A COMPARISON BETWEEN
OBSERVED AND RECORDED NON-FLUENCIES
IN THE SPEECH OF STUTTERERS DURING
REPEATED READINGS OF
THE SAME PASSAGE

by
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A Thesis Submitted to the Faculty of the
DEPARTMENT OF SPEECH
In Partial Fulfillment of the Requirements
For the Degree of
MASTER OF ARTS
In the Graduate College
UNIVERSITY OF ARIZONA

1957
STATEMENT BY AUTHOR

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APPROVAL BY THESIS DIRECTOR

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6 August 1957
ACKNOWLEDGEMENTS

The writer wishes to acknowledge the timely and invaluable technical assistance given by Griffith Barton Brackett, a graduate student in the Department of Speech, University of Arizona; the apt and foresighted thesis direction of this investigation by Dr. James David Lambert, Assistant Professor of Speech, University of Arizona; and the confidence and guidance of Dr. Klonda Lynn, Head, Department of Speech, University of Arizona.
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CHAPTER ONE
INTRODUCTION

The basic problem presented by this study was the investigation of the relationship between fear-associated non-fluencies and those non-fluencies manifested without a fear reaction in the speech of stutterers.

There is in the present literature a disagreement as to what composes "normal" non-fluency. The disagreement shows up most vividly through the use of two separate classification systems with respect to the stuttering individual. One group of authorities utilizes a two-part classification method, stating that either a person is normally non-fluent, or he is a stutterer. The line of demarcation in this system is that point at which the individual manifests fear or anxiety in connection with his hesitations, repetitions, or prolongations during the act of speaking.

The other group of authorities believes that speakers are 1) normally non-fluent, 2) primary stutterers (more than normally non-fluent, but with no fear attached to the act of speaking), or 3) secondary stutterers (speakers to whose non-fluencies fear or anxiety is attached).

It would seem that, to the advocates of this
particular classification system, the distinction to be made between the primary stutterer and the normally non-fluent speaker lies in the type of non-fluency encountered. It is said that the primary stutterer manifests basically syllable repetition, while the repetitions of the normally non-fluent busy themselves with words and phrases. Still, it is admitted that the primary stutterer does not show evidence of either self-awareness or a fear reaction with respect to his non-fluencies.

It was not this investigator's operant nor ultimate aim to establish to what degree or quantity the relationship between stuttering and "normal" non-fluency may exist, but rather, to find out whether the relationship exists at all. More specifically, this study sought to find whether, in adapting to a given reading situation, a stutterer was controlling his physiological blocking, or was merely manifesting an adaptation to the passage itself, showing a decrease in un-feared non-fluencies such as the so-called normal reader would show.

Studies at the State University of Iowa and at Purdue University have demonstrated a reduction in observed non-fluencies during repeated readings of the same passage. Since, within the scope of our proposed five successive readings there is no contradictory evidence to this demonstration, it must therefore be assumed at the outset that this reduction
will be found to occur. The question before us at the present time, however, deals with the area in which this reduction is most marked. Does this reduction in observed non-fluencies represent a reduction in stuttering blocks, or does it represent a reduction in "normal" non-fluencies?

Specifically, then, this study sought the answers to the following questions:

1) Is the adaptation phenomenon exhibited in the speech of stutterers during the course of five successive readings of the same ninety-three word passage?

2) If this phenomenon is found to exist, is it manifested both in a reduction of blocks as observed by a listener, and as recorded by a two-channel polygraph?

3) Assuming that the phenomenon is found to exist in both of the preceding instances, is there a difference in the reduction of blocks between those observed by a listener and those recorded by the polygraph?

4) If there is found to be a difference of this nature, is this difference significant?

To answer these questions adequately, it was first deemed necessary by this writer to establish some sort of objective criteria by which a stuttering block could be
differentiated from an unfavored non-fluency when dealing with records obtained from the polygraph; then, to use these criteria in the tabulation of the number of blocks exhibited by a group of stutterers during repeated readings of the same passage. With this value plus the tabulation of the number of observed non-fluencies as recorded by this investigator, it was determined whether the reduction in observed non-fluencies represented a reduction in stuttering blocks or a reduction in unfavored non-fluencies.
CHAPTER TWO

REVIEW OF THE LITERATURE

This review of the literature is designed to shed light upon three separate areas: 1) fear and its relation to stuttering, 2) the measurement of the physiological manifestations of fear, and 3) non-fluency and the adaptation phenomenon, with special reference to its existence in the successive oral readings as performed by the stuttering individual.

