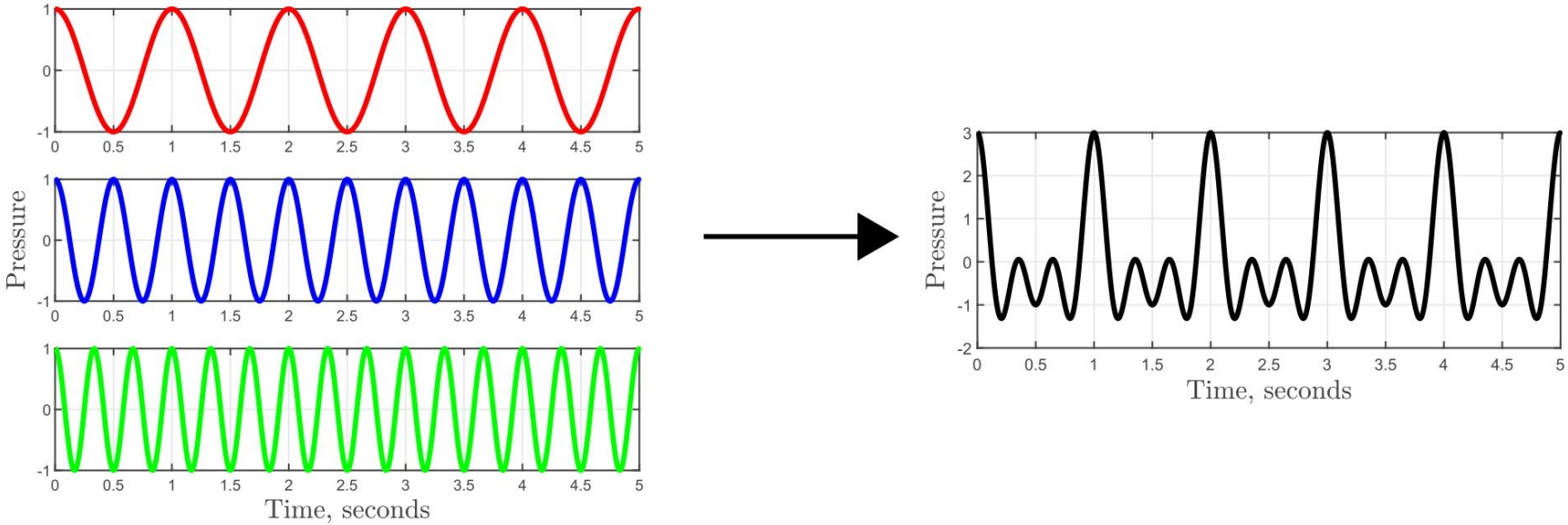
Fourier Transform and Filtering

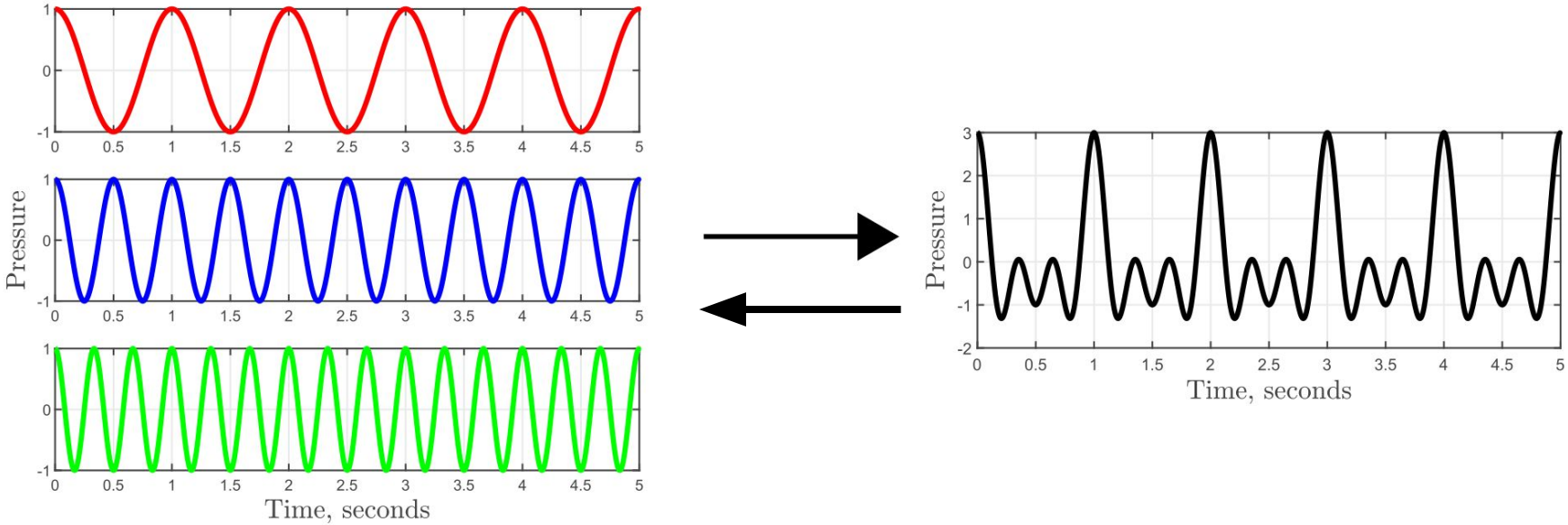
Reminder: Signals are additive

Signals can be made up of components



