Advanced Neuroscience

Homework #4

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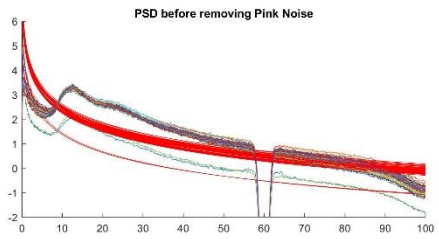
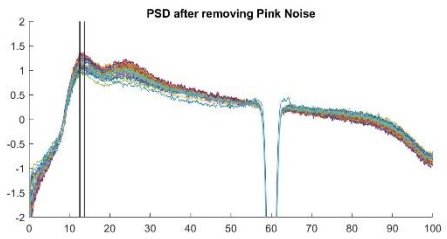
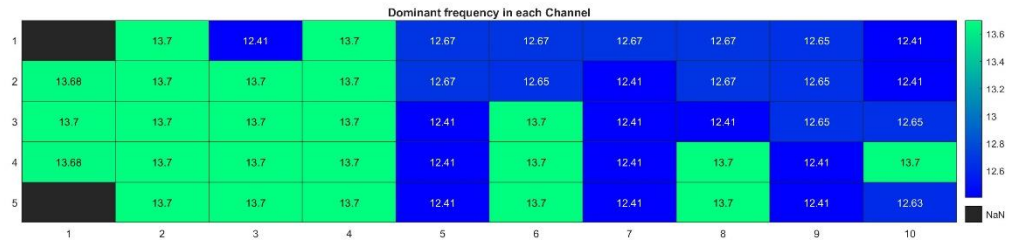
- **1-1 & 1-2-**
  Concatenate all trials for each channel together and used "pspectrum" function. Then removed pink noise by fitting 1/F, using "polyfit" function.

