Data structure of animal Koz4 (30 channel electrode):

The data structure is as follows (explained on example “140429”):

Koz4_140429_lfp_ch 1-16:

- Three-dimensional variable that contains information about LFP channels 1 to 16 (for information about channels see “Channel map.docx”)
- 1st dimensions: raw LFP data from channels 1 to 16 (hardware filtered at 0.1 and 300 Hz)
- 2nd dimension: sample rate (the “weird” non-integer value of our SR is due to the intrinsic maximum SR of the Tucker Davis recording system)
- 3rd dimension: channel list (list of numbers from 1-16 for offline channel mapping if needed)

Koz4_140429_lfp_ch 17-32:

- Same as for “Koz4_140429_lfp_ch 1-16” but for LFP channels 17 to 32 (for information about channels see “Channel map.docx”)

Koz4_140429_info_Tria:

- Three-dimensional variable that contains information about the trial onset
- 1st dimensions: name
- 2nd dimension: timestamps indicating the start of each trial in seconds
- 3rd dimension: trial list

Koz4_140429_info_Stro:

- Three-dimensional variable that contains information about tone onset and Go/NoGo trials
- 1st dimensions: name

- 2nd dimension: timestamps indicating the onset of each FM-tone in seconds
- 3rd dimension: list of 0s and 1s matching the list of tone onsets (“0” indicates that the respective tone was played during a Go trial, “1” indicates that the tone was played during a NoGo trial)

Koz4_140429_info_Shoc:

- Three-dimensional variable that contains information about the onset and offset of shocks
- 1st dimensions: name
- 2nd dimension: timestamps indicating the onset and end of each shock in seconds
- 3rd dimension: list of 0s and 1s matching the list of shock onset and end (“1” indicates the start of the shock, “1” indicates end of the shock)

The experiment:

The gerbil is in the shuttle box. A rectangular electrode array with 20 electrodes has been implanted above the auditory cortex on top of the dura mater (for the spatial arrangement of surface array electrodes see “Channel map.docx”). In addition, a wire bundle of 8 depth electrodes has been implanted into the striatum.

The gerbil is exposed to two different types of tones: linear **rising** frequency modulated tones (FM 2-4 kHz, duration 200ms) and **falling** FM (FM 4-2 kHz, duration 200ms). These FM tones are presented not as single tones but in a short sequence: FM-pause-FM-pause-FM-pause ….

A pause is 300 ms long (corresponding to an inter-stimulus-interval of 500 ms). Every sequence consists solely of rising **OR** falling FMs, but **not** of a mixture of alternating rising and falling FMs.

The gerbil is supposed to learn to move from one side of the box (by crossing a small hurdle) to the other side of the box when the **FM rise** occurs (which is why we call it **Go tone** or **Go trial**). If the animal crosses the hurdle within a time period of 6 s after tone sequence onset (**Hit**) the tone is switched off, the trial ends and after an inter-trail interval of 25 to 30 s, the next tone sequence (and, therefore, the next trial) starts. If the animal misses to jump within the 6 s window (**Miss**), it receives a mild to moderate electrical foot shock via the metallic grid floor of the shuttle-box. This results in a forced escape response to the other side of the box after which both shock and tone are switched off (end of trial). One can see the foot shock in the LFP-signal.

For the **FM fall** the animal is supposed to stay within the presently occupied compartment of the box for at least 10s (which corresponds to a **Correct Rejection** and ends the trial). If it does change compartments during such a **NoGo trial** (**False Alarm**), it will receive a foot shock after crossing the hurdle and the trials ends with the end of the foot shock.

One training session (which corresponds to one full training day) consist of **96 trials** (48 Go and NoGo 48 trials). The trial sequence is the same for every day and is coded in an offline list (based on a Gellermann sequence).

So we present 96 trials, but, however, there are 97 time stamps. This is due to the fact that the last trial timestamp only serves to indicate the end of the training session and can thus be ignored.

Movement artifacts:

In the current dataset (Koz4) you will notice pronounced movement artifacts that manifest as voltage deflections which are one to two orders of magnitude larger than the biological signal from the brain (see thumbnail below). These movement artifacts are the result of some sort of “bad” ground loop (due to initial grounding of both the headstage and the grid floor in our setup) and are completely of non-biological origin. However, as they are related to movement of the animal, those artifacts are particularly evident in Go trials when the animal has to cross the hurdle.

By now, we managed to solve the grounding issue within our recording setup and the next dataset that you will receive, hopefully, in about a month or so should contain no more of these massive artifacts related to movement of the animal. Meanwhile, we have to deal with the current dataset containing such artifacts. Since they completely obscure the signal, only segments of trials free from those artifacts should be analyzed for now (e.g. the segment **before** the animal crosses the hurdle in a Go trial).