Third Five minute
IV = Fourth Five minute
V = Fifth Five minute
VI = Sxith Five minute

APPENDIX – B

Subject	:	B
Sex	:	Male
Age	:	18 years
Age of onset	:	6 years
previous History	:	Nil significant
Therapies given	:	Shadowing

Description of Stuttering behaviour :

Stuttering behaviour mainly characterized by Repitition of sounds and syllables. Hesitations were also observed.

Repetitions were accompanied, sometimes, by nodding of heads downward movement of the upper eye lid. There were silent repetitions of sounds (IC) (O) (S) sometimes. Repetition of non-nasal consonants may be accompanied by a nasal component, and addition of sound (d) between words were also present.

Response chosen : Repetition

Shock level:

Detectable level ; 5 volts
Painful level : 45 volts

Sequences of Schedules :

1. Continuous Contingent Negative Stimulation
2. Random Negative Stimulation
3. Random Contingent Negative Stimulation

APPENDIX - B

Table 1 (RAW SCORES FOR THE SELECTED RESPONSE : REPETITIONS)

Minute	Base Rate Session 1			Base Rate Session 2			E_1C			E_2R			ERC		
	A	B	A′	A	B	A′	A	B	A′	A	B	A′	A	B	A′
1	8	6	7	6	4	9	9	3	2	1	4	4	3	4	3
2	7	5	7	7	6	9	3	5	3	2	5	5	3	1	2
3	4	6	6	7	5	4	9	6	3	4	6	2	6	3	5
4	4	6	6	8	4	6	6	4	3	3	6	4	3	1	2
5	4	5	6	4	7	6	3	3	6	3	6	4	5	3	3
6	5	6	8	5	7	3	4	3	5	2	4	5	3	3	4
7	6	6	4	7	9	5	3	3	4	4	6	4	6	2	3
8	6	6	5	6	7	9	4	2	4	1	5	7	4	3	2
9	4	4	6	5	7	7	7	4	3	4	6	6	4	1	7
10	7	6	3	5	5	7	6	4	5	1	4	3	3	2	5

E_1C = Experimental Session 1 : Continuous Contingent Negative Stimulation
E_2R = Experimental Session 2 : Random Negative Stimulation
E_3RC = Experimental Session 3 : Random Contingent Negative Stimulation

APPENDIX – B

TABLE II : Reading Rates

Sl. No.	Session	I	II	III	IV	V	VI
1.	Base Rate	76	78	80	75	78	82
2.	Experiment – 1	75	79	84	89	85	86
3.	Experiment – 2 (R)	67	68	60	58	62	65
4.	Experiment – 3 (RC)	70	74	68	72	74	75

C = Continuous Contingent Negative Stimulation

R = Random Negative Stimulation

RC = Random Contingent Negative Stimulation

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	:	P
Sex	:	Male
Age	:	25 years
Age of onset	:	6 years
Previous History	:	Nil
Therapies taken	:	Prolongation

Description of Stuttering Behaviour :

Characterized by Repetitions of Sounds and s syllables in initial position; sometimes even in the medial position prolongation is also present.

Tension in the neck region is observed. The lower jaw move downward during hesitation. Addition of sounds(n) and (s) between words or in the initiation of a word are also present.

Response Chose : Repetitions of sounds and syllables in the initial position.

Shock levels :

Detectable level : 5 volts
Painful level : 15 volts

Sequence of Schedules :

1. Continuous contingent
2. Random Contingent
3. Random

APPENDIX - C

Table 1 (RAW SCORES FOR THE SELECTED RESPONSE : REPETITIONS)

Minute	Base Rate Session 1			Base Rate Session 2			E_1C			E_2RC			E_3R		
	A	B	A′	A	B	A′	A	B	A′	A	B	A′	A	B	A′
1	10	8	12	9	7	12	10	6	5	7	8	9	12	12	9
2	11	10	9	11	9	11	11	9	9	7	7	8	10	11	7
3	12	13	10	12	10	10	12	8	12	4	6	7	8	11	8
4	12	10	9	11	9	11	10	8	9	7	10	6	8	13	10
5	9	9	10	11	8	14	10	3	10	8	10	6	8	12	9
6	9	10	11	11	12	14	8	8	9	7	6	6	8	13	7
7	13	12	14	10	16	12	8	9	6	10	5	11	11	12	13
8	12	12	11	8	12	9	11	6	7	7	8	7	7	10	10
9	13	12	13	12	12	9	11	8	4	9	7	9	9	11	10
10	14	12	15	10	19	10	12	6	7	5	8	9	9	12	11

E_1C = Experimental Session 1 : Continuous Contingent Negative Stimulation

E_2RC = Experimental Session 2 : Random Contingent Negative Stimulation

E_3R = Experimental Session 3 : Random Negative Stimulation

APPENDIX – C

TABLE II : Reading Rates

Sl. No.	Session	I	II	III	IV	V	VI
1.	Base Rate	33	37	40	39	42	41
2.	Experiment – 1 (C)	35	32	19	18	22	25
3.	Experiment – 2 (RC)	32	38	22	20	20	25
4.	Experiment – 3 (R)	28	29	21	27	23	25

C = Continuous Contingent Stimulation

RC = Random Contingent Negative Stimulation

R = Random Negative Stimulation

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 – G.