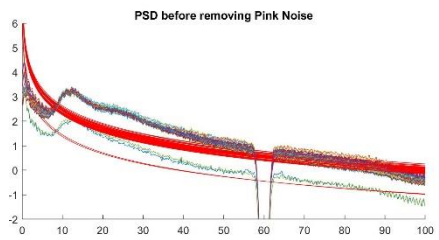
Full Trial

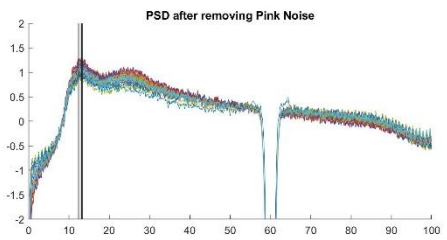


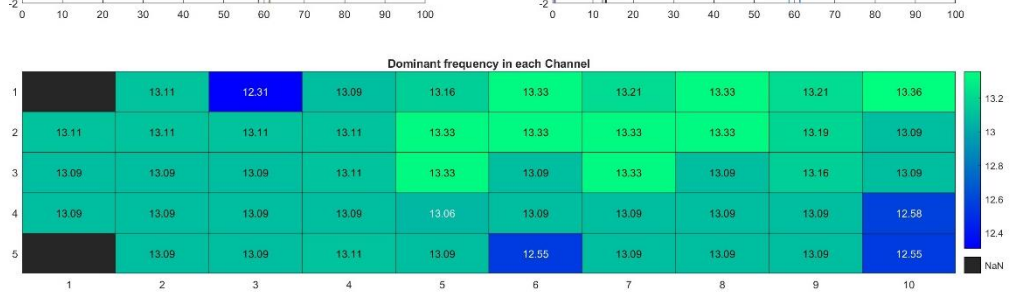




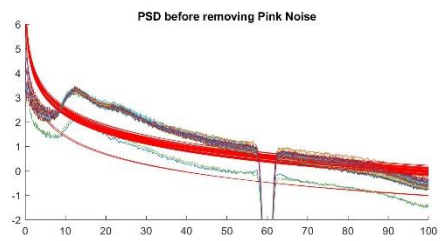
Before Cue

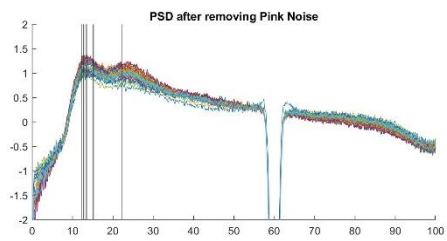






After Cue





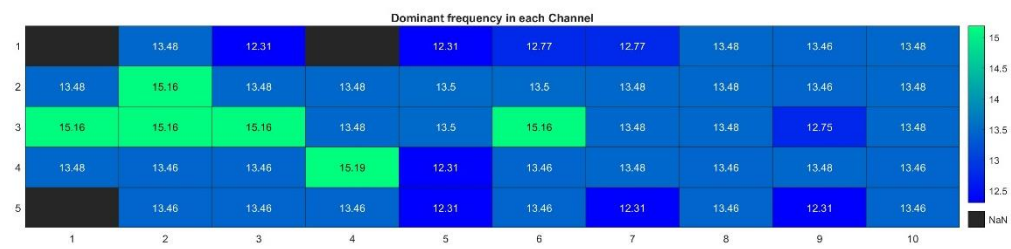
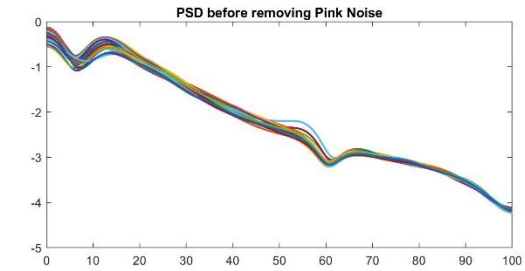


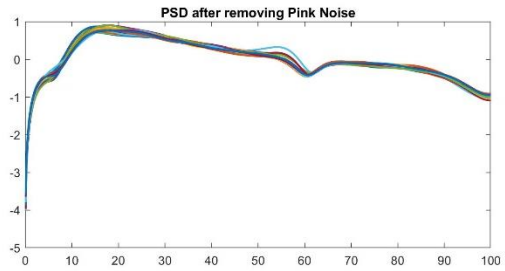
Table 1 Dominant Frequency (Hz)

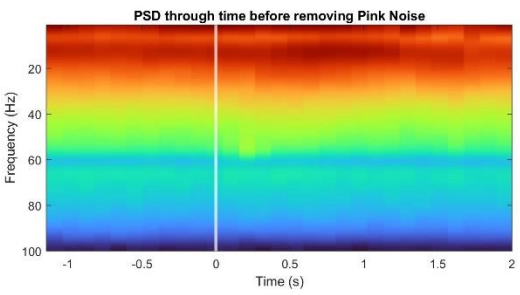
Full Trial	*Before Cue*	*After Cue*
13.1119	**13.0992**	**13.5249**

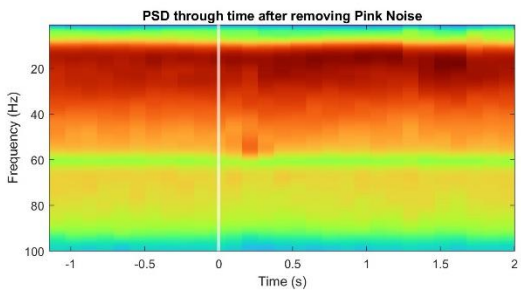
- **1-3-**
  Used pspectrum's STFT option for each signal; then averaged PSD over trials for each channel.

