SpeechRhythmExtractor (version 1.8)
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This script was implemented by Leônidas SILVA JR. (State University of Paraiba / University of Campinas - Brazil) & Plínio A. BARBOSA (University of Campinas - Brazil). It aims to build rhythmic multidimensional models of vowel, consonant, phonetic syllable and higher units computed from rhythmic metrics and prosodic-acoustic parameters.

This script can be used in a cross-section of diifferent languages and dialects.

- Audio/TEXTGRID files are required and have to be in the same directory of the script.
- Script under updating process.

HOW TO CITE THIS SCRIPT
SILVA JR., L.; BARBOSA, P. A. (2021). **SpeechRhythmExtractor.** Computer program for Praat (version 1.8). Available at: https://github.com/leonidasjr/SpeechRhythmCode

GETTING STARTED...
We will start from the point having in mind that you have already installed Praat in your computer.

BEFORE RUNNING THE *SpeechRhythmExtractor* SCRIPT (examples at the right margin)

- For the sake of two of the variables (*language/dialect* and *sex*), we strongly recommend that the audio file be named in the following sequence: the first to third letters = the *language/dialect*; and the fourth to sixth letters = the *sex* of the speaker. Additional characters may represent the speaker.

  AmEFEM001
  AmE = *language* (American English); **FEM** = *sex* (female); **001** = *order* (the very first participant)

- You will need a couple of **Audio**/**TextGrid** files;

  Example .**wav**
  Example.**TextGrid**

- The audio, TextGrid files and the script MUST BE in the **SAME DIRECTORY**;
- The TextGrid files must be segmented into inter-vowel onsets (VV), vocalic (V) consonantal (C), silence (# or _) and chunk (CH) intervals as shown in Figure 1.
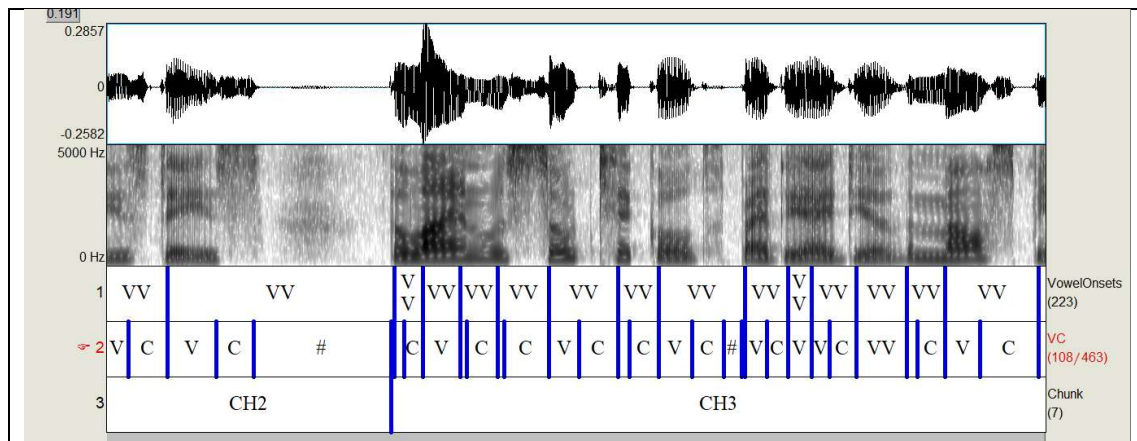
Figure 1.

