Top 9 ERP Guidelines

1. Before connecting the ERP cap, any physiological monitoring devices, eye channels, etc. make sure that the amplifier is already connected to the computer and the amplifier is already connected to the battery. Adjustments to this order may damage the hardware.
2. Make sure metal NEVER touches any electrodes (external electrodes or electrodes on the cap) as this may damage the electrodes.
3. Never pull on the cables of the equipment, rather, pull on the electrodes themselves or the plastic plug that goes into the box.
4. The ribbon cable attaches to the amplifer with a clamp. You need to squeeze the sides of the clamp to remove it.
5. Always place electrodes on a soft surface (e.g., a dry towel)
6. Never let the splitter box (between the ribbon cable and the individual electrode cables, where the clip is) come into contact with water.
7. The rubber rings can come off of the cap, try not to lose them.
8. Always leave the battery (actipower) charging when not in use. A deep discharge can damage the battery.
9. Be sure the door is locked when you leave.

Troubleshooting Tips

* If, on the recording computer pycorder software, the very bottom of the screen turns red. Simply close pycorder, and reopen the program. There is no need to restart the computer.
* If you are not seeing event codes on pycorder, or if e-prime gives you an error saying that you are attempting to write to a port configured for input, you will have to restart the task computer (where you run e-prime). (NOTE FROM ABBIE: This is my biggest pet peeve about the system, because it takes the computer some time to restart. I tried for ages to figure out this issue, as did Johanna, and David Findley, but no luck. It seems that it is an issue with e-prime itself and their tech support people were… difficult. I hope when we have an ERP lab manager they’ll be able to dedicate the necessary time to dealing with e-prime tech support.)

Step-by-Step Guide to Running a Participant

1. **Scheduling**
   1. Reserve 1345 (the ERP Room) and 1318 (the capping room) in MSR. Be sure to reserve enough time before (for set-up) and after (for clean-up) when the participant will actually be participating. I recommend one hour of padding before and after.
2. **Before the Participant arrives**
   1. Make sure actiChamp is plugged into the computer.
   2. If you are doing tasks where participants will respond, make sure gamepad/keyboard is plugged into the computer.
   3. Turn on task computer and monitor, turn on stimuli monitor, make sure tasks are working well.
   4. Make sure the monitor parameters and resolution are set how you want them to be for your experiment.
   5. Turn on recording computer and monitor.
   6. Turn on camera monitors (if using)
   7. Prepare application station in 1318. You will need:
      * Gloves
      * Applicators (either syringes and blunt needles, I recommend the longer blunt needles, or gel injector technology – see gel injector manual if using)
      * electroconductive gel
      * alcohol wipes
      * external electrodes
      * ground electrode
      * external electrode stickies
      * cap electrodes
      * respiration belt (if using) and scissors
      * fake head
      * cap(s)
      * entertainment cart (if using)
   8. If participant’s head circumference is known ahead of time, bring the appropriately sized cap and:
3. Place cap on fake head (with ground forward above the fake head’s nose)
4. Place all electrodes in fake head with cables pointing backward (toward the back of the participant’s neck). I usually do the cables sort of in numerical order… I will do one section at a time but within a section I do the electrodes in numerical order. I find this prevents tangling.
5. You will be able to skip to step 3.6

**3) When participant arrives**

3.1) Introduce the participant to the electrode cap and what you will be doing. Keep in mind what works best for your participant (of course). For example, with the 12-18 year olds we show them the applicators and that they are blunt, but this might not be appropriate in younger kids who don’t understand the concept of a “blunt” applicator. (We still don’t say needle though.)

3.2) Put on plastic gloves

3.3) If you weren’t able to get the participants head circumference ahead of time measure it now. We usually use the disposable head measuring tapes provided in the vitals room.

3.4) Select the appropriate cap and place on fake head (with ground forward above the fake head’s nose)

3.5) Place all electrodes in fake head with cables pointing backward (toward the back of the participant’s neck). I usually do the cables sort of in numerical order… I will do one section at a time but within a section I do the electrodes in numerical order. I find this prevents tangling.

