

Steps to create the audio stimuli for the word-learning task

(Last update: March 17 2021 by Rachel) -- Added section on compressing .wav to .mp3

Overview of audio stimuli types:

- Familiar word phase
 - Create 2 versions:
 1. Add 2000ms to the beginning of the audio stimuli -- such that the visual stimuli will be shown in silence for 2000ms before the audio stimuli plays
 2. Add 5000ms to the beginning of the audio stimuli -- this serves as the audio stimuli replay, so when participants make no response 5000ms upon the offset of the audio stimuli, the same audio stimuli will play again
- Novel learning phase
 - Create 4 types for different conditions:
 - One-language-at-a-time condition: Both carrier sentences in the same language (i.e., Eng-Eng, Fr-Fr)
 - Immediate translation condition: The two carrier sentences in different language (i.e., Eng-Fr, Fr-Eng)
 - How to create:
 1. Add a 500ms pause in between carrier sentences
 2. Add 200ms to the beginning of the audio stimuli -- such that the visual stimuli will be shown in silence for 200ms before the audio stimuli plays
- Novel test phase
 - Same as Familiar word phase audio stimuli

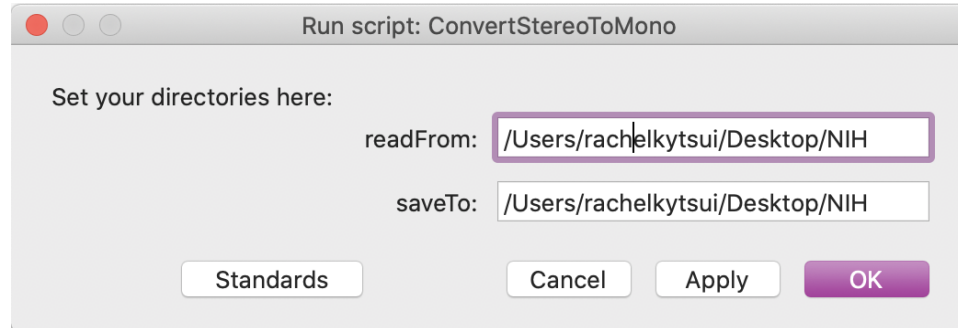
Preparation:

- You'll need the software Praat for the following steps. Praat can be downloaded [HERE](#)
- All the Praat scripts can be found in the project's Google Drive: [HERE](#)
- All sound files should be placed in one single folder. (All Praat scripts can be run on multiple sound files at the same time as long as the sound files are saved in the same folder. For details, please follow the detailed instructions below.)
- All sound files should be converted to .wav files before opening them in Praat.

Step 1: Convert all sound files to mono signal (This step is optional depending on the sound files you obtained from the speaker.)

- Depending on the device the speaker used, some sound files were stereo files. [This Praat script](#) converts all recordings to mono signals. (If the sound files were already mono, you can skip this step.)
- To run the script:

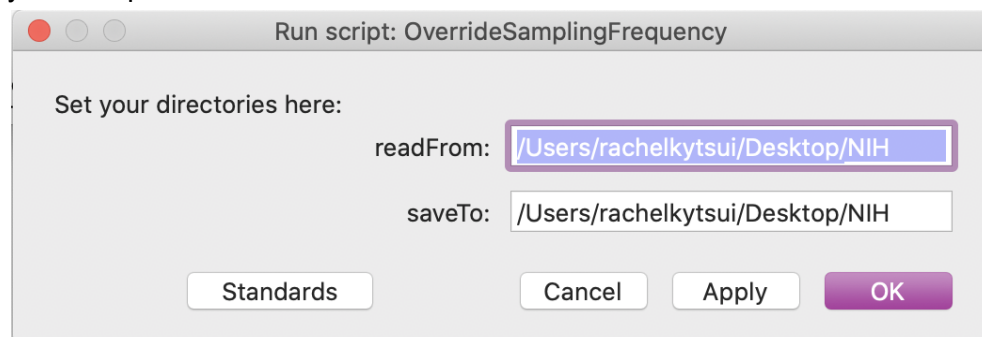
- Before running the script, 1) create a “stereo” folder on your computer and put all the original sound files in there; and 2) create a “mono” folder (this is where the converted files will be saved)
- Once you run the Praat script, change the directory paths to where the folders are on your computer



- readFrom = the path to your “stereo” folder
- saveTo = the path to your “mono” folder
- Then run the script by clicking [OK]
- * This script can be ran on multiple sound files at the same time (as long as all sound files are in the “stereo” folder)