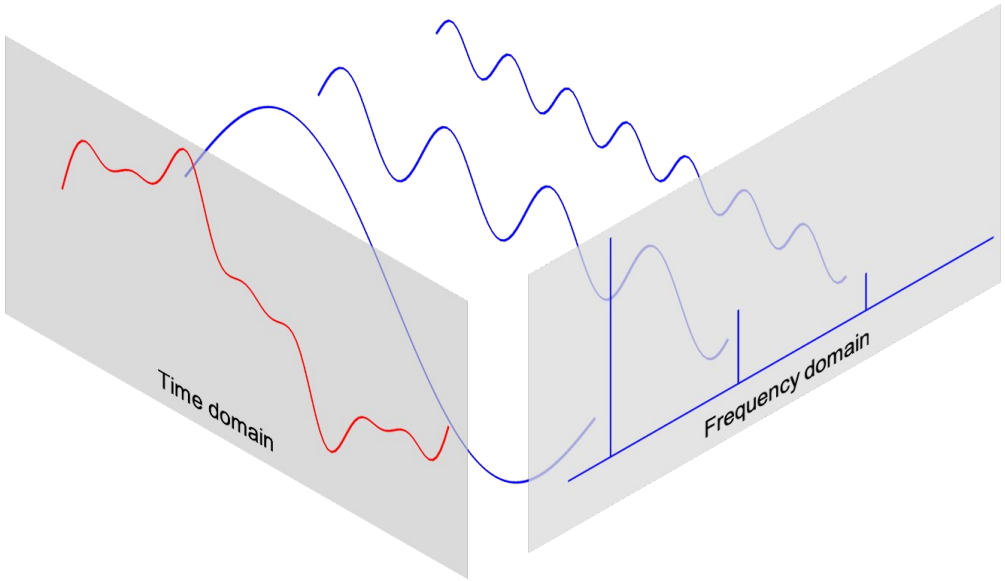
Fourier Transform

Decomposing a function into its frequency components



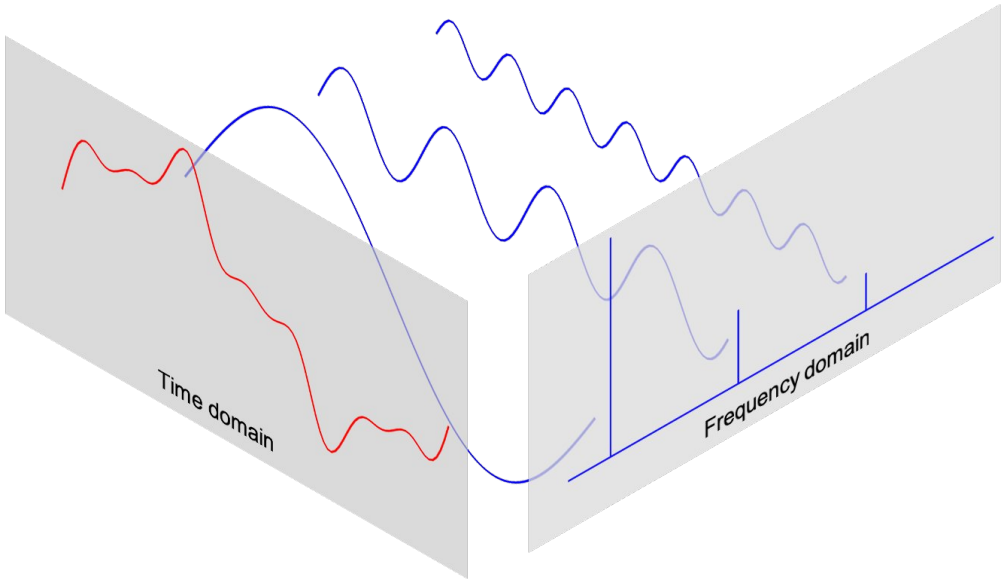
Fourier Transform