Fear and its Relation to Stuttering

The emotion of fear is best described as a level of bodily activation, being general in nature. Fear, like anger, has a characteristically high level of physiological activation, and, possessing this, can be quantitatively measured in a number of different ways (22). Woodworth and Schlosberg (22) state that

An outstanding characteristic of strong emotional states.....is the high level of activity and reactivity. When a person is in an emotional state, his level of activation is high in contrast to the moderate levels which characterize normal states and the very low level in sleep.
Some of the measurable manifestations of a high level of activation are: abnormalities in respiration, blood pressure and pulse changes, muscular tension, electrodermal response, skin temperature, oral temperature, pupillary response, salivary secretion, gastro-intestinal activity, tremor and steadiness, eye blink, and brain waves measured through the use of the electroencephalograph (22).

As fear is a high level of general activation, and as such may be so measured, it is of importance in this study to look into the manifestations of stuttering to see if possibly fear and stuttering have enough in common so that certain concomitant manifestations of the disorder may be measured scientifically. Is stuttering, in essence, a fear reaction?

For the answer to this question, we need look only to the current accepted theories of the disorder to find that, in most quarters, fear is taken to be the basic element of stuttering, either in its beginning, or in its perpetuation. Smiley Blanton (3) writes that

In any state of fear, the discriminating, inhibitory function of the cortical nerve cells holding independent actions of the speech muscles in check is blocked...... There is, as a result of the fear, the loss of co-ordinated relationship between muscle groups.

In less scientific wordage, Van Riper (20) feels that hesitancies are bound to occur when a person's fluent utterances are suddenly frozen by fear. Fear, according to
Tam Ripere, is the refrigerant that always congeals action.

As to stuttering behavior being motivated by fear or anxiety, there appears to be a great deal of general agreement in the field. As Wendell Johnson (6) so aptly puts it:

"Stuttering is an anticipatory, apprehensive, hypertonic avoidance reaction. In other words, stuttering is what a speaker does when 1) he expects stuttering to occur, 2) dreads it, and 3) becomes tense in anticipation of it and in 4) trying to avoid it.... All this is to say that the stutterer consists.... in the stutterer's attempt to keep from stuttering--to prevent the occurrence of something he expects, dreads, and would rather avoid.

Similar views have been expressed by many authorities, among them Charles Van Riper and Meyer Solomon. Van Riper (20) states that "Once stuttering creates fear, and this fear, more fear and more stuttering, the disorder can exist on a self-sustaining basis." Solomon (15) notes, in essence, that stuttering is an emotional and personality speech disorder. It manifests itself in the social maladjustment of the individual, anxiety states concerning speaking, as well as the overt physical speech blocks. Johnson and Sinn (8) in 1937, mentioned that stuttering, considered psychologically, is to a significant degree self-perpetuating. It is stimulus and response.

In 1939, Barber (2) put it a different way, saying that the more positively the stutterer evaluates fluency,
the more he resists non-fluency and, in consequence, the more he stutters.

Perhaps the best recommendation we could present concerning stuttering as a fear response is offered by George Wischner (21) who, in 1952, stated that stuttering behavior, by virtue of its availability and quantifiability, provides an excellent opportunity for the study of anxiety.

Statistically, Knott, Johnson and Webster (9) found that stuttering and its expectation correlate to a highly significant degree, and Van Riper (20) appears to concur, with the observation that "The relationship of fear to stuttering is so great that stutterers often feel that if they could destroy the fear of approaching words, they would be able to say them without difficulty." Johnson and Sinn (8) found that there is a strong tendency for expectation to occur with reference to words previously stuttered.

These references serve only to point out that through fear or anxiety, stuttering can not only have its inception, but its heart. Fear appears to be the factor which prolongs the disorder, giving rise to its self-perpetuating life. Johnson (6) states: "In the final analysis, then, stuttering is basically an anxiety problem," and again, "If you take away the anxiety, or fear, the whole Cheshire cat vanishes, including the grin."
The Measurement of the Physiological Manifestations of Fear

As was previously stated, there are many ways to measure fear as a physiologically high level of activation. Two of the best have been found to be the recording of the respiratory cycle by means of a pneumograph as, according to Woodworth (22), "Since breathing is a massive response, there is little trouble in recording it," and the measurement of the comparative rise and fall of the subject's blood pressure through the use of the sphygmomanometer.