Step 2: Convert the sampling frequency to 44100Hz

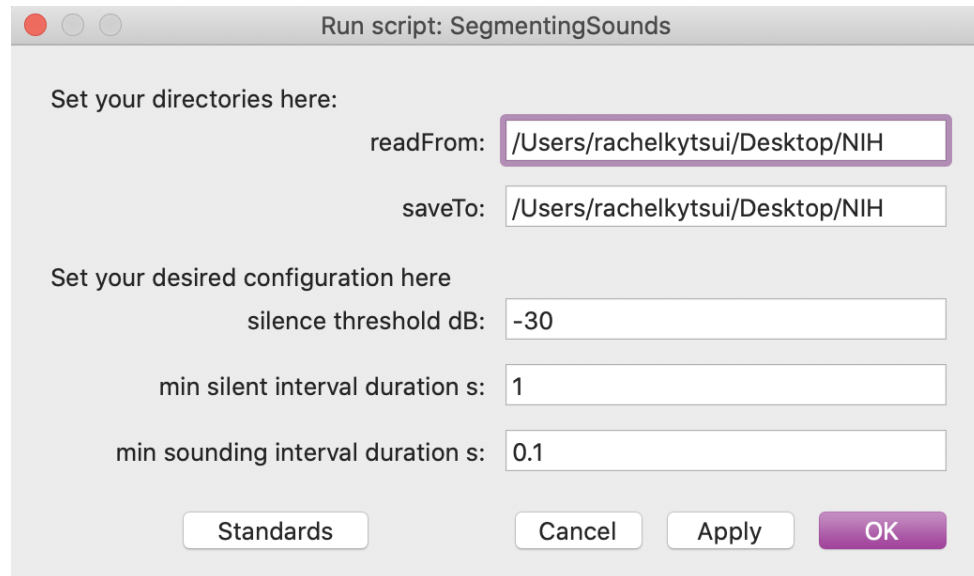
- Depending on the device the speaker used, some sound files were not at the 44100Hz sampling frequency (which is the general standard for audio files). **To run the script in the next few steps, all the sound files have to be at the same sampling frequency.** [This Praat script](#) converts the sampling frequency of all sound files to 44100Hz.
- To run the script:
 - Before running the script, 1) pull all the original sound files in the “Original” folder; and 2) create a “44100Hz” folder (this is where the converted files will be saved)
 - Once you run the script, change the directory paths to where the folders are on your computer



- readFrom = the path to your “Original” folder
- saveTo = the path to your “44100Hz” folder

Step 3: Segment the original sound files

- The original sound files we obtained from the speakers were very long as speakers often recorded multiple sentences in one sound file. [This Praat script](#) segments the sound files and gives us an individual .wav file for each recorded sentence.
- To run the script:
 - Before running the script, 1) put all the sound files in a “original” folder (this is where the sound files will be read from); and 2) create a “saveTo” folder (this is where the segmented files will be saved)
 - Once you run the Praat script,



Run script: SegmentingSounds

Set your directories here:

readFrom: /Users/rachelkytsui/Desktop/NIH

saveTo: /Users/rachelkytsui/Desktop/NIH

Set your desired configuration here

silence threshold dB: -30

min silent interval duration s: 1

min sounding interval duration s: 0.1

Standards Cancel Apply OK

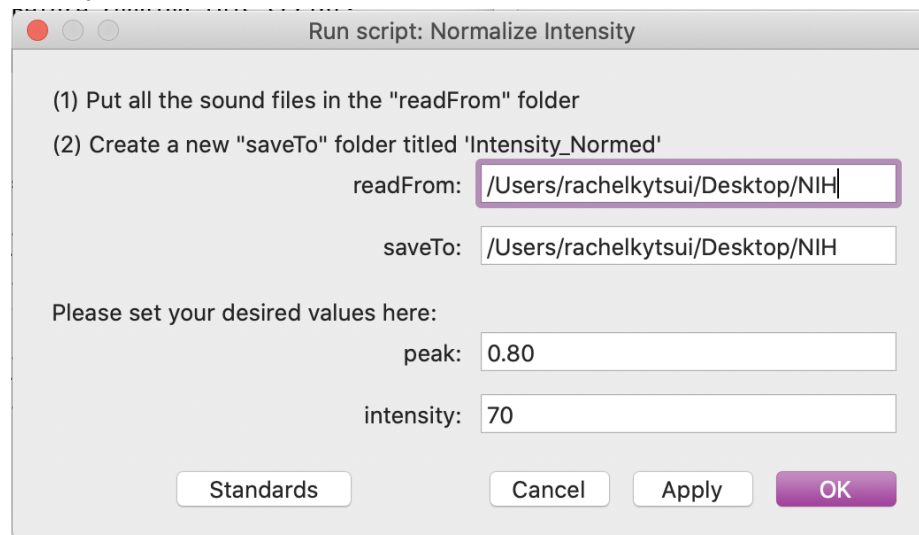
- Change the directories to where the folders are on your computer
 - readFrom = the path to your “original” folder
 - saveTo = the path to your “saveTo” folder
- Set the desired configuration
 - Those numbers listed are set as the default
 - But you may need to adjust the values depending on the language/ the speaker you’re segmenting
 - * Best practice: Run the script once without changing the configuration and listen to a few segmented files to see if it works fine. If not, run the script again but change the configurations (you’ll need to look closely into the sound file to determine the configurations. Most often you’d need to increase the silence threshold to properly segment the /p, t, k/ stop sounds).
- * Don’t forget to check the segmented files to make sure nothing weird is happening. There may be cases where the burst following a stop consonant (i.e., /p, t, d/) or a syllable is cut off because of the low intensity of that burst/syllable. Sometimes you may have to further adjust the segmented files manually.
- The segmented sound files can be found [HERE \(En-Fr\)](#).

Step 4: Choose the best sentences manually (* No Praat script for this step)

- Each speaker was asked to read each sentence three times. So we had to choose the best repetition to be included in the final 15s stimuli.
- The selected sound files can be found [HERE \(En-Fr\)](#).

Step 5: Normalize intensity to 65dB

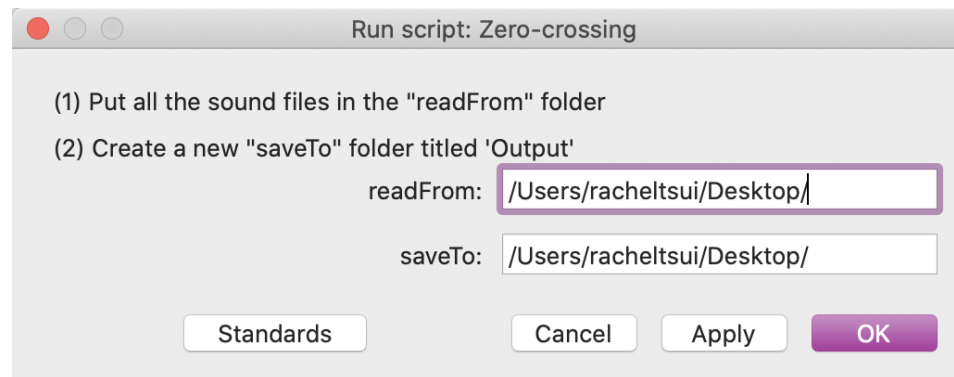
- [This Praat script](#) normalizes the intensity of all the sound files to **65dB**.
- To run the script:
 - Before running the script, 1) put all the sound files in one folder; and 2) Create a new folder titled 'Intensity_Normed' (this is where the normed stimuli will be saved to)
 - Once you run the Praat script,



- Change the directories to where the folders are on your computer
 - readFrom = the path to the folder where the sound files are saved
 - saveTo = the path to your "Intensity_Normed" folder
- Set the desired configuration
 - Those numbers listed are set as the default
- At the end, the script will give you a table that shows the intensity value of each sound file -- both before and after the normalization. You should check the normalized intensity values to make sure they are at the intensity values that you want. (The table can be found [HERE \(En-Fr\)](#).)
- * To run this script, you should put all the sound files in the same folder and set that folder to the "readFrom" path. This makes sure the intensity is normalized across all sentences throughout the experiment.
- The normalized sound files can be found [HERE \(En-Fr\)](#).

