Standard Operating Procedures for EEG Acquisition

Accelerating Medicines Partnership® SCHIZOPHRENIA

An observational study examining clinical trajectories and predictors of outcomes in the clinical high risk population.

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For EEG hardware questions, contact NeuroSig: +1 619-737-2518 / support@neurosig.com

Procedure	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6	Visit 7	Visit 8	Visit 9	Visit 10	Visit 11	Visit 12	Visit 13	Visit 14	Visit 15	Visit 16	Conversion
Month	-3 to -1	0	1	2	3	4	5	6	7	8	9	10	11	12	18	24	-
Consent Form	✓																
Interview/ Questionnaire	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cognitive Tasks	✓	✓		✓				✓						✓		✓	✓
MRI*		✓		✓													
EEG*		✓		✓													
Blood and Saliva Samples*		✓		✓													
Actigraphy (daily)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Digital Data (daily passive sensing, EMA, audio diary)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Free Speech Sampling (audio and facial recording)		✓		✓													
PSYCHS (audio recording)		✓	✓	✓	✓			✓						✓	✓	✓	✓

* In-person visit

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Supplies and Equipment

Electrode Application Materials
1. Alcohol Pads
2. Blunt Syringe Tips
3. Electrode Gel
4. Gloves
5. Paper Towels
6. Plastic Combs
7. Plastic Syringes, Luer Lock Tip
8. Soft Measuring Tape
9. Styrofoam Head

EEG Recording Equipment
1. EEG Recording System
    a. EEG Amplifier
    b. EEG Amplifier Battery & Charger
    c. EEG Amplifier Power Cable
    d. EEG Cap
    e. EEG Electrodes
    f. Ground Electrode
    g. EEG Recording Software
    h. EEG Run Sheet
    i. EEG USB Cable
    j. Laptop
    k. Laptop Charger
    l. Laptop Dongle
    m. Power Strip
    n. USB Thumb Drive
2. Recording Room
    a. Chair
    b. Room Thermometer
    c. Small Cart
    d. Table
    e. Trash Can
3. Stimulus Presentation System
    a. Earphones
    b. Foam Tips

     c. Monitor

     d. NeuroSig Stimulus Box

     e. Pen Cap

     f. Photosensor

     g. Photosensor Adhesive

     h. Response Button

EEG Clean Up

1. Baby Shampoo
2. Container(s) for Water/Disinfectant
3. Disinfectant
4. Hamper
5. Sink
6. Toothbrush
7. Towels
8. Wall Hangers

Subject Comfort

1. Beverages
2. Blanket
3. Coffee Maker
4. Cups
5. Mini Fridge
6. Snacks

1) Before the EEG Session

a) Pre-EEG "Preparing for Your EEG Session" Handout:

At least a few days before a scheduled EEG assessment, written information about the EEG procedure and instructions for how the participant should prepare for the EEG should be provided to the participant by the EEG technician via an electronic mail and/or postal mail.

When sending the Pre-EEG "Preparing for Your EEG Session" Handout (see Appendix) to the participant by postal mail, please include a paper tape measure for the participant to measure their head circumference at home. Provide instructions to the participant on how to measure their head circumference. The head circumference information should be retrieved when the participant is called to remind them of the next day's appointment.

b) EEG Session Scheduling:
EEG sessions scheduled back to back with other cognitive or clinical assessments should be avoided in order to avoid recording EEG when participant is fatigued from other assessments. If back to back assessments are unavoidable, please make sure to start with the EEG session.

c) Reminder Phone Call:
A phone call reminding the participants of the same points should be made the day before the EEG.

2) EEG Recording:

a) Overview of Procedures:

Participants will be seated in a comfortable chair in front of a computer display for the duration of the EEG session. Caps fitted with electrodes are placed on the participant's head, and electrolyte gel is added to each electrode with a single-use, disposable syringe (either curved or blunt tip). Mild scalp abrasion with the syringe tip is done to lower impedances (electrical resistance). Disposable insert earphones are placed into the participants ears to deliver auditory stimuli. Participants are provided instructions and complete a series of auditory, visual, and passive tasks, using a button press to respond when needed. The entire procedure, including setup, recording of tasks, and removing the cap takes 90 minutes to 2 hours**.**

b) EEG Run Sheet:

The various tasks described above comprise multiple runs that are interleaved to prevent excessive habituation or fatigue during any particular task. The order of the tasks is fixed and represented in the EEG Run Sheet. Please use a paper copy of the EEG Run Sheet for each participant recording session and make notes as the recording progresses.

   i)   Note whether each run:
- (1) was completed,
- (2) needed to be re-run (i.e., session aborted then restarted), or
- (3) is incomplete (participant terminates the session early before run could be collected)

  ii)   Note any problems with the recording (e.g. noisy electrodes) or with the participant's behavior (e.g., sleep, excessive movement) during each run.

