



Segmentation

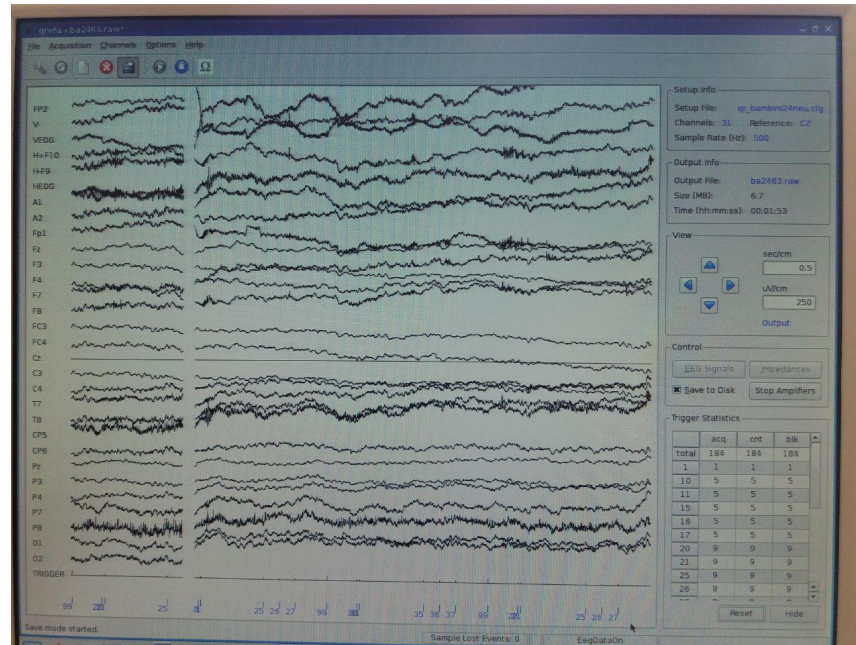
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Continuous EEG

EEG signal is
originally continuous





Segmentation

- For ERP studies, the signal is segmented based on **triggers**
- You only analyze the segments of interest, i.e. time windows around your stimulus of interest
- Segments usually include a few hundred of milliseconds **pre-stimulus** as a **baseline** and several hundred milliseconds or even over a second **post-stimulus**



Trigger files

- triggers are sent from your presentation computer to your EEG computer
- triggers let you know which part of the EEG signal corresponds to which part of your experiment
- triggers can be a string of letters and numbers
- design your triggers with your analysis in mind; try analyzing your first dataset before acquiring the rest
- **document your triggers** - other people should be able to understand them
- **it's always better to send too many triggers than too little** - you can always choose to only use some of your triggers for analysis



Trigger files

Example: in a visual oddball paradigm, you might want to send a trigger for each letter you present

- trigger “sta” for standards (frequent stimuli)
- trigger “dev” for deviants (infrequent stimuli)



Exercise

Take your N400 experiment you designed earlier and add triggers to it



Length of time windows

- **pre-stimulus / baseline period:** typically at least 100 ms
- **post-stimulus period:**
 - depending on your effect of interest, e.g. shorter for an N1 experiment than a P600 experiment
 - usually a few hundred ms longer than the latency of your effect of interest

Exercise: why not just make the time window as long as possible?



Exercise

- Assume we have an N400 experiment with the following stimuli:
 - Cond 1: For breakfast, I had some bread
 - Cond 2: For breakfast, I had some table
- Which time window would you choose for segmentation, i.e. which word would you timelock your signal to?



Segmenting in FieldTrip

- FieldTrip uses 2 functions for segmentation
 1. `ft_definetrial`
 2. `ft_redefinetrial`
- `ft_definetrial` takes a `cfg` as input that includes options for segmentation and **outputs a `cfg`**
- `ft_redefinetrial` takes the `cfg` that `ft_definetrial` outputs as input



trialfun

- ft_definetrial needs a “trialfun” as one of its cfg options
- Trialsfuns are **functions** that use triggers and the sampling rate to calculate the onset and offset of each trial
- FieldTrip supplies a default trialfun, but they can also be written manually



Trigger files

- Let's start by having a look at the triggers in our data
- Use `ft_definetrial` with `cfg.trialdef.eventtype = '?'` to inspect the triggers
- What do our triggers look like?
- Prior to segmentation, what does your data structure look like?
- Use `trialfun_affcog.m` (provided by FieldTrip) as the `trialfun`, `ft_definetrial` and `ft_redefinetrial` to segment your EEG signal
- What does your data structure look like after segmentation?