3.6) If you are using the respiration belt, put that on the participant now (Note to Abbie, fill this out later since Ryan and Meagan aren’t using the respiration belt anyway)

3.7) Carefully lift the cap off the fake head and place it on the participants head. I usually find this is easier if I clip the splitter box to my shirt before doing it so the cables aren’t flying all over the place.

3.8) Measure distance from nason to inion (between the eyebrows to bump on back of head), electrode Cz should be at 50% of the nasion-inion distance.

3.9) Measure distance between earlobes, electrode Cz should be at 50% of this distance

3.10) Connect the chin strap (Velcro) snugly. If the chin strap is itchy, place a piece of tissue between chin strap and participant’s chin.

3.11) Carefully push the applicator through each electrode aperture.

3.12) Gently move the hair out of the way with circular movements of the applicator until reaching the scalp.

3.13) Apply a small amount of gel (0.2 to 0.3 ml) directly to scalp.

3.14) Fill the remaining space in the electrode with gel. Gel must top up each electrode aperture.

3.11) For external electrodes, use alcohol wipes to clean participant’s temples and above and below the right eye.

3.12) Place stickers on external electrodes with the tab pointing to the wire.

3.13) Fill a small amount of gel in the hole of each external electrode. Because it is metal, make sure the blunt needle does not touch the electrode itself!

3.14) Peel off the sticker backing and place the electrodes on the participants face.

* Make sure to use the same color wires for horizontal versus vertical eye channels. For example, you could use blue wires for both temples, and red wires above and below the right eye.
* When placing the external electrodes, make sure they are centered. It is helpful to have the participant stare straight ahead for this step, perhaps at a colleagues finger.
* The wires on the horizontal electrodes should point downward; the wires on the vertical electrodes should point to the side (away from the nose) so as to not obscure the participants vision.

3.15) Hold on the cables loosely behind the participant and walk them to the participant chair in the ERP room.

1. **Once in the ERP room set-up**

4.1) Plug the actichamp adaptor into the battery (before plugging in any electrode cables)

4.2) Plug in electrode cables (the ribbon plugs in to the top of the adaptor, the ground plugs in to the front port labeled “GND”).

4.3) Plug in external eye channels. The left most black box plugged into the adaptor port 1 is for the horizontal eye channels. You could do left temple into the negative port and the right channel into the positive port, for example.

4.4) The right black box (adaptor port 2) is for the vertical eye channels. You could do left temple in the negative port and right temple in the positive port, for example.

4.5) Plug in any physiological equipment (Note to Abbie, fill this out more later)

4.6) Clip the splitter box to the participants shirt or jacket

4..7) Measure the participant’s distance from the monitor, we use 57 cm.

4.8) Open pycorder software on the recording computer. Click “accept” when it asks if you accept the terms and conditions.

4.9) First select impededence mode.

4.10) In the drop down menu, change from “50” to “100”

4.11) For any electrodes in the red (the LED lights will also turn on on the cap) use the applicator to make circular motions to try to reduce the impedence. Sometimes you also just need to let the electrodes settle after making the circular movements (we often let them settle for the duration of our task instructions) Never minimize impedence first by injecting additional gel. However if circular movements and waiting don’t work, some channels may need additional gel. Additionally, always minimize impedence on ground and electrode 1 first. I (Abbie) also recommend paying particular attention to the TP9 and TP10 electordes (make sure they are green, not just yellow) since these are the reference electrodes

4.12) In pycorder, use the dropdown menu in the right column to make sure you VEOG (vertical eye channel) and HEOG (horizontal eye channel) are working. I (Abbie) often find these channels have more high frequency noise than the head channels. However, so long as you can detect blinks and eye movements I haven’t had a problem filtering the HF noise in post.

4.13) Make sure the monitor is well aligned: the participants eyes are centered on the screen.

4.14) Make sure the position is comfortable so they don’t fidget too much during the task. I also try to get them in a position where they won’t be tempted to move forward or backward, since for our tasks the 57 cm distance to the monitor is very important.

4.15) We leave the lights on for instructions and practice, you can run these now.

4.16) We turn off the lights for the actual tasks

4.17) To record, close the impedence window and switch the pycorder to “default mode.” Click start recording, a window will pop up asking you to select the location for your recording and name the file. If you are nervous about missing part of the task, you may wish to do this before starting the task.

