

## EEG lab user guide

This manual is meant as a basic guide to testing participants in the EEG lab, using the Brain Vision Recorder software. If you are a new user, please contact the lab manager ([Birgit.Knudsen@mpi.nl](mailto:Birgit.Knudsen@mpi.nl)) for a lab tour and help with your pilot-participant and first test-participant.

The MPI has 2 EEG labs: 146/147 and A107 and two dual-EEG labs: room 222: dual-EEG + eye-tracker and room 223: dual-EEG + RIFT

We use the **standard 10-20 ActiCAP montage** for 32 or 64 channels (see PDF of the montage on Maxintra)

### General

- Handle EEG equipment with care (see Figure 1). Cables, wires and electrodes are fragile. Do not twist or pull the cables and **always avoid** contact of the amplifiers, splitterboxes, controlbox and cables with **water**.
- Treat your participants well. Explain the whole procedure (EEG cap preparation, filling out consent form, experiment which lasts N mins with N nr of breaks , more paperwork, etc.) to your participant. If the participant is new to EEG, introduce and explain everything, especially the use of the blunt needles, carefully.
- Work in a hygienic fashion. Use new needles for each participant, and make sure the cap is clean (washed and, in some cases, soaked in the disinfectant sekusept, see 'EEG Lab Cleaning Procedure'). Syringes are cleaned and re-used.
- If supplies are running out (gel, syringes, needles, alcohol, shampoo, etc.) please let the lab manager know as soon as possible.
- Please write down any problems, questions, suggestions in the lab notebook.

### Before the participant arrives

1. Use the big red button to turn on the electricity
2. Turn on the computers (one for EEG recording, one for running the Presentation script, one for the Camera in the experiment room).
3. Make sure that the caps and electrodes (and other items in the lab) are properly cleaned. When dirty or broken, please notify the lab manager.
4. Prepare everything you need on the table - take the CAP PREP BOX from one of the cupboards (contains electrode rings, syringes, needles, stickers, alcohol, cotton pads, scrub, measuring tape), and a box with gel (when opening a new one, please write the opening date on it) :
  - fill the syringe(s) with gel
  - needle(s)

- 4 or 6 plastic electrode rings (to attach the face(eye)/mastoid-electrodes)
- stickers
- alcoholswabs
- cotton pads
- scrub (NuPrep)
- fully charged batteries (put spare batteries in the charger)
- measuring tape
- spread out the set with electrodes that you are going to use
- towel to put around the participant's shoulders
- if capsize is registered in the participant database: take the right size and start attaching the electrodes to the cap (this saves some time!)

5. Make an entry for the set you are going to use (note the label on the controlbox and/or splitterbox) with your name and the date in the EEG lab notebook
6. Turn on the lights in the experiment room.

### **Controller room**

7. Open Vision Recorder on the EEG computer; **turn off the network connection**
8. Create/open your personal **workspace** (with filter settings and montage)
9. **Turn off the network** on Presentation computer; open your experiment

**!WARNING!** If you use audio or video stimuli requiring accurate timing, presentation requires things to be set up in a specific way which may not be intuitive. Please contact Maarten van den Heuvel (via a TG-ticket, helpdesk@mpi.nl) to ensure that the settings are correct!

10. Use the switch box to choose the screen that should be displayed in the experiment room
11. check whether all settings are correct for your experiment (e.g. sound settings)

### **Preparing the participant**

12. Ask whether the participant needs to go to the bathroom
13. Ask participant to switch off his/her phone
14. Ask participant to fill out consent form; make sure the participant understands his/her rights and the procedure
15. Measure the participant's head: around the entire head, just above the ears (where the brim of a hat would be): get the right cap size (available sizes 54-56-58-60; cap should fit tightly)
16. Attach the electrodes to the cap on the **styrofoam head** (match numbers on the electrodes with numbers of the holes in the cap)  
Put the cap on the participants head by pulling gently! Please note that cables easily catch on the hard plastic electrode labels. You may have to stop pulling and loosening up the cables.
17. Clean the places on the skin and mastoids where you will stick additional electrodes, using a little bit of scrub gel (NuPrep) and alcoholswabs (be careful with the alcohol):

18. Attach the plastic rings to the electrodes and place them on the skin/mastoids
19. Connect GROUND and REF cables to the Control Box ('stick' them in the right holes)
20. Put the cap with all the electrodes on the participant's head. Attach the cap using the chin strap, check with the participant that it is not too tight. **Make sure that the cap is placed correctly:** Cz should be in the middle of inion and nasion and ear top to ear top. If cap is adjusted, check Cz again. Stick the splitterboxes to the towel around the participant's shoulders with the clip; use some tape if necessary.
21. Show the participant that the needle is blunt, if you haven't already told them (let them touch the needle), before using it on his/her head
22. Place the batteries in the control box
23. Turn on the control box with on/off button, push Z for impedance check
24. Put gel in all electrodes; try to release the gel as close to the skin as possible; do not use too much gel so that individual electrodes do not connect!
25. First reduce impedance for **REF** and **GROUND** electrodes. Use the syringe + needle to move around the participant's hair and spread out the gel. If necessary, add a little bit of extra gel. Always check with the participant that it does not hurt!
26. Try to reduce impedance for each electrode until all the lights are green
27. The control-box times out after a couple of minutes, you will hear a beeping sound. Just switch on the box and the impedance check (Z) again
28. Bring participant to the booth