Ax (22), in 1951, found that systolic pressure, heart stroke, pulse rate, and palmar sweating showed a greater increase in fear than they did even in anger. In 1928, A. E. Nissen (22) obtained blood pressure readings from two patients in the dentist's chair. The pressure rose sharply when the dentist came into the room; in fact, the rise at this time was more regular than when he began his operations.

The apparatus chosen for the study at hand was a two-channel polygraph composed of a pneumograph and a blood pressure recording device, or sphygmomanometer. As this polygraph is basically made up of the same component parts as a lie detector, some references will be cited in the following pages by authorities in the field of the detection of criminal deception.

William Marston (12), a pioneer in the blood pressure
phase of lie detection notes that if the testee experiences fear, the blood pressure may show a sharp drop with a still greater rise thereafter. An early study by Travis, Tuttle and Cowan (17), investigating heart rate during stuttering, concluded that changes in heart rate during stuttered speech are secondary to changes in respiration and general body activity. Van Riper (19) in 1936, noted that certain stutterers presented stereotyped breathing abnormalities which were both characteristic and consistent. It has also been found that breathing is an extremely sensitive and rapid indicator of an increase of general activation level (22).

In summation then, as phrased by Fred Inbau (4) in his book, *Lie Detection and Criminal Interrogation*, "Fear..... appears to be the principal factor accounting for the physiologic changes which are recorded," (on the polygraph, or lie-detector). John A. Larson (10) also noted that the deception syndrome is comprised of physiological disturbances arising from activation in response to fear.

**Non-Fluency and the Adaptation Phenomenon**

As previously stated in the introductory chapter of this paper, this writer does not wish to make a distinction in this study between the normally non-fluent speaker and the primary stutterer. For the purposes of this investigation, then, the distinction seems best to be drawn between
fear-associated non-fluencies and those non-fluencies to which no fear is attached. Therefore, for the sake of clarity, this investigator will henceforth refer to any non-fluency accompanied by fear or anxiety as measurable on the polygraph as a stuttering block. It would appear to follow, then, from this discussion, that a non-fluency not accompanied by measurable fear or anxiety manifestations is not a stuttering block by definition.

This argument appears to be a well-founded one in the literature, and a logical statement leading to this conclusion is advanced by Wendell Johnson (6). Speaking of the four aspects of stuttering, i.e., expectation, anxiety or fear, tension, and avoidance, he writes

From a purely practical point of view, however, one of these four, anxiety, tends to be the most important. It means nothing, for example, to expect to stutter if there is no anxiety whatever about it. That is, there would be no tension and no desire or effort to avoid the stuttering, since there would be no anxiety to be expressed in these ways. And this amounts to saying that there would be no stuttering.

One of the basic assumptions underlying the ultimate end of this study is that observable non-fluency will decrease during repeated readings of the same passage by a stuttering individual. Of special note at this time is the investigation of the adaptation effect in both stuttered and normal speech behavior undertaken by Starbuck and Steer (16) in 1953. Two
of their basic conclusions were that adult stutterers and non-stutterers both demonstrate adaptation in successive oral readings of the same passage and that this adaptation phenomenon in stutterers and non-stutterers is not the same. Curves, graphed on the basis of mean number of blocks for one coordinate, and the number of trials, or readings, for the other, show that for stutterers, the mean number of blocks starts comparatively high and decreases rapidly to the fourth trial, whereupon it begins to climb again. On the other hand, the curve for the normal non-stuttering speaker starts much lower with respect to the mean number of blocks, and steadily decreases throughout the five trials.

Another investigator who has found the adaptation effect to be a reality with relation to successive oral readings of the same passage by stutterers was William Trotter (18) who, in 1955, concluded that stuttering was significantly more severe (in terms of mean severity) on the first reading of the given material.

Johnson and Knott (7) noted that the percent of words stuttered fell markedly between the first and the tenth reading, and this demonstrable effect has been found to exist in a question-answer situation with stutterers by Schae (13). Shames (14) has proposed using the adaptation phenomenon as a negative practice therapy in a clinical situation, and Leutenegger (11) noted, in 1955, that with stutterers, adaptation
and recovery increased progressively.