Channel: 4

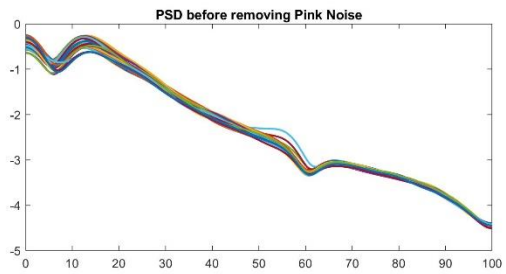


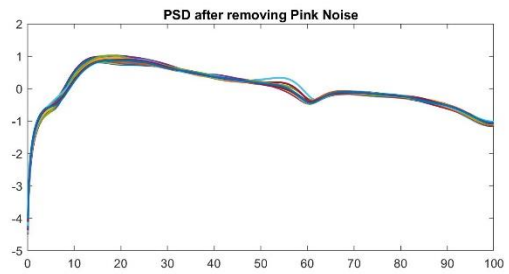


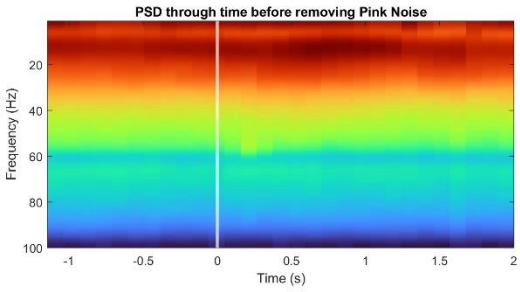


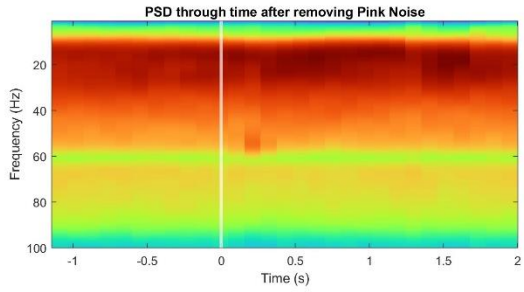


Channel: 11





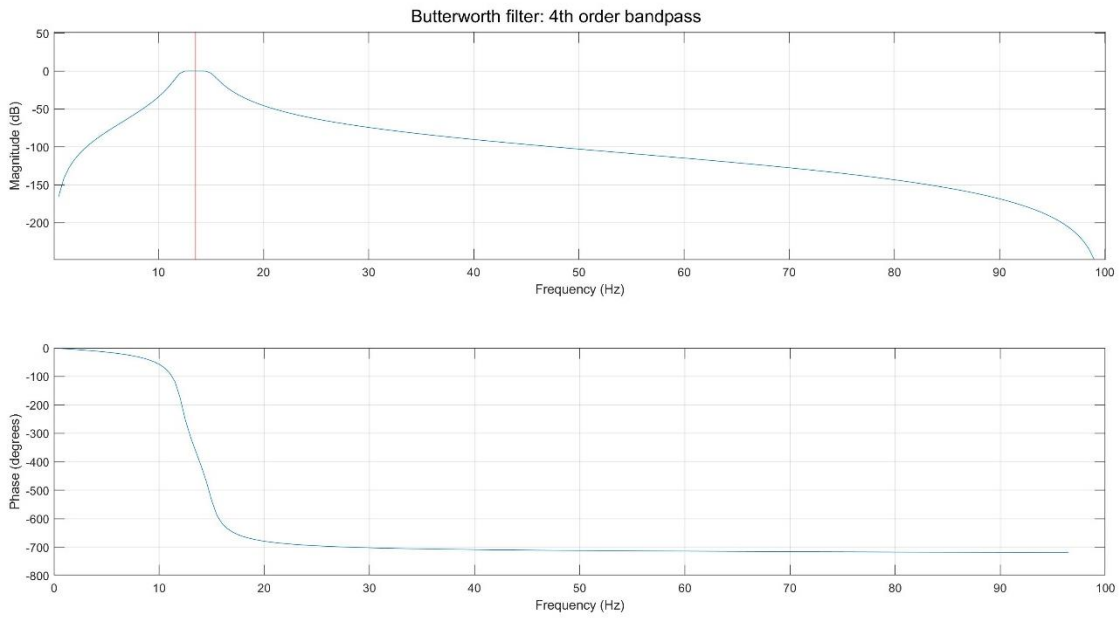




- **1-4-**

  There is a similarity; as we can see there is an slight increase in PSD magnitude after Cue onset around the dominant frequency (dark red areas).