Sex : Male

Age : 12 years.

Previous ()
History () Had attack of fits at the age of 12 years and since then stutters; has dental problems, emotionally labile.

Thearpies taken :

1. Prolongation
2. Took Partt in an experiment on the effects of three verbal stimuli, ‘wrong’, ‘ right’, and ‘zehu’ on stuttering.

Stuttering behavior :

Stuttering characterized by repetitions of sounds and syllables; hesitations and prolongations of sounds are also present. Articulation is not clear.

Response Chosen : Repetitions.

Shock levels :

Detectable level – 5 Volts
Painful level – 20 Volts.

Sequences of Schedules :

1. Random Contingent
2. Random
3. Continuous Contingent

APPENDIX - D

Table 1 (RAW SCORES FOR THE SELECTED RESPONSE : REPETITIONS)

Minute	Base Rate Session 1			Base Rate Session 2			E_1R			E_2C			E_3RC		
	A	B	A′	A	B	A′	A	B	A′	A	B	A′	A	B	A′
1	16	14	15	15	18	15	15	10	12	12	4	8	14	9	11
2	13	16	14	16	15	13	15	11	7	15	6	15	14	13	9
3	12	16	13	13	12	19	15	10	13	12	7	8	10	14	13
4	13	14	15	14	12	19	13	12	12	14	15	6	12	15	13
5	18	15	13	15	14	20	18	10	17	10	3	11	13	15	17
6	13	15	14	19	14	18	14	11	16	12	4	6	13	8	15
7	14	16	18	15	15	14	15	14	19	13	2	12	14	10	13
8	16	12	17	15	18	16	14	15	16	11	3	15	15	12	13
9	16	19	15	14	18	17	15	18	15	10	4	12	12	7	11
10	16	18	15	14	15	15	16	20	15	15	2	14	15	7	17

E_1R = Experimental Session 1 : Random Negative Stimulation

E_2C = Experimental Session 2 : Continuous Contingent Negative Stimulation

E_3RC = Experimental Session 3 : Random Contingent Negative Stimulation

APPENDIX – D

TABLE II : Reading Rates

Sl. No.	Session	I	II	III	IV	V	VI
1.	Base Rate	70	72	75	78	82	69
2.	Experiment – 1 (R)	65	68	80	85	90	88
3.	Experiment – 2 (C)	80	82	100	105	113	89
4.	Experiment – 3 (RC)	83	87	106	110	92	102

R = Random Negative Stimulation

C = Continuous Contingent Negative Stimulation

RC = Random Contingent Negative Stimulation

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 – E

Subject – G.

Sex : Male

Age : 35 years.
Age of onset : 12 years.

Previous ()
History () Had attack of fits at the age of 12 years and since then stutters; has dental problems, emotionally labile.

Thearpies taken :

1. Prolongation
2. Took Partt in an experiment on the effects of three verbal stimuli, 'wrong', 'right', and 'zehu' on stuttering.

Stuttering behavior :

Stuttering characterized by repetitions of sounds and syllables; hesitations and prolongations of sounds are also present. Articulation is not clear.

Response Chosen : Repetitions.

Shock levels :

Detectable level – 5 Volts
Painful level – 20 Volts.

Sequences of Schedules :

1. Random Contingent
2. Random
3. Continuous Contingent

APPENDIX - E

Table 1 (RAW SCORES FOR THE SELECTED RESPONSE : REPETITIONS)

Minute	Base Rate Session 1			Base Rate Session 2			E_1RC			E_2R			E_3C		
	A	B	A′	A	B	A′	A	B	A′	A	B	A′	A	B	A′
1	18	21	22	20	24	25	16	10	12	17	15	16	17	11	16
2	22	20	20	20	23	20	20	16	18	17	20	16	25	8	17
3	22	2	123	26	20	23	19	14	16	14	25	22	24	13	21
4	20	22	20	17	2	420	28	18	17	15	19	21	21	9	20
5	24	19	18	15	34	22	23	12	13	20	25	26	22	10	16
6	18	16	20	20	19	16	23	6	11	11	23	26	25	8	18
7	23	23	24	21	23	24	21	4	21	19	21	29	25	12	22
8	21	17	21	23	22	21	18	7	13	15	22	22	23	11	26
9	21	17	22	21	25	20	27	10	16	14	19	27	25	10	18
10	19	27	21	21	17	20	19	15	18	12	18	25	22	14	28