Step 6: Make sure the stimuli are cut at zero-crossing

- Some of the segmented recording files are not cut at [zero-crossing](#), which may introduce weird clicks and pop sounds at the beginning and end of the audio file. [This praat script](#) adjusts the beginning and end of all sound files to the nearest zero-crossings.
- To run the script:
 - Before running the script, 1) put all the original sound files in one folder; and 2) create an "Output" folder (this is where the adjusted files will be saved)
 - Once you run the Praat script, change the directory paths to where the folders are on your computer



- readFrom = the path to the folder where the sound files are saved
 - saveTo = the path to your "mono" folder
- Then run the script by clicking [OK]

Step 7: Compile the Novel Learning stimuli

- There are two steps to this process:
 - Step 7.1: Manually randomize the sound files
 - Step 7.2: Run the praat script to compile the audio clips

1) Step 7.1: Manually randomize the sound files (the combination of carrier sentences you want for the novel learning phase)

- To generate the combination, create a .csv file which lists all combinations you've arranged.

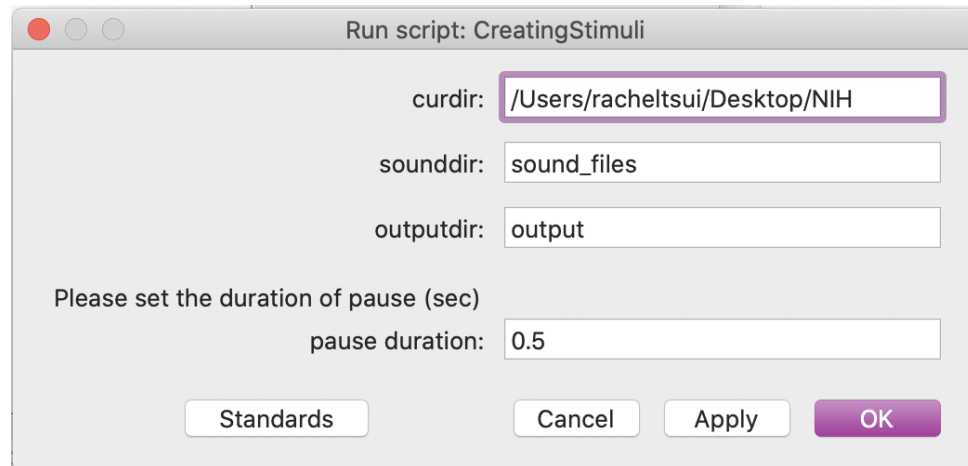
	A	Final file name of the novel learn audio stimulus		E	
1	learning_blicket_Look	learning_blicket_here	learning_chatten_Look	learning_chatten_here	learning_fiffin_Look
2	blicket_look.wav	blicket_here.wav	chatten_look.wav	chatten_here.wav	fiffin_look.wav
3	blicket_touch.wav	blicket_touch.wav	chatten_touch.wav	chatten_touch.wav	fiffin_touch.wav
4	Order of the sound files that will be combined in that single audio stimulus				
5					
6					

- In this list, you will need to set:
 - Row 1: The final output file name of the novel learning stimulus; these become the file name after you run the Praat script in the next step.

- Row 2 -...: The arranged order of the sound files that will be included in that single stimulus.
- * So each column represents one single sound file order.
- Then save this list as “list.csv”.
- You can find the combinations [HERE](#) (“En-Fr_learning_combination.csv”).

2) Step 7.2 : Compile the novel learning audio clips

- [This Praat script](#) creates the novel learning audio stimuli (with a 500ms pause in between sentences).
- The .csv file we generated in the previous step will be read by this Praat script to generate the stimulus (combining the two carrier sentences).
- To run the script,
 - Before running the script, 1) put all the sound files in one folder; 2) create a “output” folder where the final audio clips will be saved; and 3) put the “list.csv” in the parent folder (your current directory).
 - Once you run the script,



- Change the directories to where the folders are on your computer

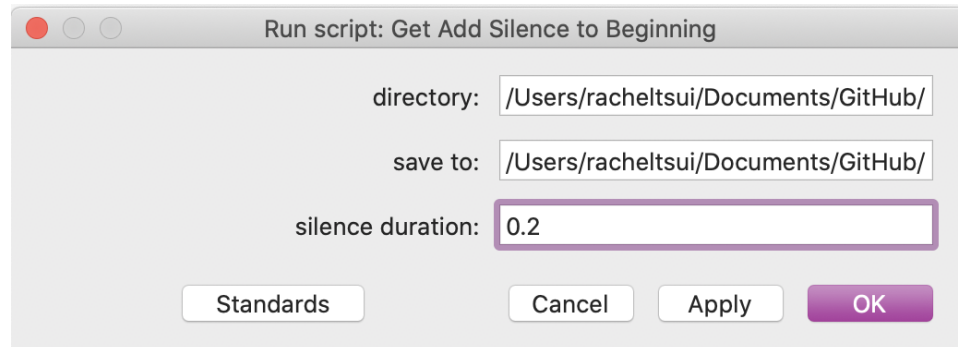


- curdir = the path to the parent folder where your “list.csv” file is saved
- sounddir = the name of the folder where your sound files are saved
- outputdir = the name of the folder where you want the final audio clip to be saved
- Set the desired duration of pause (in second)

- The default is set to 0.5 second
- You can find the final audio learning stimuli [HERE \(En-Fr\)](#).