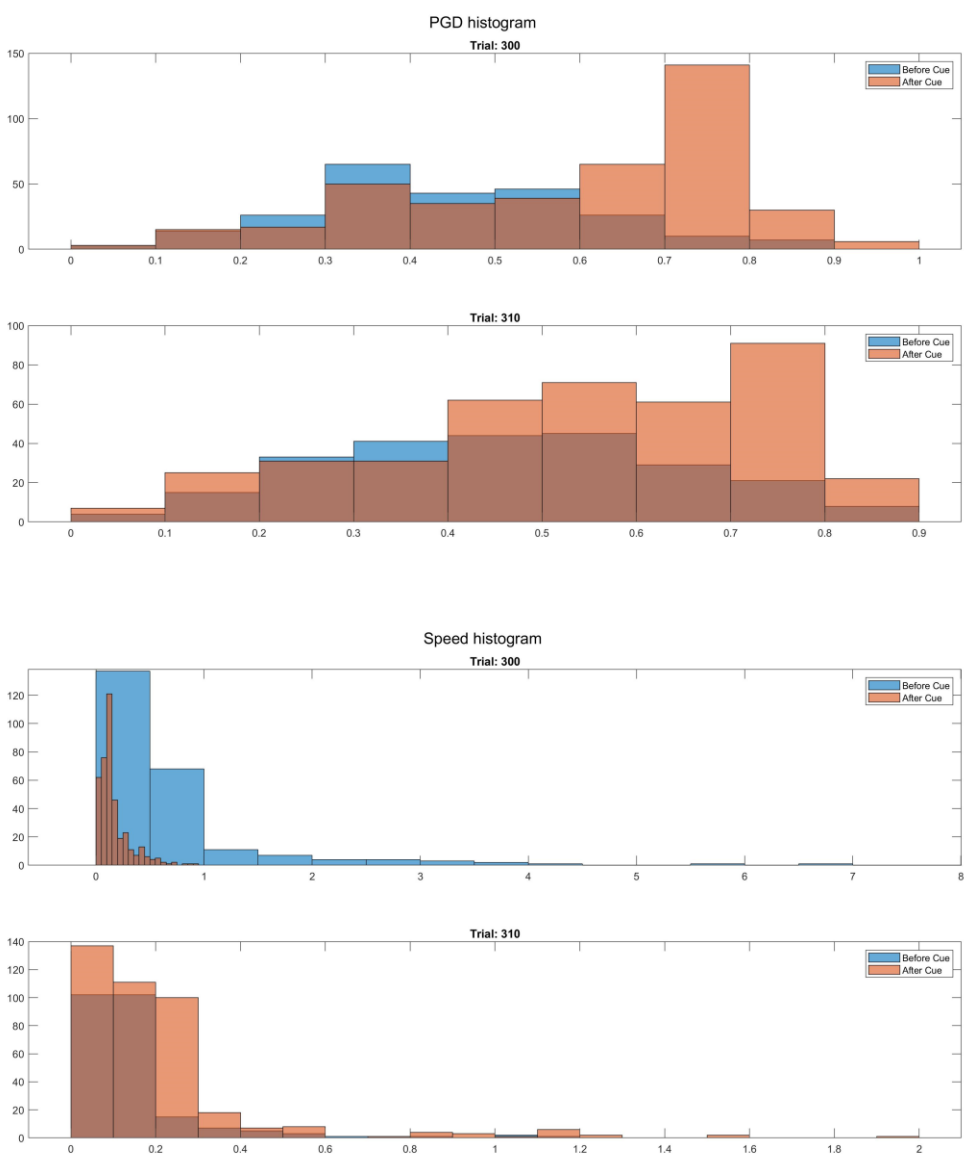
- **2-1-**
  "After cue" dominant frequency is chosen for rest of the experiment:



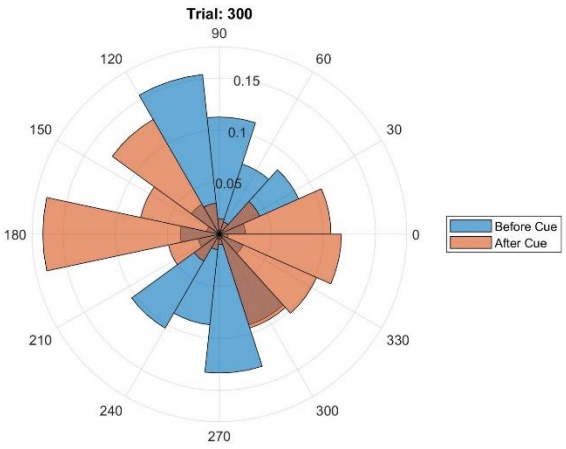
- **2-2 – 2-5-**

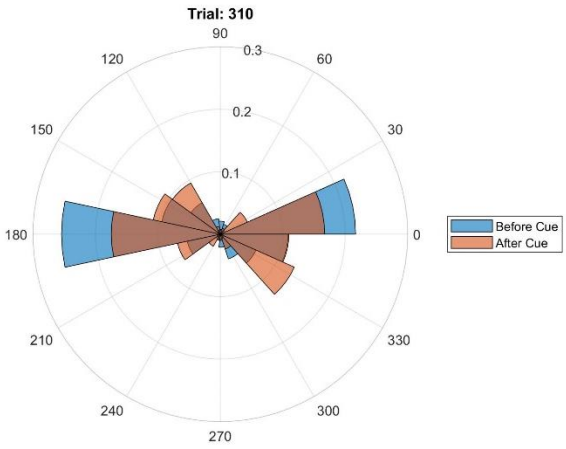
2 trials were chosen to show as demonstration (trials 300 & 310) which wave gets stronger after cue.

