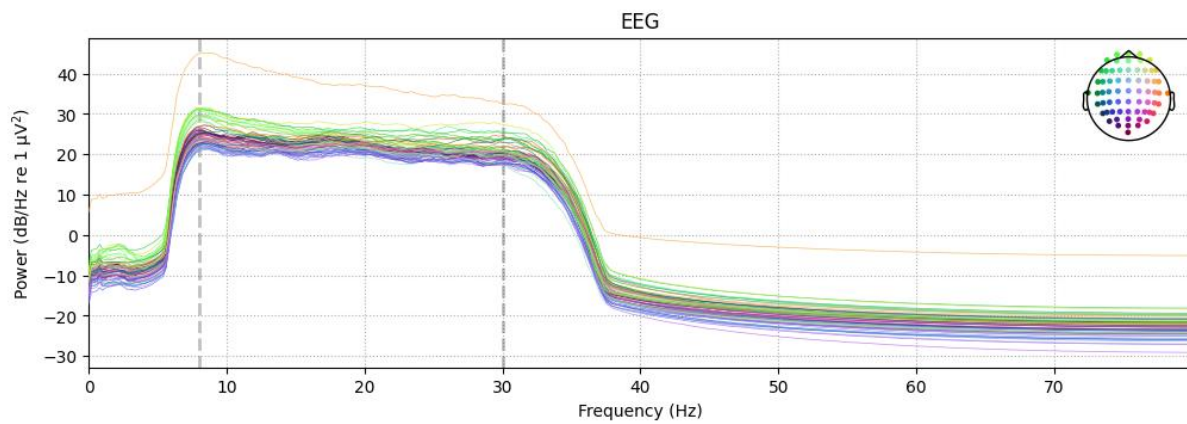# 1. Power Spectral Density (PSD) Plot

This graph is a **Power Spectral Density (PSD) plot**, which shows the strength of different brainwave frequencies for each EEG sensor (represented by the coloured lines). You can see that the signals have been filtered, as the power is very low for frequencies below ~8 Hz and above ~30 Hz. This is a common preprocessing step in BCI to focus only on the brain rhythms most relevant for motor imagery, such as the alpha and beta bands.

# 2. Time-Frequency Representation (TFR) Plot
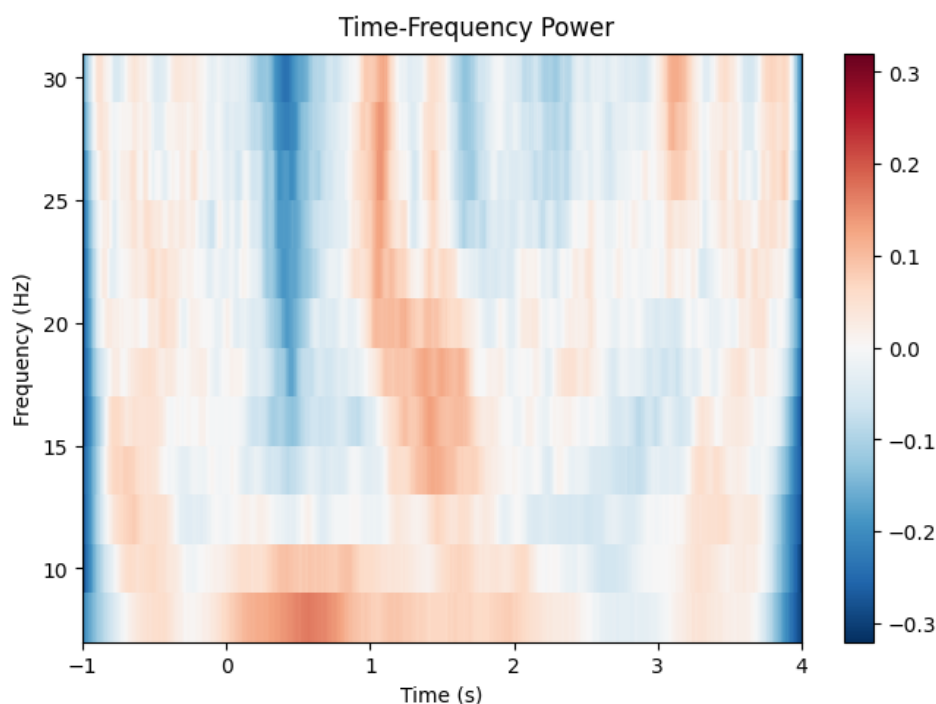
This **Time-Frequency Representation (TFR)** plot is a map showing how different brainwave rhythms change in strength after a cue is given at time zero.

- Warm colors (red) show an increase in power.

- Cool colors (blue) show a decrease in power.

