EEG Experimental Protocol

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Version 1

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Contains lab specific instructions for: Gel Cap, EEGO amplifier, EEGO software & MOTU.

Contains general information for: Saline Cap

**PRE-EXPERIMENT PROCEDURES**

**(CONDUCT BEFORE PARTICIPANT ARRIVAL)**

**1. Turn on Experimental Computer, EEG Laptop & MOTU Sound card**

**2. Plug in the trigger cable (into MOTU output channel 1 and the EEG trigger input)**

(The triggers can also be sent via the internet, for this please look at EEGo documentation)

**3. Plug in special EEG earphones into L&R channels at the back of MOTU**

(Play youtube and test if both earphones are working perfectly (if not, the audio jacks are probably not inserted entirely)

**4. Set MOTU knob to -40dB and computer volume to 100%**

(MOTU sound intensity will differ across experiments)

**5. Launch the experiment and run a test to ensure that the stimuli and triggers are both working correctly**

(Make sure triggers are visible on the EEGo Computer)

**6. Make sure EEGo amplifier has enough battery**

**NAVIGATING EEGO & CAP PREPARATIONS**

**1. Explain the experiment to the participant properly**

**2. Ensure that the pre-experimental procedures are completed**

(If yes, proceed to set up the EEG cap. If there's an issue, contact the respective FYP/EEG supervisor to help.)

**3. Plug the cap into the amplifier**

(They are labelled, so do it accordingly)

**4. Turn on the EEGO amplifier - black button behind it**

**5. Open EEG064 software on the EEG laptop and click “acquire” in the top left corner**

6. **Default Sampling Rate is 500**

(You may want to change the SR based on your experiment. Confirm with supervisor.)

**7. Click "New Subject" and type their name under first name' and indicate left/right handedness under last name'. Log ‘Date of Birth’ as the date the experiment was conducted.**

(Create a CSV file with all your participant information including and no limited to: #, Name, Handedness, Date of Birth, Date of Experiment, Contact Information, Errors in the experiment)

**8. Properly put the cap on and take measurements to confirm it**

(Read: Mounting the cap, if confused)

**9. Click “impedance” to check impedance while gelling the participant.**

(Make sure impedances of all electrodes are at least below 20 and are green in colour)

**10. Gel every electrode (even M1 and M2 behind the ears).**

(This step can be skipped if using the saline cap)

**11. All electrodes need to be green (have an impedance lower than 20) - be sure not to over-gel the participant**

**12. Turn off the impedance check by clicking “impedance” again.**

(You should now see the waves)

**13. Remind the participants to try not to blink during the trials. They can blink in- between trials**

**14. Run the pre-tests of respective experiment**

**15. !! DISCONNECT EEG CHARGER AND LAPTOP CHARGER !!**

**16. Turn on the experiment in pycharm, spyder, etc.**

(Refer to your respective protocol)

**17. !! CLICK RECORD !! before running the experiment**

**18. If the EEG session has multiple experiments, break up the recording. i.e. stop previous recording and start a new one.**

1. Stop the recording of experiment 1, and click “finalize” the data.
2. Since participant is already in the EEGo system now, select the participants subject ID again, and launch the 2nd experiment.

3. **!! CLICK RECORD !!** before the 2nd experiment starts

**19. After all experiments in the session are complete. Stop recording, and finalize the data.**

**20. Plug the amplifier and laptop charger back in, and turn them off**

**MOUNTING THE CAP**

**1. Measuring the Head:**

Two more measurements must be made in order to center the cap on the participant’s head.

* 1st measurement: Place the measuring tape in the middle of the participant’s nasion (between eyebrows) and run it to under the bump in the back of the person’s head (inion). Place a notch mark at the midpoint of this total distance (i.e. total length = 37cm, place dot at 19cm). Mark the midpoint with a line.
* 2nd measurement: Places the tape at the middle of the participant’s ear, and run the tape over the participant’s head to the middle of the other ear. Take the midpoint of this distance, and place a line on the person’s head.

Make a circle or dot where the 1st and 2nd lines intersect. This is where the center of the EEG cap (REF point CZ) needs to go. Once these measurements have been made:

**The Saline Cap:** has to be soaked for 10 minutes. After which it is time to place the cap on the participant’s head.

**The Gel Cap:** can be placed immediately, after which gel is injected into the electrodes.

 NOTE: Consult EEG cap placement manual, by EGI for more specific instructions.

**2. General Rules for Placing the Cap on the Head:**

Saline Cap Instructions:

1. Place a towel (found in black cabinet) around the participant’s shoulders. Place another over the front of their shirt. This is to prevent water from dripping on them. Make sure the participant has removed earrings, glasses, etc. prior to putting on cap. Glasses can be placed back on the face after cap is put on.
2. Ask the participant to close eyes while putting cap on head. This prevents excess water from going into participant’s eyes. Tell participant it should only take a couple minutes to get cap on in a comfortable spot and you will let them know when their eyes can be opened.
3. Make sure the sponges on cap are on the inside and the circles and numbers are on the outside.
4. Spread cap out as wide as possible with both hands (without over-stretching the cap). Start off behind the participant’s head; slowly bring the cap over the participant’s head, ensuring that the red REF reference electrode aligns with the dots made previously, which mark the center of the participant’s head. It is very important that REF rest upon the center of the participant’s head.
5. It helps to keep your hands in the cap as long as possible, until the cap is fully in place. Make sure to line up the ear holes properly, look for electrode #17 to be between/above the person’s eyebrows, etc.
6. If the REF electrode is more than 0.5 cm away from the center of the head, the cap must be taken off, re-soaked for 1-2 minutes, and then reapplied onto the participant’s head. The quicker the cap gets on the participant’s head, the better. Not only for comfort of participant, but also for the sake of the wetness of the sponges. It is very hard to keep sponges wet, and the more time the cap is out of the bucket; the more the sponges are drying.

NOTE: Putting on the cap is one of the trickier parts of doing the EEG. It takes some practice to master, but once you get it down, it should take only a minute or two to place the cap on correctly.