3) Detailed Recording Procedures:
a) Laptop Information Key
i) AMP-SCZ Keyboard Function

Key Press	Function
Spacebar	To continue with instructions or run
A	To redo instructions, practice run, or to return to the previous screen
Z	To skip the instructions or run
.	To pause or unpause the recording session
esc	To go to the quit menu while recording session is paused
Y	To quit the session during the quit menu
N	To return to the session during quit menu

ii) Event Markers
(1) Blue Circle Task Run:

Event Marker	Stimulus
S16	Frequent Tone (Auditory Standard)
S17	Button Response
S18	Infrequent Tone (Auditory Deviant)
S32	Small Circle (Visual Standard)
S64	Large Circle (Visual Target)
S128	Fractal Image (Visual Novel)

(2) Tone Task Run:

Event Marker	Stimulus
S1	Frequent Tone (Auditory Standard)
S2	Infrequent Tone (Auditory Target)
S4	Novel Sound (Auditory Novel)
S5	Button Response

(3) Click Task Run:

Event Marker	Stimulus
S8	Auditory 40 Hz Click Trains

b) Equipment Setup:

  i) Make sure that the laptop computer is plugged into power, and that the blue dongle is connected to a non-SS (super-speed) USB port on the right side of the laptop (left side for international laptops).

  ii) Make sure that the monitor and NeuroSig Stimulus box are plugged into a power strip, and that the power strip is currently turned off.

  iii) Make sure that the NeuroSig Stimulus Box's USB cable is connected to a SS USB port on the left side of the laptop (right side for international laptops). If there is only one SS USB port, plug the Stimulus Box's USB cable into a non-SS port.

  iv) Make sure that the NeuroSig Stimulus Box's HDMI cable is plugged into the back of the ViewSonic monitor.

  v) Connect the response button to the single port on the side of the NeuroSig Stimulus Box. This can be left plugged in.

  vi) Connect the earphones to the two ports on the front of the NeuroSig Stimulus Box. The blue plug should connect to the left port, and the red plug should connect to the right port. These can be left plugged in.

c) Pre-testing Instructions:

  i) At the time of booking the session, provide the participant with the Pre-EEG "Preparing for your EEG Session" Handout (see Appendix). Make sure to obtain the head circumference information from the participant before the visit. This will allow you to build the cap prior to the participant's arrival.

  ii) Print out the EEG Run Sheet. Record the Participant ID, date, EEG visit, and room temperature.

  iii) Put on clean gloves if not already wearing.

  iv) Pre-testing instructions displayed on computer:
    (1) **Measure the subject's head circumference.**
    (2) **Build the cap, and fill 3-4 syringes with gel.**
    (3) **Silence mobile phones and other equipment in the testing room.** (It is best to remove all mobile phones and devices from the testing room.)
    (4) **Send the subject to the restroom before placing the cap.**
    (5) **Confirm the correct time and date on the computer.**

v) Fill 3-4 plastic syringes with gel. Use new, clean syringes for each participant. Prepare a trash can and some paper towels.

vi) Prepare new, clean foam tips to connect to the black connectors at the end of the earphone cables.

vii) Measure the participant's head circumference (cm) at the widest part of their forehead (near the brow bone) and then select a clean, size appropriate cap.
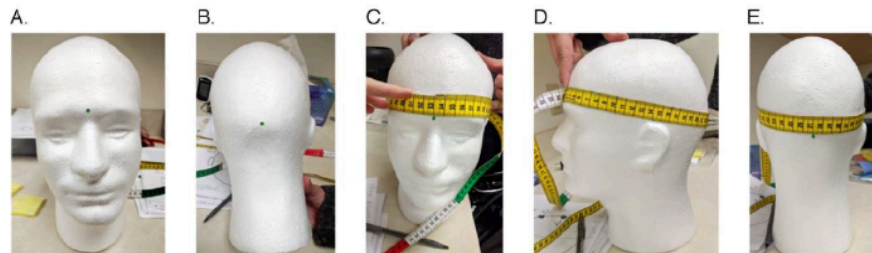

Figure 2. Location of the nasion (panel A) and the inion (panel B) used to measure the circumference of the subject's head (panels C, D, & E) to determine which cap size is appropriate.