In this specific plot, you can see that right after the cue, the power decreases (the blue area), which suggests the brain is activating to perform a task. This is followed by a rebound increase in power (the red area) between 1 and 2.5 seconds as the brain recovers, before everything returns to a normal baseline.

3. CSP Spatial Patterns Plot
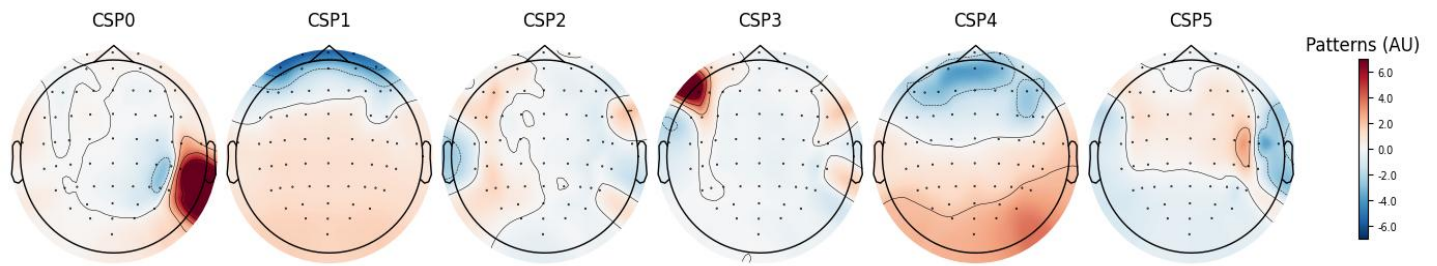
This image displays **Common Spatial Patterns (CSP)**, which are brain activity maps created for a Brain-Computer Interface (BCI) to best distinguish between two different mental tasks, such as imagining left versus right hand movement. Each circular plot represents a specific spatial filter, where the red and blue areas highlight the brain regions with the most important and opposing electrical activity for separating the tasks. A BCI system uses the strength of these key patterns (typically the first and last ones) to decode what the user is thinking.

4. Classification Score Over Time Plot
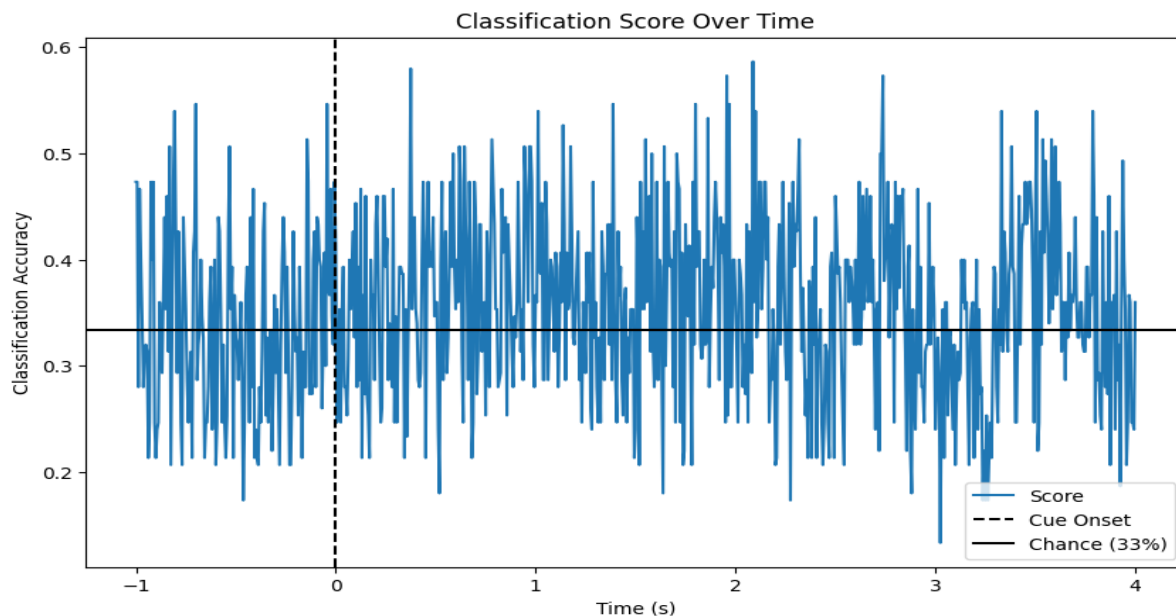
This graph shows the moment-by-moment accuracy of a Brain-Computer Interface (BCI) classifier for one run of one subject. The vertical dashed line at t=0 marks when a cue was given to the user to perform a mental task, and the horizontal line shows the accuracy of purely random guessing (33%). The plot demonstrates that after the cue, the classifier's accuracy (the fluctuating blue line) is consistently above chance, meaning it's successfully decoding information from the brain signals.