Step 8: Add silence to beginning of the audio clips

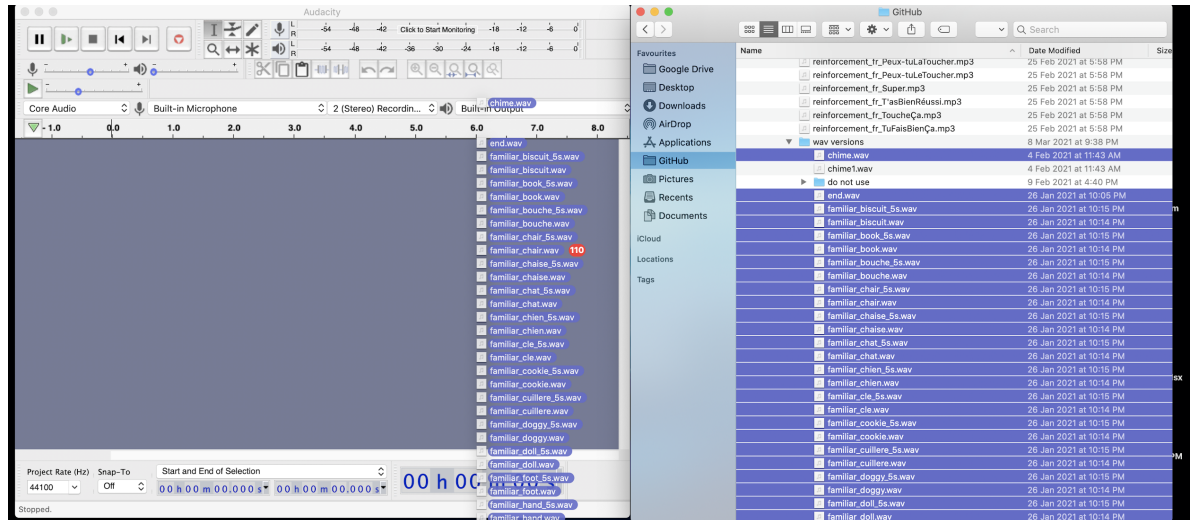
- [This Praat script](#) adds silence to the beginning of each audio stimulus you saved in the same folder.
- Depending on the stimulus type, the duration of silence you need to add varies. (For details, refer to *Overview of audio stimuli types* at the beginning of this document.)
 - For Familiar word phase and Novel test phase, you need to create 2 versions: (1) add 2000ms; (2) add 5000ms to each audio stimulus
 - For Novel learning phase, you only need to add 200ms to each novel learning audio stimulus
- Since different duration of silence will be added, it would be easier to carry out the process if you separate the different types of stimuli into 2 separate folders before you run the script:
 - Familiar word phase stimuli and Novel test phase stimuli in one folder
 - Novel learning phase stimuli in another folder
- Also, create 3 different output files to where you want the final audio clip to be saved:
 - One folder for the familiar word stimuli and novel test stimuli with a 2000ms silence
 - Another folder for the familiar word stimuli and novel test stimuli with a 5000ms silence
 - A final folder for the novel learning stimuli with a 200ms silence
- To run the script,
 - Before running the script, 1) put all the original sound files in one folder; and 2) create an "Output" folder (this is where the adjusted files will be saved)
 - Once you run the Praat script, change the directory paths to where the folders are on your computer