Decomposing a function into its frequency components

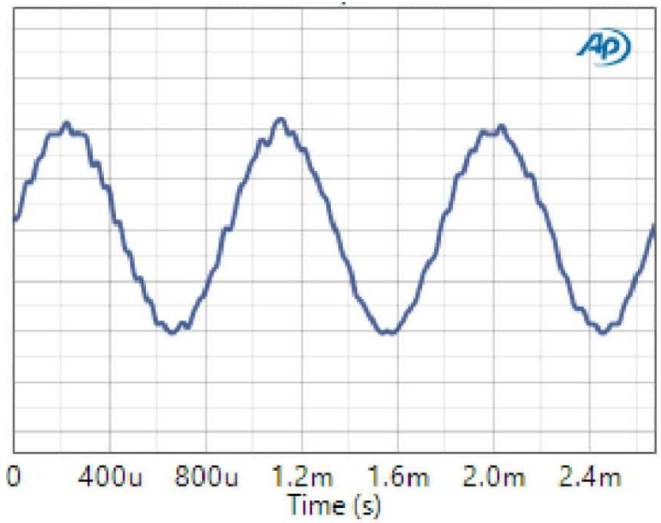


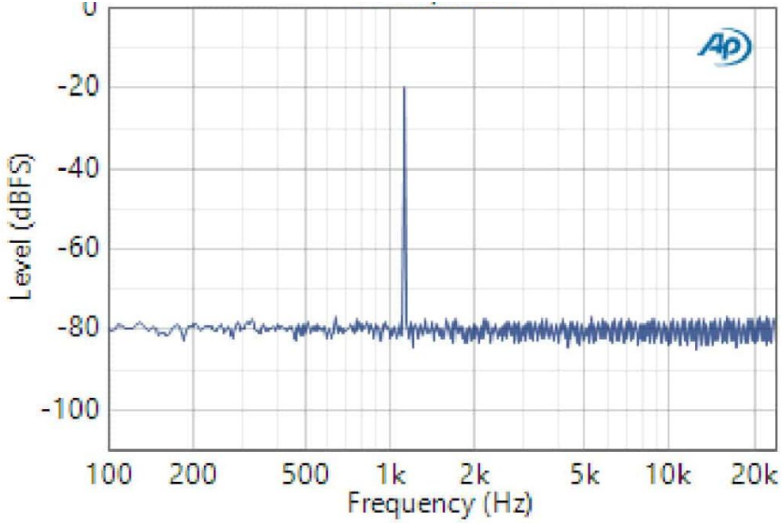
Fourier Transform

Same signal, different point of view!

