

Exercise with Sound

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Review

- Sound is characterized by frequency (pitch) and amplitude
- Sound is composed of a collection (superposition) of sine and cosine waves of different frequencies
- Sound is sampled. Higher sampling rate will generate higher quality sound.
- Volume is related to the square of the amplitude averaged over some period of time
- Sound can be stored with lossless (wave, aiff, flac) or lossy (mp3) compression. Use lossless compression if you will edit the wave.

Sound recording

- Record sound with Audacity
- Save the sound recorded
- Read into R
- Process with R

Experiment

Consistency of speech

- Choose a word
- Record the same word said 10 times
- Remove the silences inside Audacity (between the words)
- Save the sound wave in a file using non-lossy compression
- Read the data into R

How to separate words in R

- Find a way to identify silences
 - plot the sound graph
 - plot the square of the amplitude (which relates to volume)
 - Divide the signal into segments of 1/10 second
 - extract the individual words
 - compute the mean and standard of all the segments
- To what extent are the different same “words” have a similar structure (based on mean and/or standard deviations)?

Alternative

- Extract each word manually from Audacity, each in its own file
- Remove silence from beginning and end of word
- Save each word in its own file
- Process each word into R
- This approach is more straightforward but longer to implement, but might be only way if more general approach cannot be done easily.

Solution

- We will do this in class as an exercise in R and in sound manipulation.