Further communication on stuttering explained as a physiological tremor

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IV. COMMUNICATION DISORDERS and MEDICAL APPLICATIONS

A. FURTHER DISCUSSION ON 'STUTTERING EXPLAINED AS A PHYSIOLOGICAL TREMOR'*

S. Fibiger

Notes concerning the possible universality of the physiological tremor in the speech apparatus

Fibiger (1971) has discussed the physiological tremor in the facial articulatory muscles during stuttering. These muscles are the easiest accessible for injection of needle electrodes, but there is no reason to presume that the physiological tremor is located solely to the muscles of facial expression.

The results of e.g. Awazu (1965) and Fibiger (1971) have shown that the tremor bursts are synchronous in muscle groups, and all the subjects in the study of Fibiger (1971) had a physiological tremor which was bilaterally synchronous in frequency. Therefore it is on the cards that a conceivable physiological tremor in larynx is synchronous in frequency with the physiological tremor in the articulatory muscles.

The electromyographic recordings from the subjects examined in Fibiger (1971) do not give information about the muscle activity in glottis or in larynx, but the acoustic output from the subjects contains more information than what was published there. Thus, the author is anxious to point out the observation, that when a subject is stuttering on a voiceless phoneme, very often an increase of voiced phonation can be recorded.”

It must, however, be remarked that the voicing is only seen synchronously with the tremor bursts in the facial muscles and particularly at the maximum of the tremor bursts (Fig. IV-A-1).

The first utterance, "själsfrid" [ʃjɛlsˈfrid], from one of the subjects in the material used by Fibiger (1971) was analyzed in some more details. The number of reading trials for this word was 63 times.

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** This analysis was made on a F0-analyzer (frequency to voltage converter) made by FONEMÀ, Sollentuna, Sweden, and registered on paper by means of a Oscillomink (Siemens) or a Mingograf 34T (Elema-Schönander, Stockholm).
Mingogram. Stuttering on "själfrid" (peace of mind). Note that voiced phonation during unvoiced phonemes appears synchronously with the physiological tremor bursts.
The most striking results were that:

1. the $F_0$ in voiced periods during stuttering on voiceless phonemes has no significant correlation to the $F_0$ in the voiced phoneme which follows the voiceless phoneme (Table IV-A-1).

2. the standard deviation (s. d.) for $F_0$ is much higher during stuttering on the voiceless phonemes than in normal fluency on voiced phonemes.

3. the voicing is often so short in time that the value of $F_0$ cannot be analyzed with the $F_0$-analyzer used here.

The results described here give the author the impression that during stuttering on voiceless phonemes there may be a muscle activity in the larynx which creates the glottal chink or a formation like that. But it is very imaginable - because of the high s. d. and the low $F_0$ - that this muscle activity is not a normal smooth tetanus. The occurrence of the synchronous voicing with the tremor bursts therefore gives the impression that the supposed "non-(normal smooth tetanus)" muscle activity in larynx during stuttering is also a physiological tremor sync. in freq. with the physiological tremor in the facial muscles.

Notes concerning $\beta$-adrenergic blockade in the stuttering therapy

Fibiger (1971) wrote: "One possible outcome of this study is that the research of therapy of the overt symptom of stuttering may be concentrated within the research field of the treatment of tremor". In this connection the author would like to note that Marsden, Foley, Owen, and McAllister (1967), which is also mentioned in Fibiger (1971), have pointed out that the increase of the amplitude of the physiological tremor can be abolished by prior $\beta$-adrenergic blockade with DL-propranolol (e.g. "Inderal", I.C.I.). Consequently it is possible that DL-propranolol has a tendency to abolish or decrease the overt symptom of stuttering*. But in this connection it is worth to remember that a symptom-therapy of stuttering not always is the best stuttering therapy.

Acknowledgments

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* Dr. Torsten Olsson, AB Draco, Lund, Sweden, is interested to test this clinically.
References


<table>
<thead>
<tr>
<th>Table IV-A-I. Initiatary-F₀ during stuttering</th>
<th>Standard deviation</th>
<th>Number of observations</th>
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<tbody>
<tr>
<td>Initiatary-F₀ by voicing during stuttering on the voiceless phoneme: [ \text{[f]} ] in the Swedish word &quot;själsfrid&quot; [ \text{[X]} \text{f} \text{[:]} \text{l}s, \text{fri:d} ] (peace of mind)</td>
<td>106 Hz</td>
<td>32 Hz</td>
</tr>
<tr>
<td>Initiatary-F₀ during the voiced phoneme: [ \text{[ε]} ] in the Swedish word &quot;själsfrid&quot; [ \text{[X]} \text{f} \text{[:]} \text{l}s, \text{fri:d} ] (peace of mind)</td>
<td>140 Hz</td>
<td>7 Hz</td>
</tr>
<tr>
<td>Initiatary-F₀ by voicing during stuttering on the voiceless phoneme: [ \text{[l]} ] in the Swedish word &quot;själsfrid&quot; [ \text{[X]} \text{f} \text{[:]} \text{l}s, \text{fri:d} ] (peace of mind)</td>
<td>91 Hz</td>
<td>36 Hz</td>
</tr>
<tr>
<td>Initiatary-F₀ during the voiced phoneme: [ \text{[r]} ] in the Swedish word &quot;själsfrid&quot; [ \text{[X]} \text{f} \text{[:]} \text{l}s, \text{fri:d} ] (peace of mind)</td>
<td>137 Hz</td>
<td>12 Hz</td>
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Errata to STL-QPSR 2-3/1971

p. 5, last sentence .......... have shown that the amplitude of the physiological tremor increases to a concentration of 1-10 µg/l after adrenaline...

read: .................. have shown that the amplitude of the physiological tremor increases after adrenaline has been injected into the blood to a concentration of 1-10 µg/l ...