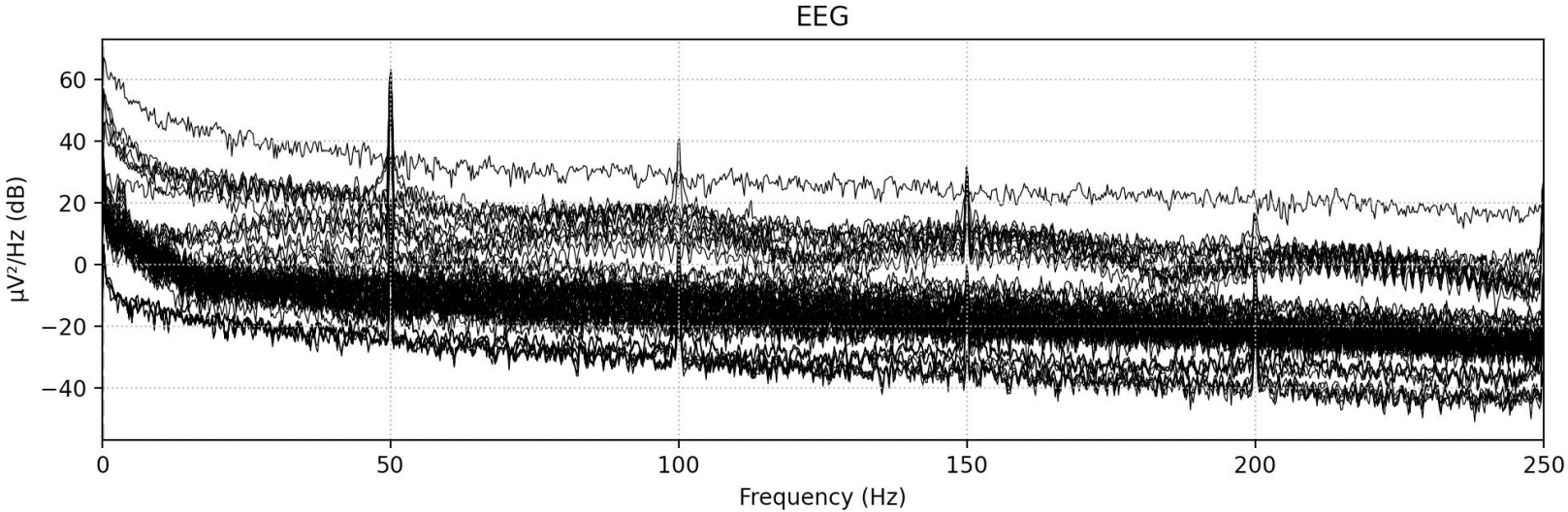


From Time to Frequency→ Spectrum



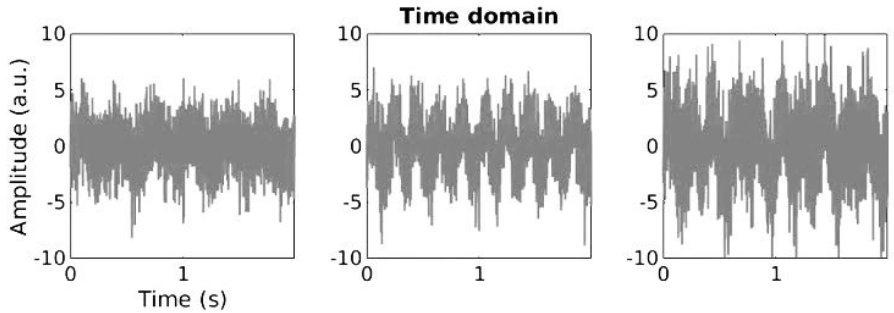


EEG Spectrum



Why?