RUNNING THE *SpeechRhythmExtractor* SCRIPT

Now that your audio, TextGrid files and script are in the same folder and the textgrids are properly segmented (see Figure 1), you will need to "call the script" into Praat object's window. On Praat's drop-down menu, click **Praat >> Open Praat script...** as shown in Figure 2. Now choose the directory you have your files and the *SpeechRhythmExtractor* script in.
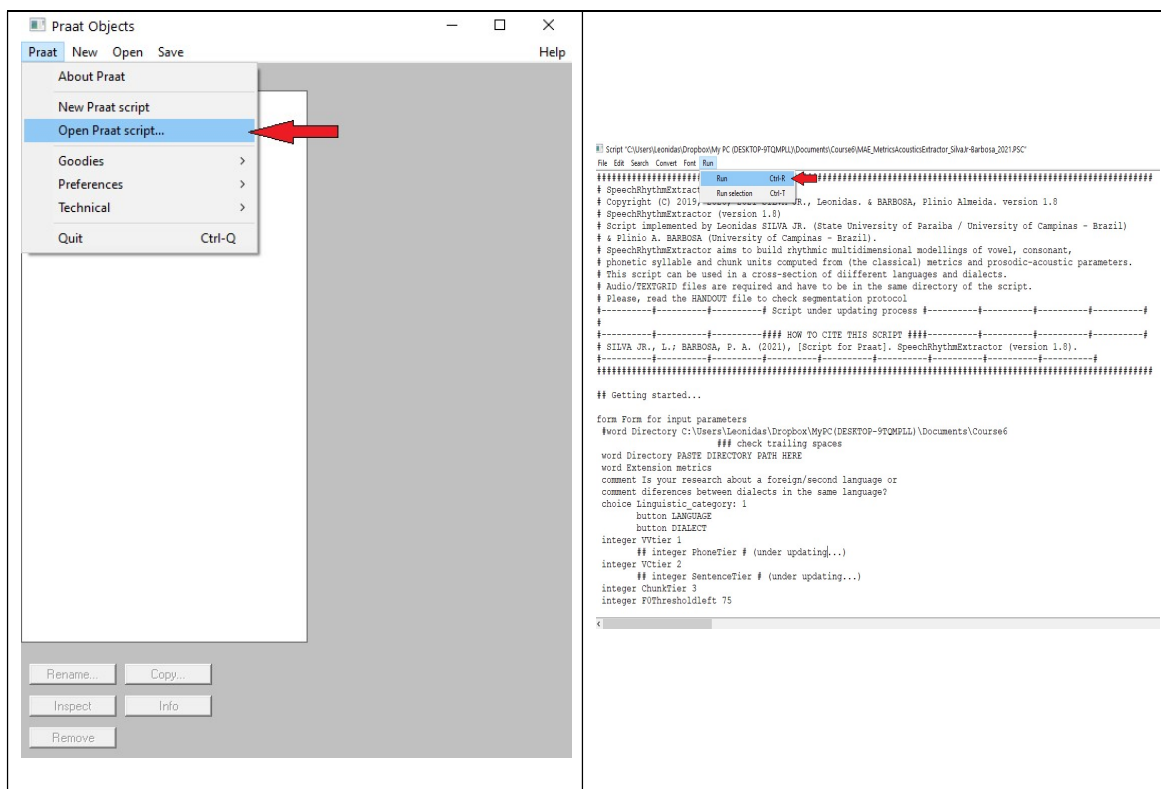

Figure 2.   **Figure 3**.

Once the script is uploaded from Praat objects' window, you will need to run it. For running the script, click **Run >> Run** as shown in Figure 3.

When you click **Run**, the script will pop-up a window (a form containing the input parameters) as shown in Figure 4. Unless you need to work under specific

conditions determined from your experimental design, we advise the maintenance of the form default values. . Click the **Ok** button to run the script.

Figure 4.

The script automatically returns an **in-tab-delimited .txt file** named '*metrics*' to the same directory where the script, audio and TextGrid files are in. The **metrics.txt** file contains:

- The string vectors (audio file ID, linguistic category and the speaker's sex), and;
- The numerical vectors (the rhythm metrics and the prosodic-acoustic parameters).

You can change the name of the .txt file right before clicking the **Ok** button in the form as shown in the argument line <*Extension*> in Figure 3.

The rhythm metrics and the acoustic parameters extracted from *SpeechRhythmExtractor* script for speech rhythm analysis can be seen in Chart 1.

METRICS		ACOUSTIC PARAMETERS	
Parameter	**Segment of application**	**Parameter**	**Segment of application**
Proportion (%)	V, C	F0 median	CH
Standard deviation (s)	V, C, (V or C), VV	F0 peak	CH
Variation coefficient (Varco)	V, C, (V or C), VV	F0 minimum	CH
Raw pairwise variability index (r-PVI)	V, C, (V or C), VV	F0 standard deviation (sF0)	CH
Normalized pairwise variability index (n-PVI)	V, C, (V or C), VV	F0 skewness	CH
Rhythm ratio (RR)	V, C, (V or C), VV	Mean of F0 first derivative (mΔ1- F0)	CH
Variability index (VI)	V, C, (V or C), VV	Standard deviation of F0 first derivative (sΔ1- F0)	CH
Yet another rhythm determination (*z-score duration*) (YARD)	V, C, (V or C), VV	Skewness of F0 first derivative (skΔ1- F0)	CH
		Speech rate (SR)	VV, CH

	F0 rate (F0-R)	CH
	Spectral emphasis	CH
	Mean of normalized syllable-peak duration (mdur- SylPeak)	VV, CH
	Mean duration of pauses (mdur-#)	CH

Chart 1.
Adapted from Silva Jr. & Barbosa, (2019, 2020)[1] based on the phonetic literature since the mid 1990s (see References for details).

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[1] SILVA JR, L.; BARBOSA, P. A. (2020). Um algoritmo para extração automática de parâmetros métricos e acústicos do ritmo da fala em L1 e L2. In. L. CIDRIM W. LOPES, F. MADEIRO. **Tecnologias e Ciências da Linguagem: vertentes e novas aplicações**, volume 2. São Paulo: Pá de Palavra, p. 11-26.
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