E_1RC = Experimental Session 1 : Random Contingent Negative Stimulation

E_2R = Experimental Session 2 : Random Negative Stimulation

E_3C = Experimental Session 3 : Continuous Contingent Negative Stimulation

APPENDIX – E

TABLE II : Reading Rates

Sl. No.	Session	I	II	III	IV	V	VI
1.	Base Rate	120	130	132	125	128	130
2.	Experiment – 1 (RC)	131	125	145	142	140	138
3.	Experiment – 2 (R)	135	139	125	128	132	140
4.	Experiment – 3 (C)	140	132	150	145	155	138

RC = Random Contingent Negative Stimulation

R = Continuous Negative Stimulation

C = Continuous Contingent Negative Stimulation

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 – F

Subject	:	H
Sex	:	Male
Age	:	21 years
Age of onset	:	6 years
Previous History	:	NIL
Therapies taken	:	NIL

Description of stuttering Behaviour :

Repetitions of sounds and syllables, prolongation and hesitations are present, Repetitions are most frequent. Tongue thrust, either in association with the Repetition of a sound or singly is present. Addition of (j0 sounds is most frequent in the initiation of words. Downward movement of the eye brow, along with the upper movement of the lip is present either occurs independently or with the repetition of any sound. Two syllable repetitions are also observed.

Response Chosen : Repetitions of sounds and Syllables.

Shock levels :

Detectable level – 10 Volts
Painful level – 20 Volts.

Sequences of Schedules :

1. Random Contingent
2. Continuous Contingent
3. Random

APPENDIX - F

Table 1 (RAW SCORES FOR THE SELECTED RESPONSE : REPETITIONS)

Minute	Base Rate Session 1			E_1RC			E_2RC			E_3C			E_4R		
	A	B	A′	A	B	A′	A	B	A′	A	B	A′	A	B	A′
1	13	9	9	15	4	-	4	1	1	4	1	1	1	2	7
2	10	9	10	18	7	-	3	0	2	2	0	2	0	1	4
3	11	12	11	15	6	-	3	0	1	4	1	1	1	1	0
4	11	14	15	18	7	-	2	1	0	2	0	1	0	3	4
5	11	13	14	18	5	-	4	1	1	3	0	2	0	4	3
6	12	10	12	19	5	-	2	2	0	4	3	3	3	2	2
7	12	10	13	13	-	-	3	1	2	2	0	2	1	2	3
8	10	10	10	14	-	-	2	1	1	2	1	0	0	1	0
9	13	10	11	18	-	-	1	2	1	1	2	0	2	2	2
10	13	12	11	18	-	-	2	0	1	2	0	3	3	2	4

E_1RC = Experimental Session 1 : Random Contingent Negative Stimulation Discontinued.

E_2RC = Experimental Session 2 : Random Contingent Negative Stimulation

E_3C = Experimental Session 3 : Continuous Contingent Negative Stimulation

E_4R = Experimental Session 4 : Random Negative Stimulation

APPENDIX – F

TABLE II : Reading Rates

Sl. No.	Session	I	II	III	IV	V	VI
1.	Base Rate	62	65	58	64	70	72
2.	Experiment – 1 (RC_D)	70	72	103	-	-	-
3.	Experiment – 2 (RC)	95	98	120	118	110	123
4.	Experiment – 3 (C)	98	90	113	115	120	106
5.	Experiment – 3 (R)	100	94	75	80	82	87

RC_D = Random Contingent Negative Stimulation Discontinued

RC = Random Contingent Negative Stimulation

C = Continuous Contingent Negative Stimulation

R = Random Negative Stimulation

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 – G

Subject	:	C
Sex	:	Male
Age	:	12 years
Age of onset	:	4 years
Previous History	:	He had a fall at the age of 4 years and stuttering started since then

Description of Stuttering Behaviour :

Stuttering behaviour consists of Repetitions of sounds and syllables, prolongation of sounds and hesitations. Addition of sound d) either nasalized or nasalized between two words is present.

Response Chosen : Repetitions of sounds and Syllables.

Shock levels :

Detectable level – 10 Volts
Painful level – 20 Volts.