Sometimes the time domain is not very informative



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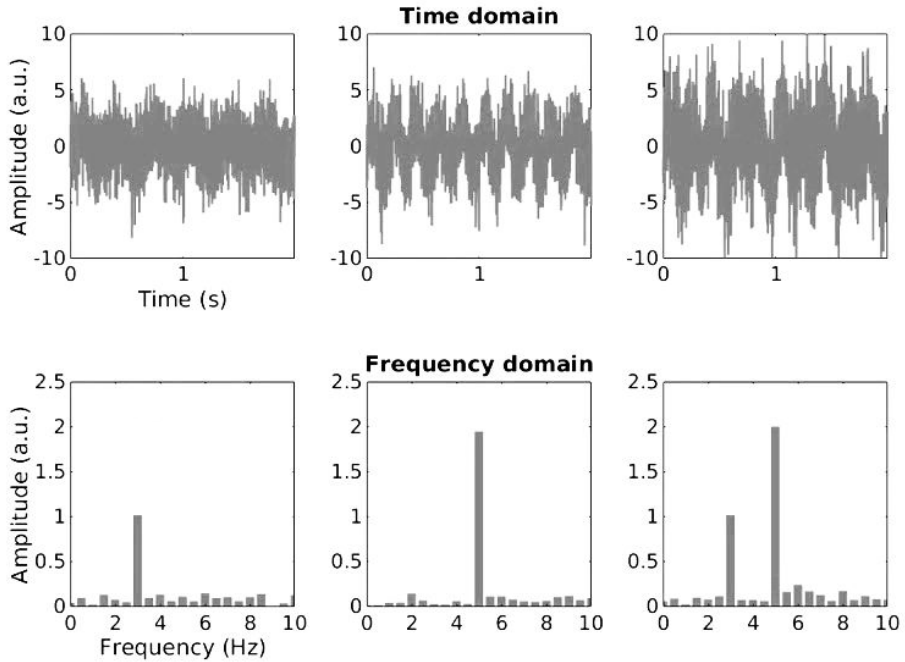
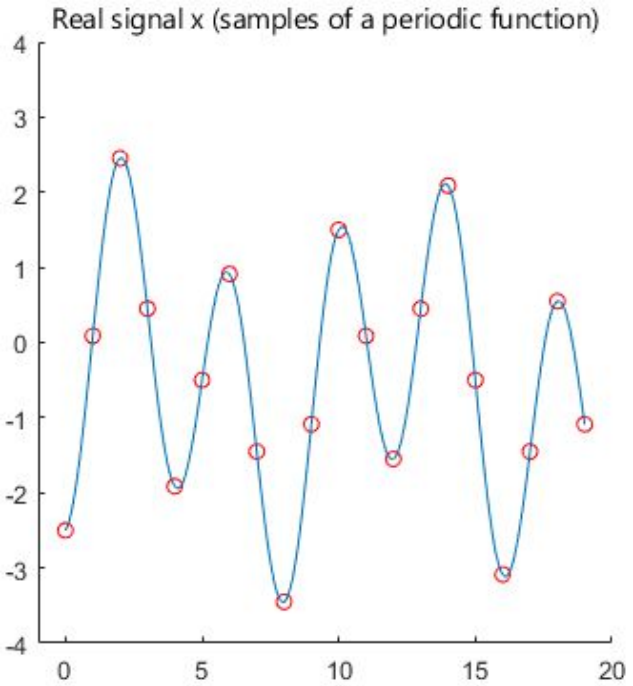
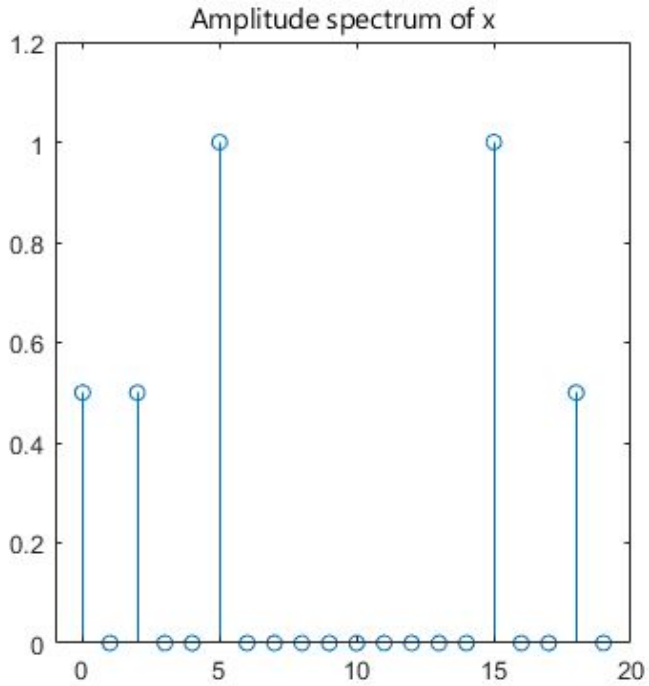
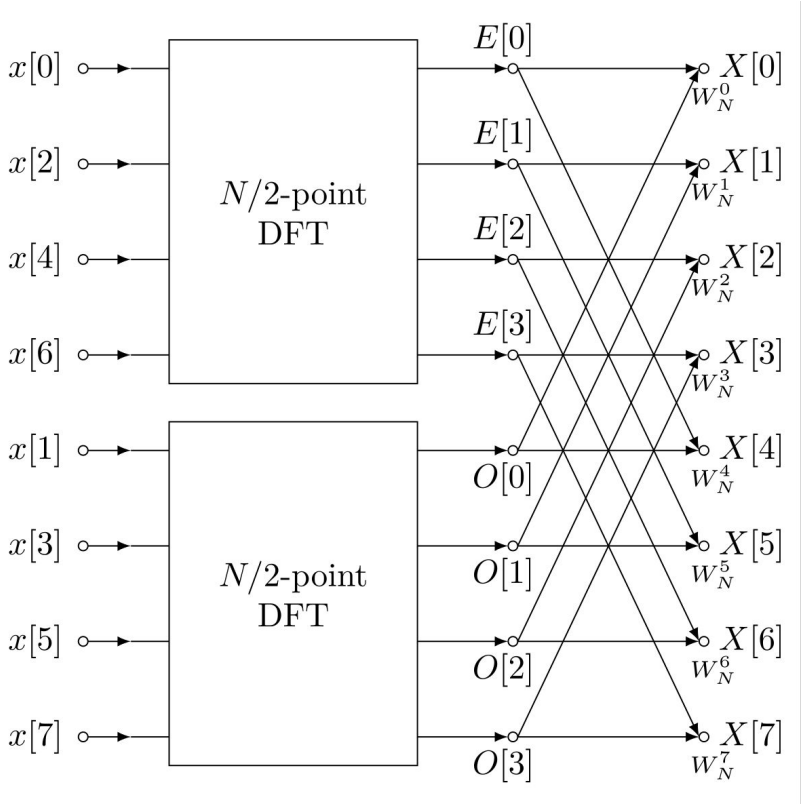