"All children speak non-fluently to some degree; so do all adults." This has been stated most concisely by Johnson (6), and this writer finds no disagreement in the literature, as the truth of such a statement is far too obvious to be contested. If non-fluency is universal among speaking peoples, then it is logical to assume that some of the non-fluencies exhibited in the speech of the stuttering individual will be non-fluencies to which no fear is attached, or "normal" non-fluencies.
CHAPTER THREE
EXPERIMENTATION

To properly undertake an investigation of this kind, it was deemed important to complete the following steps: 1) the selection of an adequate passage to be read during the trials, 2) the securing of a representative sample of stuttering subjects, 3) the setting-up of the desired equipment, and 4) the designing of the experimental procedure to be fulfilled throughout the actual investigation. This chapter will explain, in detail, how these four steps were approached and completed.

Before actual experimentation could be begun, it was necessary to select a reading passage to be used by the individual subjects in their successive trials. Certain qualifications had to be placed upon the selection so that as little effect as possible would be felt on the ultimate data gathered with respect to outside influences on the act of stuttering.

The qualifications were:

**Comprehensibility** - The passage had to be selected with the reading level of the subjects taken into consideration. All subjects had completed at least the tenth grade in high school, and therefore it was felt that a passage taken
from a book published for use in the eighth grade would be universally comprehensible, and would not lead to non-fluency resulting from unfamiliarity with the words contained within the passage.

**Factuality** - This was an incident qualification, appearing as a consequence to the fulfillment of the other three. In effect, the passage could conceivably be fiction, but a non-fiction passage, especially a familiar one, carries a certain authority and seriousness of content possibly not to be found in a like passage of a fictitious nature. To fulfill this qualification, and the following one concerned with unemotionality, it was decided that the material should be scientific in nature, the best selection being one concerned with the definition of basic physical laws.

**Unemotionality** - In the selection of a passage to be read orally by the stutterer, it would seem to be a prime prerequisite that the reading should be carefully chosen such as to eliminate any possible prejudice, bias, or outside emotion. These factors could only serve to invalidate the data when recorded on the polygraph, whose sole purpose in this study was the detection of an increased physiological level of activation. Concomitant with qualification #2, factuality, it would appear obvious that a passage concerning basic scientific laws would also carry a low level of emotionality.
with respect to the stutterer. An exception, of course, could exist, but one would be hard-put to find a person who would manifest a high bodily level of activation when reading material stating the Law of Conservation of Matter, especially when removed from context as done in this experiment.

Brevity - This, at best, is an arbitrary qualification; the passage chosen had to be long enough to give a good and sustained sample of stutterered speech when read by the stutterer, and yet not so long as to fatigue the subject after five consecutive readings. Fatigue as a factor resultant from the time spent with the blood pressure cuff and the pneumograph hose attached and in place also had to be considered. The passage finally chosen was ninety-three words in length, and was extracted from an eighth grade reading level general science book (see Appendix, page 46).

Subject Statistics

Eight subjects were used in this study, and all of them were either undergoing, or had undergone at one time, therapy for stuttering at the University of Arizona Speech and Hearing Clinic. There were five male and three female subjects. Their ages ranged from 15 to 35 years of age, the mean age being 21.1 years, and the median age, 19.5 years. The degree of stuttering varied a good deal within the group,
but each subject had a history of stuttering for at least ten years prior to the time this study was undertaken.

Apparatus

For this study, two channels of a three-channel polygraph, manufactured by the Lafayette Instrument Company, Lafayette, Indiana, were utilized. The subject's blood pressure changes were recorded using a standard blood pressure cuff attached to a tambour in the polygraph through which, by the expansion or contraction of said tambour, changes in blood pressure could be recorded on the moving graph paper by the ink needle.

For the recording of the thoracic breathing cycle, a rubber accordion-pleated hose was strapped around the subject's thorax in order to record respiratory movements by means of the pressure changes within the hose itself. The pressure changes induced in this hose caused a tambour to expand or contract moving the ink needle correspondingly on the moving graph paper.