(1) Record their head circumference and cap size on the EEG Run Sheet.

viii) Build the cap.

ix) Send the participant to the restroom before placing the cap.

x) Make sure all mobile phones and devices are outside of the testing room.

xi) Seat the participant in front of the monitor at a distance of 70 cm from the center of the monitor to the participant's nasion. It can be useful to place tape on the floor to indicate proper distance.

xii) To prevent the participant from moving, make sure that the chair does not have any wheels. Tell the participant to find a comfortable seating position with their feet flat on the floor.

xiii) Position the laptop so the participant cannot see the screen, and turn on the laptop computer.

xiv) Double-Click the AMP-SCZ icon on the Desktop.

xv) Follow the prompts to change the instruction language, if needed.

xvi) Enter the participant's 7 digit ID.

xvii) Confirm the correct time and date on the bottom right of the computer screen.

(1) If date or time needs to be updated, use the icons located on the desktop.

Set Date

Set Time
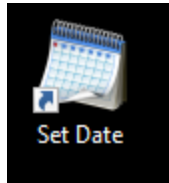
        (2) Press the enter key to continue.

d) EEG System Power Up:

    i)   EEG System Power Up instructions displayed on computer:

        (1) **Connect the battery to the amplifier.**

        (2) **Check that the "Mode" light on the back of the amplifier is flashing green.**

        (3) **Switch on power strip / surge protector (for monitor and Stimulus Unit).**

        (4) **Wait for the green check mark to appear on the external monitor.**

    ii)   Place the amplifier on top of the battery. The amplifier can be left on top of the battery after the session.

    iii)   Connect the battery to the amplifier using the supplied power cable, then connect the amplifier to the laptop computer by plugging the supplied USB cable into one of the SS USB ports on the left side of the laptop (right side for international laptops).
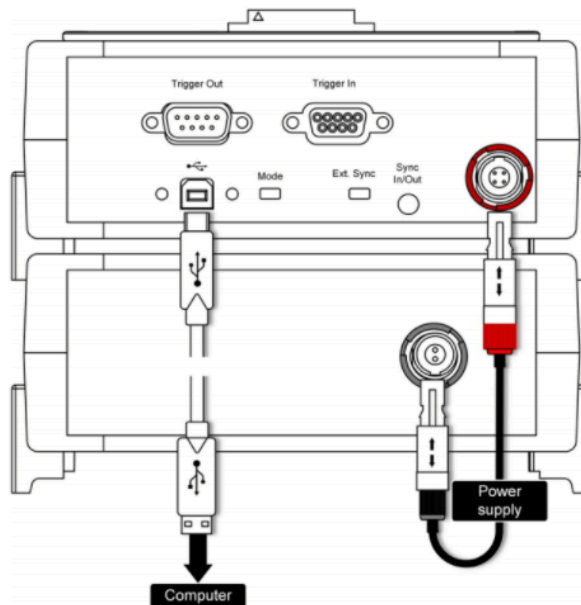

    iv)   Confirm that the "Mode" light on the back of the amplifier is flashing green.

      v)   Turn on the power strip into which the monitor and NeuroSig Stimulus Box are plugged, and wait for the green check mark to appear on the monitor.

      vi)   On the computer, press the spacebar to continue, or the "A" key to go back.

e) Cap Placement:

      i)   Supply the participant with a comb so that they may use it to comb their hair to slightly abrade the scalp. Combs can be disinfected between uses.

      ii)   If the participant is wearing glasses, advise them to take the glasses off before cap placement and put them back on after inserting gel into electrodes.

      iii)   Cap Placement instructions displayed on computer:

           (1) **Place the cap on the subject's head.**

           (2) **Make sure that Green #18 is centered between the subject's nasion and inion.**