Discrete Fourier Transform (DFT)





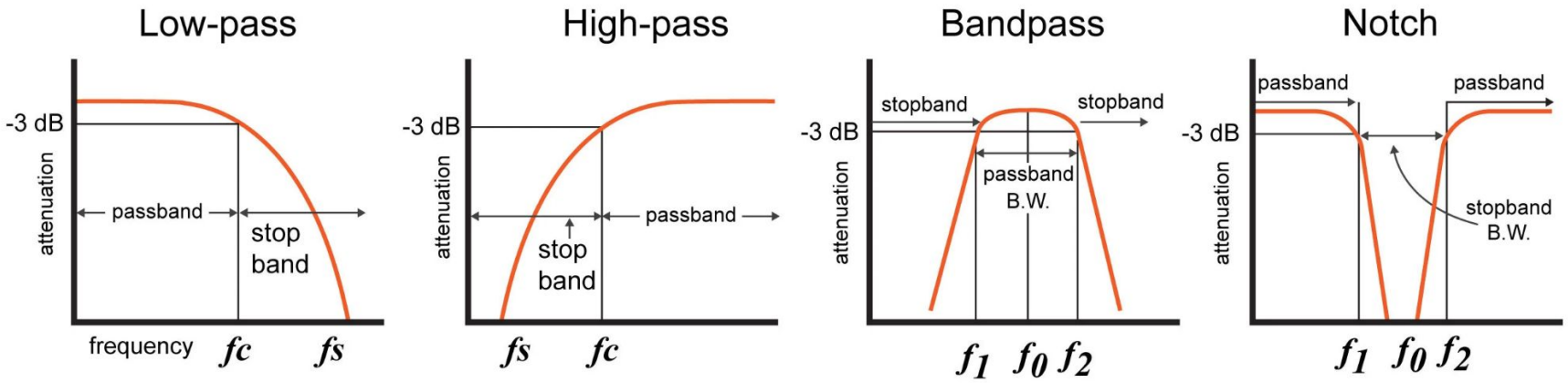
Fast Fourier Transform (FFT)



What is this good for?