Both trials have higher PGD after cue.



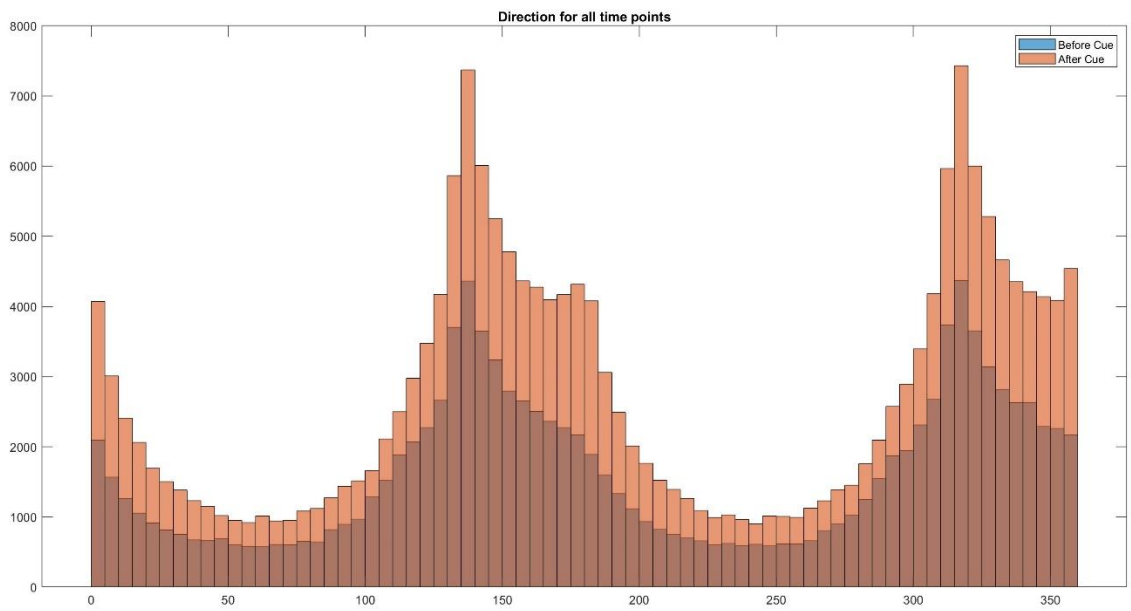
Direction histogram





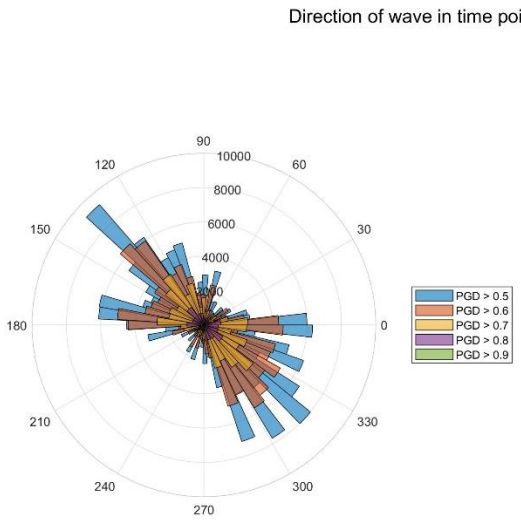
Trial 300 changes gradient direction after cue while trial 310 stays the same.

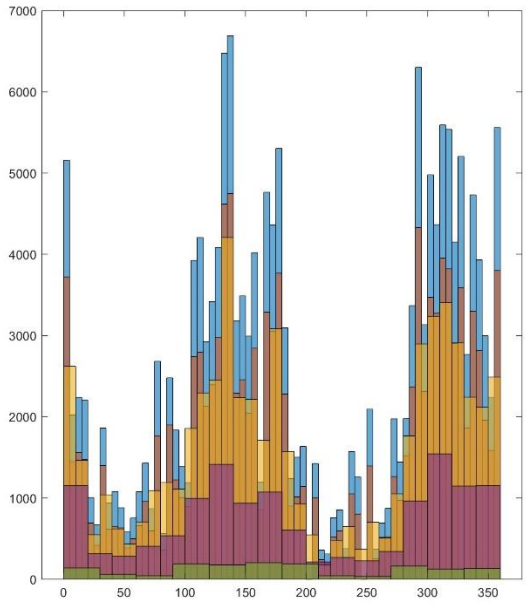
- **2-6-**
  Histogram for all time points show that we have more gradient directions around 0°, 130° and 330°.