Plate 1, on the following page, is an actual polygraphic record, illustrating vegetative, thoracic breathing (upper ink line), and restive, steady blood pressure (lower ink line). Plate 2, page 20, is a polygraphic recording of the fourth reading of Subject #5. The perpendicular cross-marks on the bottom ink line are the marks made by the
experimenter, and represent observed non-fluencies. Those marks topped by an "x" represent those observed non-fluencies recorded as fear-associated, either on the respiration record (A), the blood pressure record (B), or both simultaneously.
Polygraph Recording of Vegetative Breathing and Restive Blood Pressure

PLATE 1
Polygraph Record After Analysis

PLATE 2
Procedure

All testing was carried out in a semi-soundproofed room with only the experimenter and the testee being present. The subject sat facing the experimenter with the polygraph on a table between them.

At the start of the experiment, the pneumograph was strapped around the subject's thorax, and the blood pressure cuff wound around the subject's upper right arm. The subject was then shown the passage to be read, and told to read it through silently first to discover whether there were any definitions or usages of words in the passage which the subject did not understand. Then the blood pressure cuff was inflated to 85-90 millimeters of mercury pressure, and the subject was instructed to begin the first reading, aloud, and in his normal reading voice.

By means of an electromagnetically operated ink needle controlled through a manual push-button, the experimenter could mark the moving graph paper at any point at which he detected a non-fluency in the speech of the subject. Non-fluency, for this experiment, consisted of any hesitation, prolongation, or repetition such as would interfere with the fluent continuous speech of the subject.

At the conclusion of each reading, the mechanism was neutralized and the needles allowed to run in a disengaged position for an interval of from 5 to 10 seconds. At the
end of this interval, the mechanism was again engaged and the next reading begun. Once the initial reading had been begun by the subject, no extraneous speech of any kind was allowed on his part until the completion of the fifth, or final, trial reading.
CHAPTER FOUR
RESULTS

As has been previously stated, a fear reaction on a sphygmomanometer will manifest itself either in a sharp rise or drop in blood pressure. A fear reaction, when recorded on the pneumograph, will show abnormalities in the normal breathing cycle such as noticeably increased or decreased depth of inspiration or expiration, plateaus (indicative of holding one's breath), and sudden, straight drops during expiration (indicative of a sudden release of breath).

To best accomplish the ends of this study, the analysis of the individual's polygraphic records had to show the difference in number between fear-associated blocks and those blocks to which no fear was attached, all having been originally recorded as observed non-fluencies. It was pointed out in Chapter Three that the experimenter had at his disposal an electromagnetic signal needle, and it was through the counting of the number of signal marks per reading that this writer could directly tabulate the number of observed non-fluencies per reading. Then, by checking these marks against the respiratory and blood pressure recordings for fear reactions shown at the same point, it was determined how many of the
observed blocks were fear-associated and how many were not.

To graphically analyze the data thus calculated, a percentage value per reading appeared to have the most utility. That is, in the final analysis of each subject's blocks, a value representing that percent of the total number of observed non-fluencies which was composed of fear associated (recorded) blocks was tabulated (Table 1, page 26) and charted both on individual subject graphs (Figures 1-8, pages 29-32), and on a graph representing the totals of all subjects (Table 3, page 33), (Figure 9, page 33).

The graph representing the totals in Figure 9 is set up in exactly the same way as are the graphs in Figures 1-8. The percentages represented on this graph are the percentages of the totals per reading of the eight individual graphs. To read them, follow the abscissa until the desired reading number is reached and go straight up until the plotted line has been intersected. That point, read on the ordinate, will give the percentage value per reading that total recorded blocks were of total observed blocks.

When reading these graphs, one should keep in mind that a low, rising curve would indicate that recorded blocks were becoming a larger percentage of the total observed number, thereby indicating a decrease in unfeared non-fluencies. Conversely, a high, falling curve would show that the
percentage of recorded blocks in relation to the total number per reading was decreasing, and would thereby indicate that the reduction in observed non-fluencies was basically a reduction in fear-associated blocks.

It should be here noted that, within the limits of this experiment, fear-associated blocks comprised between 68.8% and 75.8% of the total number of observed blocks per reading; also, that the recorded percentage value of those blocks observed of the total number of non-fluencies manifested by all of the subjects was 72.8. Stated in a different manner, this indicates that of all of the non-fluencies manifested by all of the subjects in all of the readings, 27.2% were non-fluencies to which, in this experiment, no fear was attached.
TABULATIONS - Subjects #1 through #8