Filtering

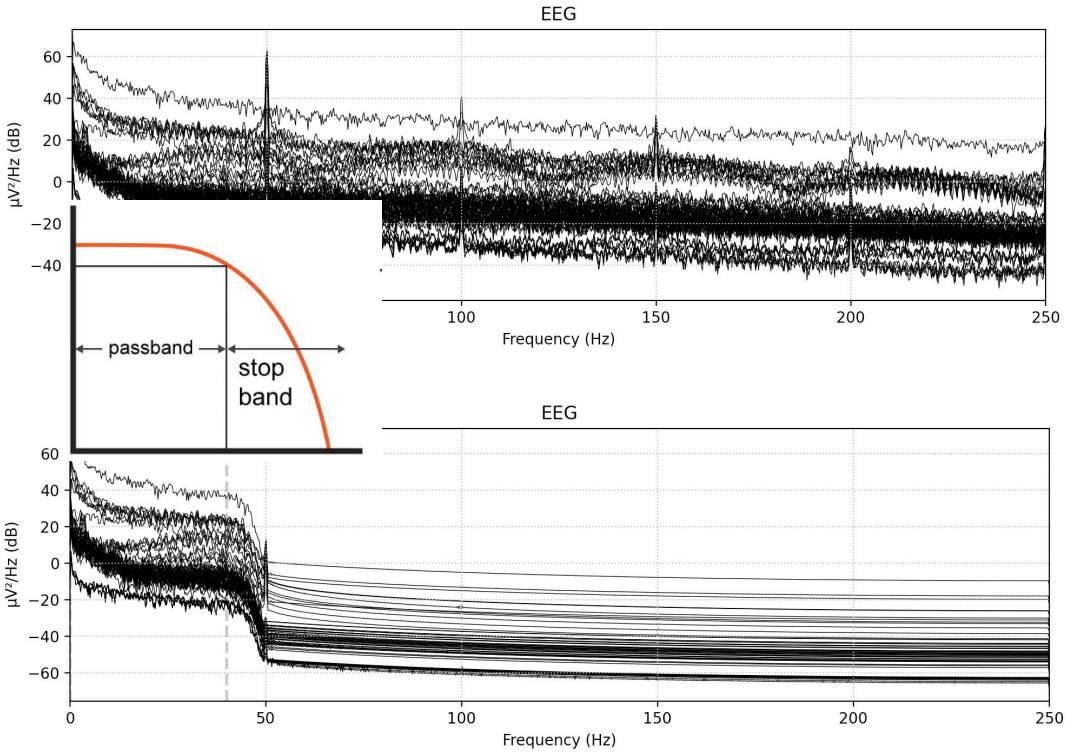
A process that removes some unwanted components from a signal



Low Pass (LP) filter - Frequency domain

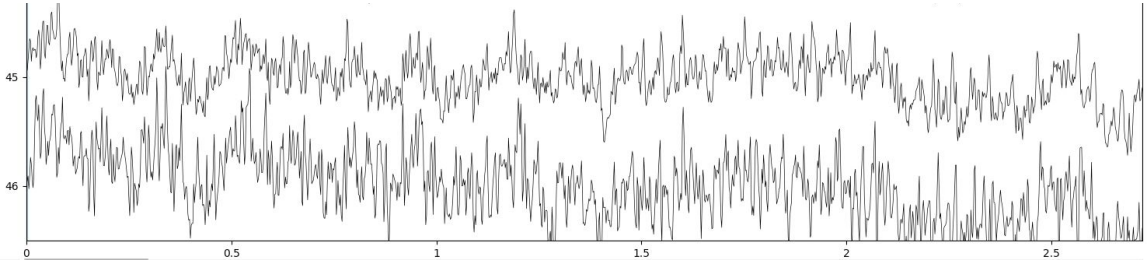
raw

raw_filtered
(LP = 40Hz)