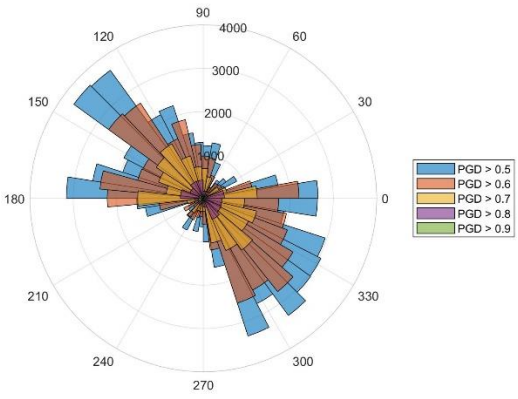
We know that wave has higher PGD; we will show histogram for PGDs above 0.5.

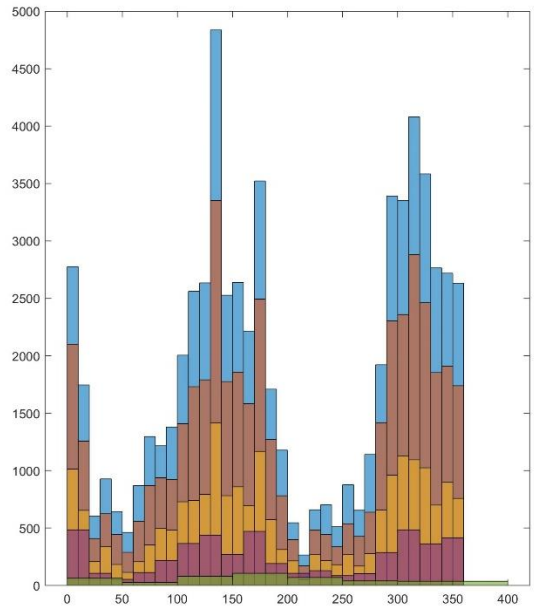
Direction of wave in time points with PGD above criteria (Full Trial)



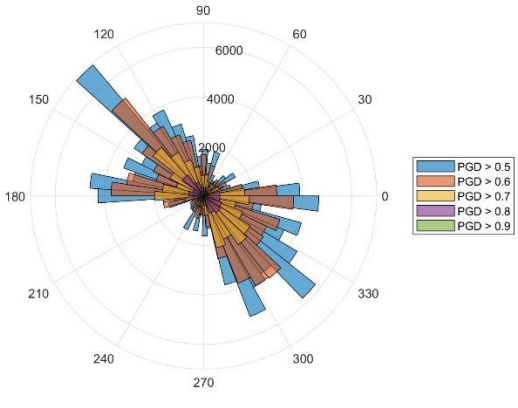


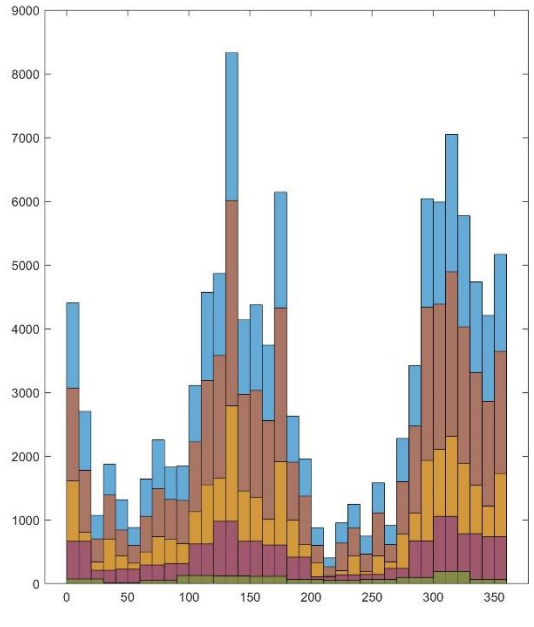
Direction of wave in time points with PGD above criteria (Before Cue)





Direction of wave in time points with PGD above criteria (After Cue)





It is still consistent with directions from all time points (we have waves most of the times).

- **2-7-**

Histogram for all time points and averages over time and trial shows we have majority of speed below 1 m/s (mostly below 0.8 m/s).

In both average over time and trial we see same results as Sejnowski's reported results (0.1-0.8 m/s) while majority are below 0.5 m/s.