# Analysis 2

## Parameters:

* Used muselsl for streaming
* No frequency filtering
* Features: Hjorth parameters, alpha and beta band powers
* No artifact removal

## Results:

### Attention vs Relaxed

The visualization aims to identify differences between a subject who has their hand in closed form (attention) vs their baseline (relaxed)

A blue and green background

AI-generated content may be incorrect.

Figure : t-SNE of all parameters

A blue and green background

AI-generated content may be incorrect.

Figure t-SNE of only alpha and beta band powers.

Based off inspection, using only band powers produced better clustering. This could be due to the other features being derived from time a series. To ensure those features are relevant, consider applying a bandpass filter before extracting time domain features.

### Hand gesture classification

This visualization aims to identify differences in each classification: Full hand closed, Ok close, Prong close.

A colorful dots on a white background

AI-generated content may be incorrect.

Figure : t-SNE derived from all features

A colorful dots on a blue background

AI-generated content may be incorrect.

Figure : Using only alpha and beta band powers

In this case it seems like there is less apparent clustering for individual hand classifications from just frequency band powers. This makes sense because attnention vs relaxed is a measure of brain state over longer periods of time. A hand movement is more of an event trigger/ sudden change between states which will require some degree of time series analysis.

### Premotor vs Action

A pink and yellow background with small dots

AI-generated content may be incorrect.

Figure Using all features

A white and pink background with small dots

AI-generated content may be incorrect.

Figure Using only alpha and beta band powers

## Future Experimentation

To accommodate for session level brain states, use comparative methods ex. How much does Action vs baseline, action vs premotor, focused vs baseline differ from each other. This allows the model to be more flexible because baselines can differ between recording sessions. Model needs to be able to adapt to any session level brain states.