### ***Experiment booth***

30. Make sure the participant is seated comfortably, leaning with their backs against the chair and without any of the electrode cables caught behind their back/shoulders. Make sure the chair can no longer move using the handle
31. Take a Power Pack (battery) from the sink and put it on the table behind the participant's chair
32. Connect the Power Pack to the amplifiers using the round plugs
33. Turn on the amplifiers (switch on the back: power lights on the front should go on)
34. Connect the amplifier connection cables (flat grey ribbon cables) to the control box ( $\Delta$  to  $\Delta$ ). Do not push directly on the cable, only on the black plastic. Press gently until there is a click. The amplifiers are marked 1-32 and 33-64. Make sure the numbers on the amplifier and control box match (both should be 1-32 or 33-64)
35. Check impedance again; make sure that all the lights on the cap are still green! Use the needle again (and some extra gel) if needed
36. Switch off the impedance check by pressing the Z button
37. On the EEG computer: In Brain Vision Recorder, click on 'monitoring' (the 'eye' icon); For 146: if the computer gives you an error when you start, unplug and replace the USB jack in that computer. Note the scale of the signal that is displayed!
38. Let the participant watch his/her EEG signal: use the switch box to switch the monitor to the EEG screen
39. Explain why blinking, swallowing, and moving are bad, let the subject try it out to show what happens to the signal (noise!)

40. Use the switch box to change to the Presentation computer screen: let subject read instructions. Questions?
41. Tell your participant that you can see and hear him/her at all times during the experiment, with the camera in the experiment room; you are obliged to let them know beforehand
42. Close the doors of the experiment room
43. **Start and SAVE recording** in Brain Vision Recorder (using the 'play' icon). Check that it says '**SAVING**' in red under the EEG signal in Brain Vision Recorder!
44. Start the experiment
45. During breaks, use the microphone to check up on your participant, offer some water, etc.
46. Never leave the participant alone while recording.

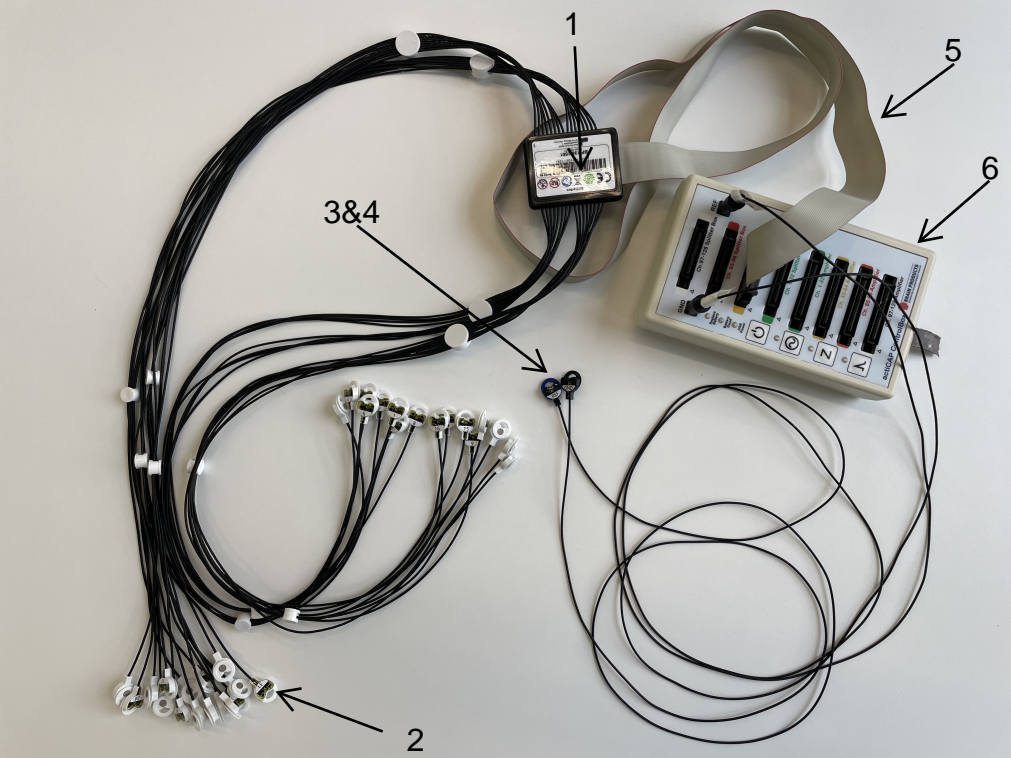
## After the experiment

- Stop recording and monitoring in Brain Vision Recorder. Switch off the amplifiers.
- Unplug the cables from the amplifiers. Walk the participant back to the control room and remove facial and mastoid electrodes as well as the cap.
- Debrief the participant
- Show the participant the way to the wash room. Give them a towel. Tell them to put the towel in the laundry basket when they are done.
- Clean the electrodes and the cap: See 'EEG Lab Cleaning Procedure'
- Charge the batteries in the socket
- Charge the Powerpack on the sink
- Throw all used needles and tissues away; syringes can be re-used
- Clean (gel stains on) the table, chairs, hand rests, button box/key board using baby lotion/ cleaning wipes
- Fill in the EEG lab notebook

## At the end of a testing day

- **Switch off the lights** in the booth and **close** both doors!
- Turn off all computers
- Turn off the electricity using the red button
- Add participant's cap size to the participant database, to speed up cap preparation for following EEG experiments.

Figure 1



- 1. Splitterbox
- 2. Electrodes
- 3. GROUND electrode
- 4. REF electrode
- 5. Flat cable
- 6. Control Box