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<td>8</td>
<td>11</td>
<td></td>
<td>69</td>
</tr>
<tr>
<td>%</td>
<td>75.0</td>
<td>100.0</td>
<td>100.0</td>
<td>73.6</td>
<td>91.7</td>
<td></td>
<td>87.3</td>
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<td></td>
<td>42</td>
<td>35</td>
<td>35</td>
<td>31</td>
<td>28</td>
<td></td>
<td>171</td>
</tr>
<tr>
<td>6</td>
<td>32</td>
<td>26</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td></td>
<td>133</td>
</tr>
<tr>
<td>%</td>
<td>76.1</td>
<td>74.3</td>
<td>68.8</td>
<td>80.6</td>
<td>92.9</td>
<td></td>
<td>77.8</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>%</td>
<td>75.0</td>
<td>0.0</td>
<td>50.0</td>
<td>50.0</td>
<td>100.0</td>
<td></td>
<td>54.5</td>
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<td></td>
<td>16</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td></td>
<td>35</td>
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<td>8</td>
<td>16</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>%</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
<td>100.0</td>
</tr>
</tbody>
</table>

* % equals percentage value of recorded of observed.

Individual Subject Non-Fluency Records and Percentages

TABLE 1

When this data was analyzed according to individual subject non-fluencies, an even larger percentage value in the direction of unfeared non-fluencies was found. Referring to Table 1 in the Totals column, we find that, for instance,
in all the readings combined, Subject #1 blocked observably 74 times. Of these 74, 45 were recorded by the polygraph, yielding a percentage value of 60.8 stuttering blocks of the total observed number. This, in turn, yields a percentage value of 39.2 as the percentage of unrecorded non-fluencies of the total observed number. By this process, the following table may be set up.

<table>
<thead>
<tr>
<th>SUBJECT - PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
</tbody>
</table>

Percents of Unrecorded (Unfeared) Non-Fluencies of Individual Subjects, Readings #1 through #5

TABLE 2

The percentage figures from this table yield a range of from 0.0% to 57.9%; a mean of 32.07%, and a median of 35.40%. Compare the mean thus yielded by this table of 32.07% with the 27.20% representing the percentage of the total number
recorded of the total number observed of all of the subjects in all of the readings.

Through this experiment, then, we may safely state that unfeared non-fluencies comprised between 27.20% and 32.07% of the total number of observable blocks manifested by the eight subjects investigated.
SUBJECT #1 - Male

FIGURE 1

SUBJECT #2 - Female

FIGURE 2
SUBJECT #3 - Female

FIGURE 3

SUBJECT #4 - Male

FIGURE 4
SUBJECT #7 - Male

SUBJECT #8 - Female

* All non-fluencies manifested by Subject #8 were recorded on the polygraph, giving five consecutive percentage readings of 100.
### TABLE 3

<table>
<thead>
<tr>
<th>Reading</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed</td>
<td>136</td>
<td>93</td>
<td>80</td>
<td>81</td>
<td>71</td>
<td>467</td>
</tr>
<tr>
<td>Recorded</td>
<td>92</td>
<td>75</td>
<td>55</td>
<td>59</td>
<td>52</td>
<td>347</td>
</tr>
</tbody>
</table>

\[ \% \]

72.8 75.8 63.8 72.8 73.8 72.8

*Percentage value equals the percent that recorded non-fluencies were of the total observed number.

**Figure 9**

Percentage Means of Figures 1 - 8
As can be readily observed by the reader, the adaptation effect, or more specifically, the reduction in observed and recorded non-fluencies, is very much the same, although a lower total number of blocks per reading in each instance is shown in the curve representing recorded non-fluencies.

To read the graphs shown in Figures 10, 11 and 12, follow the abscissa until the desired reading number is found, move straight up until the plotted line is intersected, then straight over to the ordinate at the left where the number of blocks manifested on a particular reading may be found. Values obtained from these two graphs are total number of blocks for all eight subjects. For exact tabulations of the total number of blocks exhibited, refer to Table 3, page 33.
FIGURE 10

Adaptation in Observed Non-fluencies
FIGURE 11

Adaptation in Recorded Non-fluencies
Adaptation in Observed but Unrecorded Non-fluencies

FIGURE 12
CHAPTER FIVE
SUMMARY AND CONCLUSIONS

This study was set up, and an experiment designed to investigate the reduction of observed non-fluencies in the speech of stutterers during five successive readings of the same passage. More specifically, the investigation concerned itself with the area in which this reduction was found to be most prominent. Was the reduction in observed non-fluencies a reduction in fear-associated non-fluencies, or was it a reduction in non-fluencies to which no anxiety, or fear, on the part of the individual speaker was attached?

