

## THE EFFECT OF SHOCK ON STUTTERING

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The effect of aversive stimuli on stuttering has been an important area of investigation. This is largely due to the fact that such investigations are immediately relevant for developing more effective techniques for the modification of stuttering. Secondly, the effect of punishment on stuttering is of immense theoretical significance. Whether response contingent punishment will be able to suppress stuttering or will it result in an increase in the same behaviour is a factor of importance for a theoretical position on stuttering.

The existing literature on the effect of punishment, particularly with electric shock, on stuttering is rather conflicting. The early studies of Van Riper (1937) and Frick (1951) indicated that shock or threatened shock will result in an increase in the frequency of stuttering. Van Riper, however, did not shock his subjects in a response contingent manner and hence his results are difficult to interpret. On the other hand, Frick delivered response-contingent shocks and found stuttering to increase under such a condition. Flanagan, Goldiamond and Azrin (1958), however, found stutterers to have significantly less fluency failures when a response-contingent aversive noise of 105 dB was delivered. Contrary to this, again, a series of studies (Siegel, Martin and Henrickson, 1963, 1964; Siegel and Martin, 1965; Martin Brookshire and Siegel 1964) did not produce unequivocal results. However, in most of the shock conditions there was no decrease in stuttering or nonfluency. There was also a suggestion that the 'secondary' aspect of stuttering will decrease when punished whereas, in the same condition, the 'primary' aspects will increase (Martin, Brookshire and Siegel, 1964). However, a later study by Martin and Siegel (1966) indicated that response contingent shock will suppress stuttering behaviour, irrespective of whether a particular aspect or a total response of stuttering was punished.

In summary, the evidences on the effects of shock on stuttering are conflicting and more experimental work on the problem seems to be in urgent need. In view of this the present study was undertaken. The present study was also a part of a larger effort to find more effective methods for the modification of stuttering.

### Problem

The problem of this study was to evaluate the effects of response contingent shock on stuttering. A null hypothesis that stuttering under two conditions Shock and No Shock—will not differ significantly, was formed.

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## Method

*Subjects:* Five male stutterers who were, on an average, 19.6 years old, served as subjects. The youngest was 18 years old and the oldest was 23. All the subjects started to stutter during their early childhood days although they were not able to specify the exact age of onset. All of them were studying in different colleges in Mysore and they had registered themselves for therapy at the All India Institute of Speech and Hearing. On an average of two sessions of 25 minutes each, only one stutterer stuttered on 72 words where as the rest of them stuttered on 350 to 450 words.

*Apparatus:* An apparatus, devised at the All India Institute of Speech and Hearing on an experimental basis was used to deliver shocks to the subjects. The apparatus consisted of an electric variac, a control switch for the therapist and a metal plate with necessary connections where the subject placed his finger(s). The experimenter operated the switch with the left hand and noted down the number of blocks with his right.

*Procedure:* In the Shock condition, each subject was studied individually. He was seated across a table and was asked to keep his finger on the metal plate. He was then given a long non-emotional passage from a Kannada magazine to read in his usual manner until he was asked to stop. The subjects read for 25 minutes. In the No-Shock condition the subjects read, also for 25 minutes, a different but comparable passage. During the session the shock apparatus was removed out of sight. The experimenter noted down the number of words stuttered.

All the subjects participated in four experimental sessions—two shock and two control conditions. Two sessions were held on one day and the other two on the next day. A subject that started with the shock-condition on the first day followed by no-shock condition, started with the latter on the second day followed by the former and vice-versa. Thus all the five subjects participated in both the sequences: Shock—No Shock and No-Shock and Shock. A fifteen minutes rest period was given between the two sessions on both the days. Only one of the five subjects was willing to serve in an additional experiment that was devised to study the effects of progressively increasing the severity of shock on speech behaviour. With this one subject an independent session was held with the intensity of the shock varying within the experimental session.

No effort was made to shock a specific aspect of stuttering. All the hesitations, repetitions, and prolongations with or without 'secondary' motor behaviours were defined broadly as stuttering and were shocked in all the Shock conditions.

## Results

The results of the investigation are given in Table 1. The number of stuttered words are the averages of two sessions in each condition of Shock and No-Shock.