Sequences of Schedules :

1. Random
2. Random Contingent
3. Continuous Contingent

APPENDIX - G

Table 1 (RAW SCORES FOR THE SELECTED RESPONSE : REPETITIONS)

Minute	Base Rate Session 1			Base Rate Session 2			E_1R			E_2RC			E_3C		
	A	B	A′	A	B	A′	A	B	A′	A	B	A′	A	B	A′
1	18	14	14	15	18	13	20	13	11	22	5	15	11	6	9
2	15	13	14	16	15	13	18	19	17	20	14	18	15	7	9
3	14	13	12	14	16	15	18	21	18	17	11	17	13	10	13
4	18	15	16	14	14	13	11	16	20	12	19	17	15	11	8
5	13	17	13	16	16	13	17	16	21	14	11	12	13	10	16
6	15	15	12	18	13	16	25	15	20	11	8	13	10	8	12
7	14	12	11	16	13	18	15	10	19	15	12	9	9	6	14
8	15	16	14	15	13	14	17	18	17	19	14	13	16	8	8
9	17	10	18	12	14	18	11	12	16	15	15	8	12	5	7
10	15	11	14	13	14	15	17	16	15	17	13	17	17	2	10

E_1R = Experimental Session 1 : Random Negative Stimulation

E_2RC = Experimental Session 2 : Random Contingent Negative Stimulation

E_3C = Experimental Session 3 : Continuous Contingent Negative Stimulation

APPENDIX – G

TABLE II : Reading Rates

Sl. No.	Session	I	II	III	IV	V	VI
1.	Base Rate	55	57	58	54	60	64
2.	Experiment – 1 (R)	60	58	45	50	55	58
3.	Experiment – 2 (RC)	62	64	55	58	60	54
4.	Experiment – 3 (C)	68	65	50	52	55	54

C = Continuous Contingent Negative Stimulation

RC = Random Contingent Negative Stimulation

R = Random Negative Stimulation

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 – H

Subject	:	M
Sex	:	Male
Age	:	19 years
Age of onset	:	12 years
Previous History	:	NIL
Therapy taken	:	Shadowing

Description of Stuttering Behaviour :

Stuttering is characterized by Repetition of sounds and syllables and hesitations. Repetitions in the medial position is also observed. Intake of breath in initiation of a word is observed. The intake may precede the first syllables or follow it. Sometimes upward and down-ward movement of the eye lid are present.

Response Chosen : Repetitions

Shock levels :

Detectable level – 5 Volts

Painful level – 25 Volts.

Sequences of Schedules :

1. Random
2. Continuous Contingent
3. Random Contingent

APPENDIX - H

Table 1 (RAW SCORES FOR THE SELECTED RESPONSE : REPETITIONS)

Minute	Base Rate Session 1			Base Rate Session 2			E_1R			E_2C			E_3RC		
	A	B	A′	A	B	A′	A	B	A′	A	B	A′	A	B	A′
1	18	16	16	16	13	14	12	21	14	13	10	9	16	7	6
2	16	12	16	12	11	18	12	13	13	13	3	11	14	6	9
3	18	15	20	17	14	10	12	11	15	15	7	14	18	7	8
4	16	12	15	14	9	18	9	12	12	10	7	14	9	5	11
5	12	10	12	13	13	16	10	16	10	14	4	13	12	5	10
6	13	19	12	14	14	15	11	12	9	16	5	12	8	8	6
7	14	21	13	14	16	14	10	10	10	13	4	12	9	5	7
8	15	16	18	14	19	16	7	19	12	15	3	14	11	8	9
9	14	18	15	15	17	14	13	11	13	15	0	12	11	8	6
10	15	16	15	13	20	14	8	7	12	12	4	16	10	4	8

E_1R = Experimental Session 1 : Random Negative Stimulation

E_2C = Experimental Session 2 : Continuous Contingent Negative Stimulation

E3RC = Experimental Session 3 : Random Contingent Negative Stimulation

APPENDIX – H

TABLE II : Reading Rates

Sl. No.	Session	I	II	III	IV	V	VI
1.	Base Rate	89	92	94	98	90	93
2.	Experiment – 1 (R)	95	89	72	78	80	85
3.	Experiment – 2 (C)	96	98	110	120	115	112
4.	Experiment – 3	100	97	105	118	107	99

C = Continuous Contingent Negative Stimulation

RC = Random Contingent Negative Stimulation

R = Random Negative Stimulation

I = First Five Minute

II = Second Five Minute

III = Third Five Minute

IV = Fourth Five Minute

V = Fifth Five Minute

VI = Sixth Five Minute

Aversion Therapy Unit