Eight subjects were used in the study, and their ages ranged from 15 to 55 years, the median age being 19.5 years. Each subject read a ninety-three word passage five consecutive times, pausing no more than 10 seconds between readings, while his blood pressure and thoracic breathing cycle was being recorded on a Lafayette polygraph.

Data was analyzed with respect to the difference found between those non-fluencies observed by the experimenter and those non-fluencies recorded, due to a fear response, on the polygraph. Also investigated and discussed was the reduction in actual number of the speakers' non-fluencies, both as observed by this writer, and as recorded on the
polygraph.

The basic findings of this study were:

1. The number of total observed blocks decreases from reading #1 to reading #5 with a slight rise at reading #4, and a further reduction thereafter.

2. The number of recorded blocks decreases from reading #1 to reading #5 with a slight rise at reading #4, and a further reduction thereafter.

3. The two illustrations of the adaptation phenomenon are very similar in structure, although the curve for recorded blocks runs at a lower level than the curve for observed blocks.

4. The curve for unrecorded observed blocks is also a falling one; however, it shows a very slight rise at the third reading with an insignificant further reduction thereafter, and is plotted at an even lower level than the two preceding curves.

5. The composition of total number of observed blocks is 72.3% recorded, and 27.2% unrecorded.

6. The mean percentage per subject of unrecorded blocks (unfeared non-fluencies) is 32.07%.

7. Recorded blocks, analyzed as the percentage per reading of the total number of observed blocks (per subject) show no trend toward an increase or decrease, but are highly inconsistent and vary greatly with each individual
stutterer.

8. **Recorded** blocks, analyzed as the percentage per reading of the total number of **observed** blocks (all subjects included) when charted, yield a straight-line function, varying (in the five instances) from 68.8% in the third reading to 75.8% in the second reading.

9. The mean percentage, **recorded** of **observed**, all subjects, all readings, is 72.8%.

The findings appear to warrant the following conclusions:

1. The adaptation phenomenon is real and extant in the speech of stutterers during five successive readings of the same passage.

2. The adaptation phenomenon appears to exist in a structurally similar manner with regard to magnitude of reduction in both **observed** and fear-associated non-fluencies in the speech of stutterers during five successive readings of the same passage.

3. Within the limits of this experiment, a reduction in unfeared non-fluencies in the speech of stutterers during five successive readings of the same passage, if existent, is manifested insignificantly when compared with the reduction extant in both **observed** and **recorded** non-fluencies. There appears to be no significant increase or reduction of unfeared non-fluencies during the five successive
4. Unfeared non-fluencies compose slightly more than 25% of the total number of observed blocks in the speech of stutterers during repeated readings of the same passage within the conditions prevailing in this study.

Even after a small, preliminary investigation into the nature of the stuttering block, per se, it appears obvious to this writer that much of the observed non-fluency in the stutterer's speech is unfeared. Stated in a slightly different manner, approximately 25% of the observed non-fluencies in the speech of a given stutterer (with exceptions, of course) are "normal" non-fluencies, universal in the act of speaking. It would also appear that this percentage of normal non-fluency in the stutterer's speech is a fairly constant one, decreasing in a much lesser magnitude than feared non-fluencies.

In a previously cited study by Starbuck and Steer (16), it was noted that the adaptation exhibited by non-stutterers differed significantly from the adaptation exhibited by the stutterer. A graph, set up on the basis of the mean number of blocks for one coordinate, and the trial number (1 through 5) for the other, show that stutterers have their sharpest drop in number of blocks from reading #1 to reading #2. The blocks continue to decrease, though less sharply than in the preceding instance, up to reading #4, whereupon
they rise markedly.

Compare, if you will, a curve such as the one just described (Figure 13, page 44) with the curve graphed in Figure 14, page 44. The greatest drop is, as in the Starbuck-Steer study, from reading #1 to reading #2; however, there appears to be, in the present study, a slight rise in the number of observed non-fluencies at the fourth reading with a definite drop noted from reading #4 to reading #5.

Because of the very slight rise in number of observed non-fluencies noted by this experimenter at the fourth reading, the data here presented does not agree with that of Jones, Dixon, or Fierman, who severally noted that there was a steady decrease in non-fluency in the speech of stutterers from the first to the fifth reading. Neither can this writer explain the rise found by Starbuck and Steer from the fourth to the fifth reading.