TABLE 1: Showing the number of stuttered words in the experimental and control conditions, the obtained  $X^2$  value and the level of significance

Subjects	No. of words <i>stuttered</i>	
	Shock	No-Shock
1	478	450
2	360	232
3	92	72
4	570	420
5	492	358
<b>Total</b>	<b>1992</b>	<b>1532</b>

$$X^2=6.00 \text{ (P=0.05)}$$

It is evident that every one of the five subjects stuttered more under the shock than under the control condition. Whether a stutterer stuttered less (72 in 25 minutes of reading) or more (450 for the same duration) did not seem to affect the trend. As a group, the subjects stuttered on 1992 words under the shock and 1532 words under the control condition. The observed difference was evaluated with a chi-square test based on the hypothesis of equal probability or null hypothesis (Garrett, 1961). The obtained chi-square value of 6.00 is significant beyond 0.05 level of confidence. Actually, it is significant very nearly at 0.01 level ( $X^2$  value of 6.635 would have been significant at 0.01 level). Since the P is less than 0.05, the null hypothesis is rejected. The two conditions differ significantly, the subjects stuttering more under the shock than under the control condition.

### Concomitant variation of shock and stuttering

The results of an independent experimental session with one subject is plotted in Figure 1, During this session, the number of blocks were counted separately

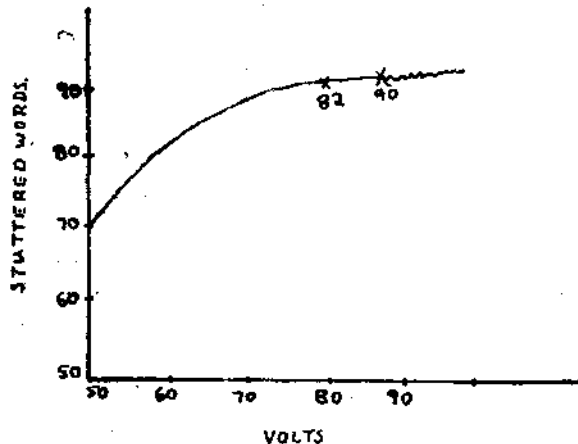


FIG. 1

for every five minutes. The subject read a long passage and received response-contingent shocks. He received a shock of 50 volts during the first five minutes, 60 volts during the second and 80 volts during the third five minutes duration and stuttered on, 70, 82 and 90 words respectively. The voltage was increased to 85 during the fourth-five minutes but the subject could not continue reading; he became extremely anxious, tense and fearful and any attempt at reading resulted in a complete disorganization. The experiment was discontinued at this stage.

### Discussion

The results of the present investigation confirmed findings of some of the earlier studies that have reported an increase in stuttering when response-contingent shocks were delivered. Out of the five subjects studied, not a single stutterer stuttered less under response contingent shock condition. Some of the observational data indicate that stutterers generally become tense during the shock condition and that they tend to be somewhat relaxed under the control condition. The subjective reports of the stutterers indicate that they became fearful in the experimental situation and two subjects felt that they stuttered hopelessly badly when they were shocked. Questioning the subjects after the experimental sessions revealed that all the subjects understood that the shock was contingent on stuttering but this understanding apparently did not help them. They said they were aware of the fact that they could avoid receiving shocks by not stuttering but they felt helpless because of the fear of shocks.

It is difficult to relate the findings of this investigation to those of the earlier ones because of the conflicting nature of the latter. However the significant increase in stuttering under shock conditions need to be explained and some speculation on its possible significance is in order. The effect of punishment on behaviour has been a complex problem and several variables seem to influence the final outcome. The experimental studies have been reviewed by Church (1963) and Solomon (1964). According to Solomon, punishment generally reduces the frequency of the punished response. However, if a response has been established by a particular noxious stimulus, then the application of that particular stimulus will not be effective in suppressing the response. Church (1963) also stated that if punishment reinstates a condition of original learning then that kind of punishment may actually facilitate the response. That stuttering increased in frequency under the shock-condition may at least partly be due to this trend. Although it is improbable that stutterers will have been shocked under the conditions of acquisition of the maladaptive response, it is not unlikely that those conditions have certain properties in common with the shock-condition. Probably, it is not the stimulus *per se* that is crucial, but the *modus operandi* of it. The subjects of the experiment reported, that shocks are not only *unpleasant* but they are also fearful and *anxiety-provoking*. To the extent that the original conditions of acquisition of stuttering involved fear and anxiety provoking elements