           (3) **Connect the black ground wire to the amplifier.**

           (4) **Connect electrode Ribbon 1 (Green) to Port 1 (Green) on the amplifier.**

           (5) **Connect electrode Ribbon 2 (Yellow) to Port 2 (Yellow) on the amplifier.**

      iv)   Place the cap on the participant's head and position the cap so that the Cz electrode (Green #18) is centered between the participant's nasion and inion and the Cz electrode (Green #18) is centered between the tragus of each ear. It may also be helpful to ensure that the distance between the participant's nasion and the Fpz electrode (Black GND) is 10% of the participant's nasion-inion distance.
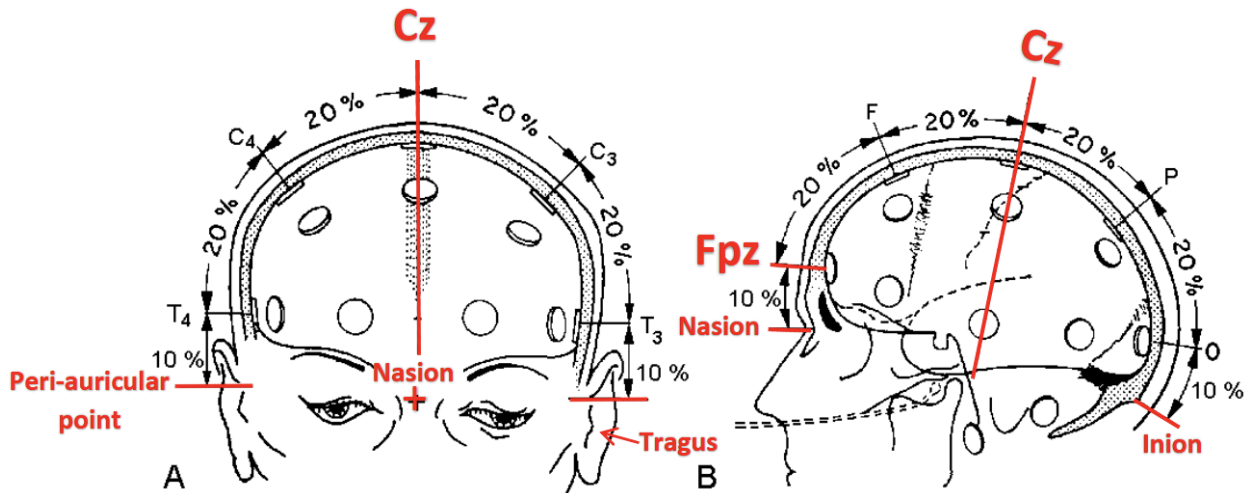
v)   Clip the splitter box to the top of the participant's shirt, positioned at the top of the shoulders. You may also clip it to a towel draped over the chair. Secure the chin strap so it's snug, but isn't uncomfortable or choking the participant.

vi)   Connect the black ground wire to the "GND" port on the front of the amplifier.
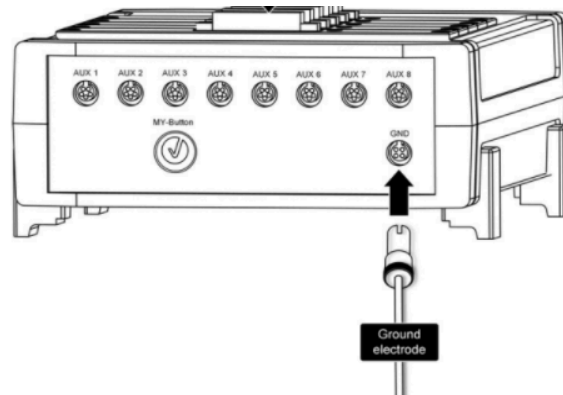
vii) Connect electrode Ribbon 1 (Green) to Port 1 (Green) on the top of the amplifier, then connect electrode Ribbon 2 (Yellow) to Port 2 (Yellow) on the top of the amplifier. Make sure that the arrows on the Ribbon plugs are aligned with the arrows on the Port sockets.
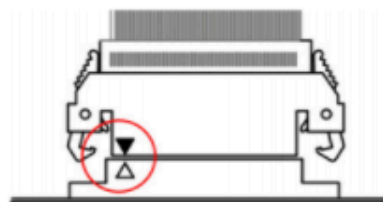
viii)   On the computer, press the spacebar to continue, or the "A" key to go back.