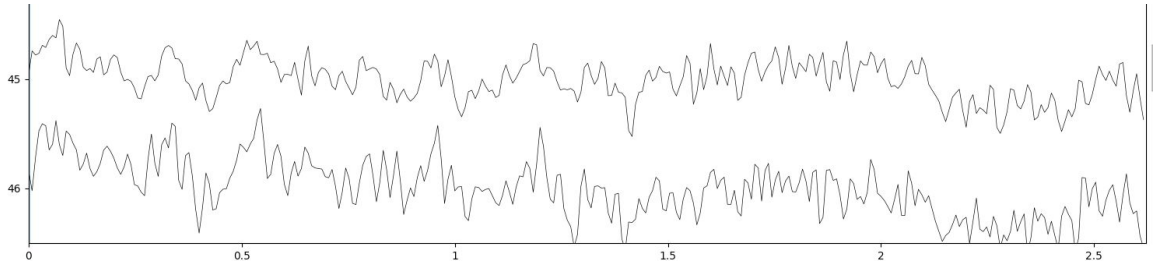


Low Pass (LP) filter - Time domain

raw

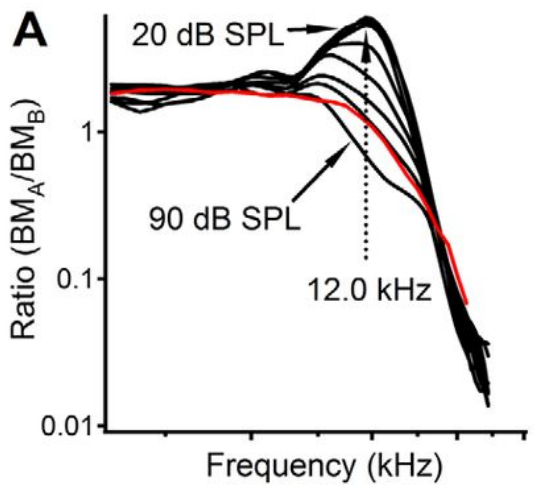


raw_filtered
(LP = 40Hz)

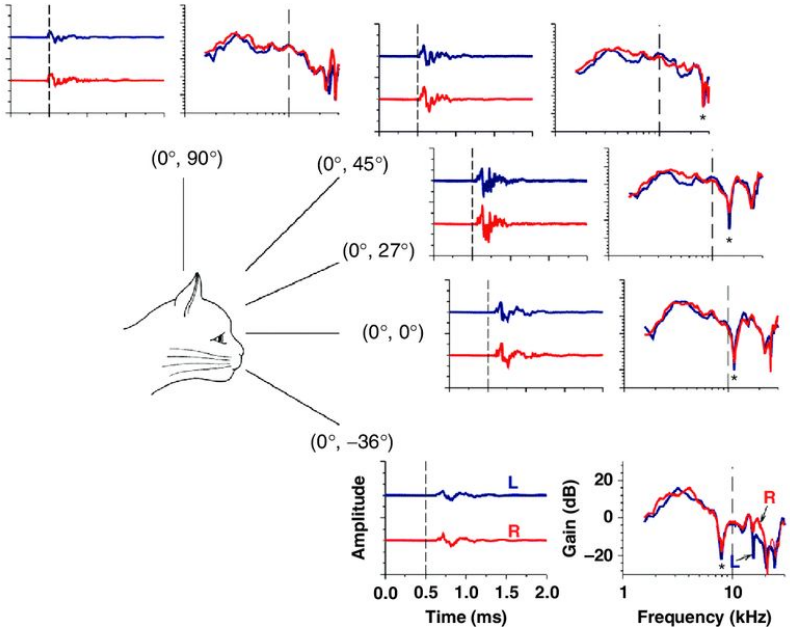


Transfer Functions are filters

Transfer Function of the human basilar membrane



Head Related Transfer Function (HRTF) of the cat



Documentation

- MNE Filtering and resampling