to that extent the present shock condition is similar to the original conditions of learning. The classical learning theory interpretation of stuttering would hold that a series of traumatic events resulting in excessive sympathetic arousal are probably at the basis of the acquisition of stuttering response. Further, even when we consider the variability of stuttering response in established stutterers, sympathetic overarousal seems to be an important factor. Most of the stutterers have more difficulty in situations that can be noxious to different degrees and they have less difficulty under conditions of relaxation and pleasant experiences. This indicates that in their day to day experiences stutterers stutter more under anxiety provoking conditions and the present finding of increased stuttering under shock condition is compatible with it. That the subjects, under the shock condition, became fearful and anxious supports such an interpretation.

The second important variable that influences the effect of punishment is whether it elicits a response similar to the behaviour under punishment. If it does, the punishment will result in an increase in the frequency of that behaviour (Church, 1963). The effect of punishment on the speech behaviour has to be understood in a broader perspective. The effect of electric shock on the general behaviour is such as to cause dis-organization. The outcome of the single experimental session wherein the amount of shock was progressively increased supports this. The concomitant increase in the severity of shocks and the frequency of stuttering was noticed up to a certain point; the subject could continue to read, albeit with a progressive increase in the frequency of stuttering until the intensity of shocks was raised to 80 volts. However, when the voltage was increased to 85, there was a total disorganization of speech behaviour. His tension and anxiety increased to an unusual degree. The subject simply could not concentrate on the reading material. When he was urged to continue reading, the efforts he made resulted in long and severe speech blocks and he felt he could not continue with it. This probably is an indication that the effect of shock is similar to the kind of disorganization that is seen in stuttering. In other words, the elicitation of fear and anxiety will disrupt the speech flow and what the shock does is to induce precisely such a fear and anxiety. If it is presumed that overarousal is at the basis of stuttering, then the shock, by inducing it, is actually eliciting a response it is purported to punish and suppress.

The obtained results of the present study supports a theory of stuttering that is based primarily on the Pavlovian conditioning principles (Brutten and Shoemaker, 1966). Stuttering is probably better understood within the context of traumatic emotional conditioning and learning. Stuttering does not seem to behave like an operant response under punishment, particularly when the shock is used as a stimulus. The increase in stuttering under conditions that create anxiety and tension strongly supports the view point that it has to be considered a dysthymic disorder (Hegde, 1970) similar to anxiety, phobia and compulsive behaviour.

From the standpoint of therapy, it is reasonable to say that more systematic research will have to be done before we can totally reject or accept shock as a therapeutic procedure. The results of the present study, however, contraindicate shock therapy for stutterers.

In view of the operation of several variables under conditions of punishment it looks rather premature to come to definite conclusions at this stage. Some of the important variables to be studied for their independent and interactive effects are the degree of pre-experimental anxiety, past training and conditions of learning, personality factors such as introversion and extraversion, severity of stuttering response, and also possibly age, sex and intelligence. Only more controlled research involving these important variables can be expected to give more conclusive evidences.

### Summary and Conclusions

The effect of response contingent shock on stuttering was studied in five male stutterers with an average age of 19.6 years who have been having their speech problem from the early childhood days. With the help of an electric variac response contingent shocks were delivered to the subjects. The subjects participated in two experimental and two control conditions on two days. They read a long Kannada passage for 25 minutes in each session and received response contingent shock in the experimental conditions and read without shocks in the control conditions. The order of the experimental and control conditions was reversed on the second day. The experimenter counted the number of stuttered words in all the four sessions.

The results indicated a significant difference between the experimental and control conditions with a  $X^2$  value of 6.00 ( $P=0.05$ ). Stutterers stuttered more in the shock-condition. The obtained results were interpreted in terms of the variables affecting the outcome of punishment. It was suggested that shock, by inducing overarousal (anxiety) facilitated stuttering response. It was also considered likely that the shock condition shared certain properties of the original traumatic situations that were probably associated with the onset of stuttering. The need for more controlled research was emphasized.

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