4.18) Run the task on the task computer (from e-prime, presentation, or matlab)

1. **During the run:**

5.1) Periodicially look at pycorder to make sure that the event codes are showing up (see troubleshooting if they are not).

5.2) Look for any bad or noisy channels in pycorder. If there are channels that look very noisy or flat line, check their impedences between blocks using impedence mode

5.3) Keep an eye on the participant using the cameras. Remind them to keep their eyes as still as possible. We do not mention to the participant not to blink, since blinks are easy to remove with ICA and telling a participant not to blink increases their cognitive load.

5.4) IF PARTICIPANT NEEDS TO USE THE BATHROOM: carefully unplug all cables form the amplifier. Like a loose scare wrap them around the participant’s neck one time. Using the large binder clip from the T clip them to the back of the participant’s shirt. Emphasize to the participant that they must keep the cables dry while they are in the bathroom! When they return and you plug everything back in, check your impedences again before proceeding.

1. **After the run:**

6.1) If you haven’t already stopped recording on the pycorder software, do so now.

6.2) Detach the external channels from the participants face by pulling on the electrodes themselves rather than the cables.

6.3) Detach the chin strap, remove the cap (still containing the electrodes)

6.4) Abbie Note: insert removal of physio here

6.5) Unplug the ribbon cable (note, this cable has clamps you need to pinch on the sides to remove) from the actichamp

6.6) Unplug the ground electrode by pulling on the plastic plug (not the cable)

6.7) Unplug the external electrodes from the black boxes by pulling on their plugs (not the cables)

6.8) Wipe off participants hair with a paper towel to avoid gel dripping off on the way to the hair wash station.

6.9) Lead participant to the hair washing station. (add more detail later since Ryan and Meagan aren’t washing hair)

6.10) Wash participant’s hair. Use hair dryer and brushes. (add more detail later since Ryan and Meagan aren’t washing hair)

1. **Clean Up**

7.1) Remove each electrode from the cap by pulling on the electrode, not the cables

7.2) The electrodes and pins are sensitive. Always place them on a soft surface (such as a dry towel)

7.3) Take the (empty) cap and an empty bucket to the bathroom. Turn the water all the way to hot (it never gets more than luke warm). While the water is warming up, clean the cap by placing each electrode holder against the faucet to squirt any gel out. Then, rinse any residual gel off the cap. This takes a while, and the water should be warm when you finish. Also note the rubber rings on the cap come off. Try not to lose any!

7.4) Fill the plastic bowl with warm water. Never use a metal bowl, as it is important the electrodes never come in contact with metal.

7.5) Immerse the electrodes (but NOT the splitter box or ribbon cables) in the warm water. NEVER let the splitter box come in contact with water. (I – Abbie- usually clean the external electrodes first, then the cap electrodes, but this is an organizational strategy not a necessity)

7.6) Carefully clean each electrode with a tooth brush. Make sure you don’t miss any electrodes. I (Abbie) have found the only way to ensure this is to clean them in sequence (i.e., 1, 2, 3, 4… 32)

7.7) The electrodes need to soak in the warm water for at least 5 minutes. I find that cleaning them takes longer than 5 minutes though, so it’s not particularly hard to accomplish this.

7.8) Place the electrodes in the disinfection solution for approximately 1 minute, then rinse them under running water.

7.9) Use a dry towel to pat the electrodes dry, any residual dampness can come off in the air.

7.19) Hang the electrodes up. Make sure they hang such that water cannot drip on the splitter box, and such that they are not touching metal.

7.20) Place the cap in the disinfection solution for approximately 1 minute

7.21) Rinse the cap under running water.

7.22) Pat the cap dry with a towel, then hang it on the hooks in the ERP participant room to air dry the rest of the way

7.23) Clean hair out of brushes and place them into the barbicide jar for 10 minutes.

7.24) Clean and disinfect all surfaces in both rooms (table, monitor, chair, etc.) – Make sure they are free of gel and any other visible residue. Also, make sure they are dry.

7.25) Abbie, add physio disinfection protocol here.

7.26) Disconnect the battery from the actichamp amplifier. Switch the primary and back-up batteries and make sure both are plugged into wall chargers.

7.27) Shut down all computers.

7.28) Turn off all power strips.

7.29) Close and lock the door behind you when you leave.