Version 1 Automated RFF Estimation

The automated RFF algorithm was developed for high-quality acoustic recordings of the exact stimuli described in Lien (2015) and Lien et al., In Press. Below are the instructions that provide recommendations for acceptable changes to the algorithm (e.g., pitch ranges, save locations). Any additional changes beyond these recommendations, such as use of different stimuli combinations or use of lower quality sound recordings, may alter your output. Please be cautious in interpreting results when applying any additional changes to this algorithm.

Automated RFF estimation instructions:

1. Save audio files as: Parameter_Stimuli.wav (e.g. Healthy_afa.wav). Do not use "+" or "–" in the file names.
2. Open main_RFF.m
3. Change lines 10-12 to indicate the minimum possible pitch, maximum possible pitch, and the maximum number of VCV instances in a recording. For example, a stimuli of /ufu ufu ufu/ would have a *maxpkn* = 3.

```
%default settings
min_pitch_set = 50; %default min pitch is 50 Hz
max_pitch_set = 400; %default max pitch is 400 Hz
maxpkn = 3; %initially assume that there will be 3 VCV instances
```

4. Output: Create a performance folder in a location where you would like to save the RFF variables and figures. Change variable in line 13 (*perform_fol*) to indicate the location.
5. Create an empty Excel file named "aRFF.xlsx" in the performance folder. Your results will automatically save here.
6. Input: Change variable in line 19 (*folname*) to the folder location of your wav files. Remember to include a backslash at the end.
7. If you made separate recordings for /afa/ /ifi/ /ufu/ and want to combine them into one sheet in your excel file, in line 14 set *stimulicomb* = 1, otherwise set *stimulicomb* =0.
8. Click Run.
9. A GUI will pop-up for each recording, asking you if the algorithm located the fricatives correctly.
    a. Click "ok" if location of the dot is within the fricative.
    b. If the location of the dot is not in the fricative, or there is not a dot for every stimulus, click "no." To identify the correct fricatives, click on the waveform where the fricatives are (3 stimuli should be 3 separate clicks) and then hit "enter". Finally, click "ok" to move on to the next recording.
10. After you have identified all the fricative locations across all of your recording files, the algorithm will work on locating the vocal cycles. More figures will quickly appear and disappear on your screen during this process.
11. Wait until the algorithm finishes running, then open the Excel file.

12. Check the output waveforms by looking at the figures stored in the performance/Parameter folder. If it looks like the algorithm is taking the wrong cycle, delete the corresponding RFF in the Excel file.

Additional Notes:

If you mistakenly identify a fricative in the GUI, do the following:

1. Ctrl C (stops the program from running)
2. In the "workspace" find "filei" which will tell you where you are (i.e. if it says 37, then you may have messed up 36).
3. Input: Change the number "1" Line 25: filei =1:length(allfiles) to the instance you want to start from
    a. Hit "Save"
4. In the "workspace" for to "all files" and find in the structure, the row that corresponds with number of the file you messed up on. This will tell you what the name of the folder is.
5. Go to your "performance" folder and delete that instance (i.e. if row 36 is "Healthy_ufu" then delete that folder)
6. Click "Run" and it should begin on the item you had a mistake on.
7. When you are finished, REMEMBER to change Line 20 back to filei =1:length(allfiles)

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References:

Lien, Yu-An Stephanie. *Optimization and automation of relative fundamental frequency for objective assessment of vocal hyperfunction*. Diss. Boston University, 2015.

Lien Y.S., Heller Murray E.S., Calabrese C., Michener C.M., Van Stan J., Mehta D.D., Hillman R.E., Noordzij J.P., Stepp C.E. "Validation of an algorithm for semi-automated estimation of relative fundamental frequency", Annals of Otology, Laryngology, and Rhinology, *In Press.*