The Starbuck-Steer study noted that the curve for non-fluencies exhibited by the non-stuttering speaker (Figure 13, page 44) was a high, falling one, shallow in nature. There was found to be a slight rise in non-fluencies at the fourth reading, with a further reduction from the fourth to the fifth trial thereafter.

Compare this curve of the non-fluencies of the non-stuttering speaker with the curve charted in Figure 14, page 44, representing observed but unrecorded (unfeared)
non-fluencies in the speech of stutterers during repeated readings of the same passage. The greatest drop appears to occur from reading #1 to reading #2, whereas the greatest drop in non-fluency in the Starbuck-Steer study occurred from reading (trial) #2 to reading (trial) #3. There was also noted in the study at hand, a slight rise in non-fluency at the third reading, whereas in the Starbuck-Steer investigation, the same slight rise occurred at the fourth reading.

Regardless of the slight exceptions noted in the above paragraph, it is of the greatest import to note the basic similarity extant between the Starbuck-Steer curve of normal non-fluency, and this study's curve of unfeced non-fluency in the speech of stutterers. It would appear feasible to postulate, from this discussion, that a significant percentage of the stutterer's observed non-fluency is, in reality, normal non-fluency of the same kind exhibited by the non-stuttering speaker.
Mean Number of Blocks per Trial by Group
——— from Starbuck-Steer (16)

FIGURE 13

Mean Number of Blocks per Trial - Eight Stutterers

FIGURE 14
Further study needs be done in every phase presented by this investigation. A larger group of subjects should be tested; other physiological fear manifestations should be recorded, i.e., pulse rate, electrodermal response, salivary secretion, etc.; stutterers should be recorded not only during five successive readings of the same passage, but ten or twenty.... stutterers should be recorded during running speech. Each segment of this study should be amplified and investigated in further detail before complete justice to its basic conclusions may be imparted.

It would seem that the recording of fear as manifested physiologically during the speaking act should be an ideal tool for the study of the vocal activity of the beginning, or "primary," stutterer. The controversial fog surrounding this classification is a needless one and, if once cleared up, would pave the way for more accurate diagnosis and prediction of a disorder far too prevalent to be so shrouded.

Attacking the problem from the other side, it might prove profitable to investigate the occurrence of the feared non-fluency in the speech of the normal or non-stuttering individual to find if there might exist a basic difference between the feared non-fluencies of the stutterer and the feared non-fluencies (if existent) of the non-stutterer. Some line of distinction must eventually be drawn between the child who exhibits no anxiety over his non-fluencies
(albeit they call attention to themselves) and the child who is acutely conscious of them and tries, unsuccessfully, to avoid them, thus leading to what we know to be a stuttering reaction.

What is the status of the unfeared non-fluency in the speech of the stutterer? Is it a "normal" non-fluency, or was it at one time feared by the individual just as are his present fear-associated non-fluencies? Is it possible that through repetition or practice, the body can control physiological fear manifestations? These questions must some-day be answered before total understanding of the disorder of stuttering will be achieved.
APPENDIX

This passage, along with the instructions, was presented to each subject at the beginning of his session.

Instructions

You are to read out loud the following passage five times, pausing no more than ten seconds between readings. Please read as you normally would, without using any helps or devices to reduce blocking which you may have learned through experience or through previous therapy.

TWO IMPORTANT PRINCIPLES ARE OFTEN STATED AS THE FOUNDATION UPON WHICH ALL SCIENCE RESTS. ONE OF THESE IS THAT MATTER CANNOT BE CREATED NOR DESTROYED WHICH MEANS THAT IN CHEMICAL CHANGES THE ATOMS INVOLVED ARE NOT DESTROYED, NOR ARE ANY NEW ATOMS FORMED. THIS PRINCIPLE IS CALLED THE LAW OF CONSERVATION OF MATTER. ANOTHER LAW STATES THAT ENERGY CAN NOT BE CREATED NOR DESTROYED AND IS KNOWN AS THE LAW OF CONSERVATION OF ENERGY. THE FORM IN WHICH ENERGY MAY EXIST CAN BE CHANGED QUITE READILY, BUT IN THIS PROCESS ENERGY IS NOT LOST.
BIBLIOGRAPHY