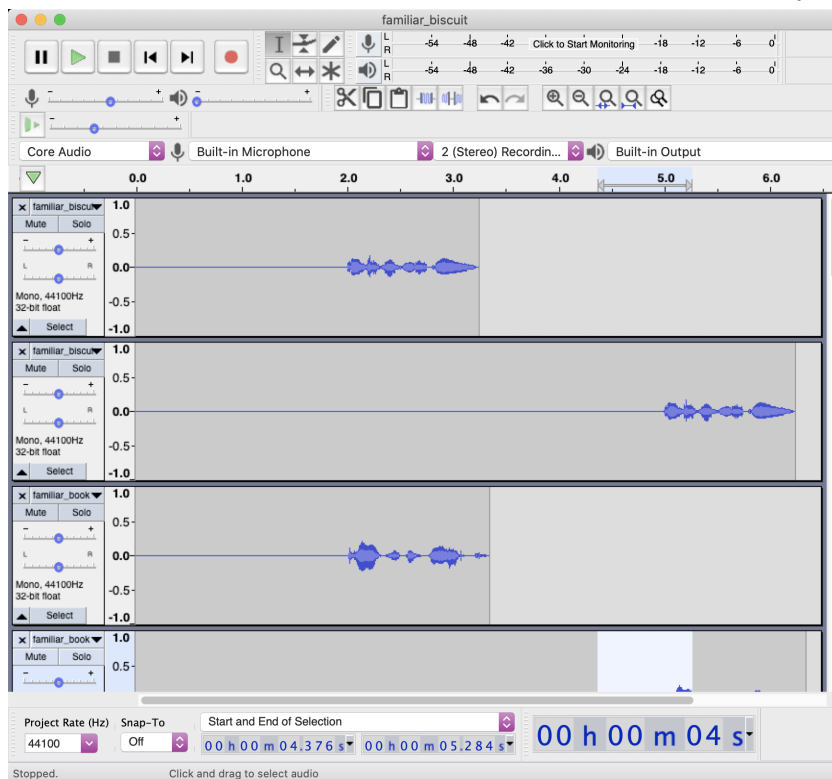
- directory = the path to the folder where your sound files are saved
- Save too = the path to the folder where you want the final audio clip to be saved
- Set the desired duration of silence (in second)
 - Then run the script by clicking [OK]
- You can find the final audio stimuli [HERE \(En-Fr\)](#).

Step 9: Changing all sound files to .mp3 file for the experiment to run smoothly on Pavlovía (We are converting .wav files to .mp3 to compress the file sizes)

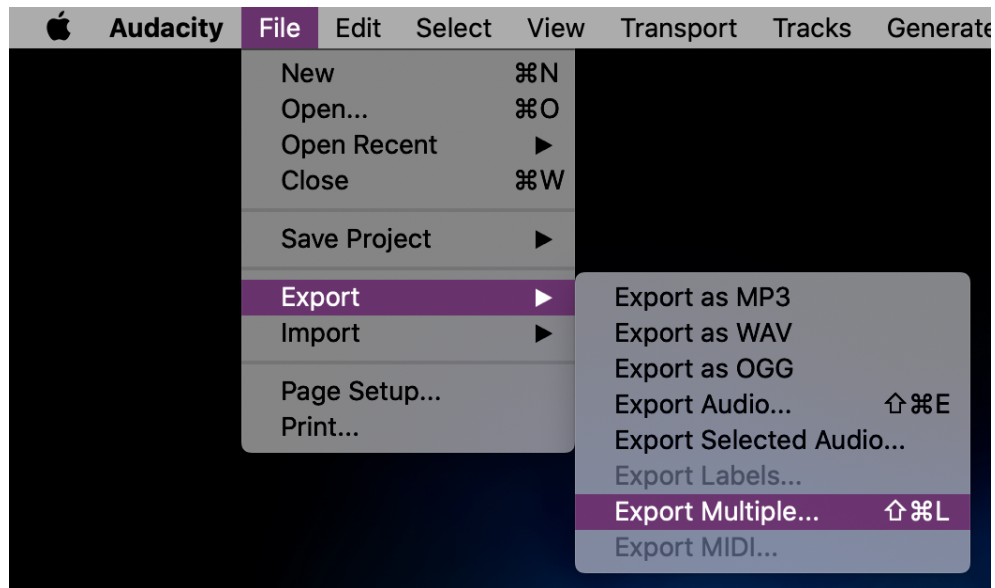
- There is no Praat script for this step.
- You'll need to use [Audacity](#) to perform this step.
- Once you open the Audacity program,
 1. Highlight all the .wav files that you want to convert and drag them into Audacity



2. You'll now have all the .wav files as different tracks in Audacity



3. Go to [File] → [Export] → and choose [Export Multiple]



4. Choose the [Folder] that you want to save your converted files & also choose the [Format] that you want to convert to (i.e., choose MP3 Files in this case); then click [Export]