f) Place Electrodes and Check Impedances:

i)   Place Electrodes and Check Impedances instructions displayed on computer:

(1) **Check the settings on the "actiChamp Window" "Active Electrode Settings" tab:**
"Good Level:" 25 kOhm   "Bad Level:" 75 kOhm

(2) **Press down on Black GND and insert gel.**

(3) **Press down on Green #1 and insert gel.**

(4) **Press down on Blue REF and insert gel.**

(5) **Prepare Black GND by rocking the syringe until the LED changes to green, and then fill the electrode with gel.**

(6) **Prepare Green #1 by rocking the syringe until the LED changes to green, and then fill the electrode with gel.**

(7) **Prepare Blue REF by rocking the syringe until the LED changes to green, and then fill the electrode with gel.**
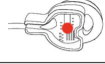
(8) **Now repeat for the remaining electrodes, one at a time.**

(9) **Put the earphone tips in the subject's ear.**

ii)   Check the electrode impedances on the Active Electrode Settings tab of the ActiChamp Window:

"Good Level:" 25 kOhm   "Bad Level:" 75 kOhm

LEDs on the electrodes will turn green when the impedance < 25 kOhm

	Color	Default impedance thresholds
	red	greater than 75 kOhm
	amber	between 25 and 75 kOhm
	green	less than 25 kOhm

iii)   Press down on the Black GND electrode and insert gel using the syringe.
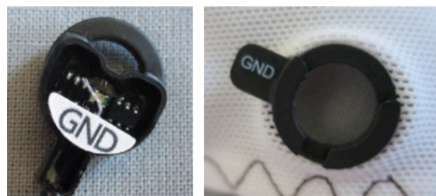
iv)   Press down on Green #1 and insert gel.

v) Press down on Blue REF and insert gel. This will be the Yellow #32 electrode.

vi) Prepare Black GND by rocking the syringe until the LED changes to green, and then fill the electrode with gel all the way from the scalp to the top of the electrode.

vii) Prepare Green #1 by rocking the syringe until the LED changes to green, and then fill the electrode with gel all the way from the scalp to the top of the electrode.

viii) Prepare Blue REF by rocking the syringe until the LED changes to green, and then fill the electrode with gel all the way from the scalp to the top of the electrode.

ix) Now repeat for the remaining electrodes, one at a time.

x) Put the earphone foam eartips into the subject's ears. It can be helpful to put the foam eartips into a pen cap prior to insertion so that the foam stays compressed for longer. The blue earphone is for the left ear, and the red earphone is for the right ear.

Proper Insertion Depth

1. 2. 3. 4.
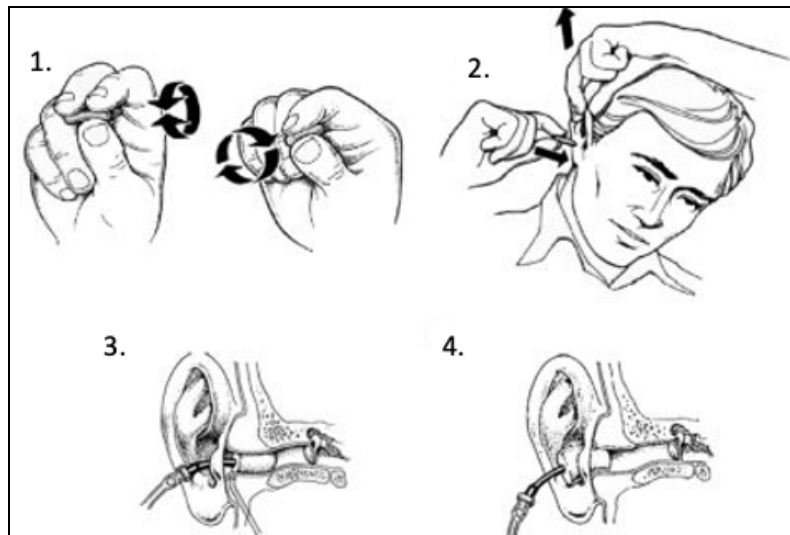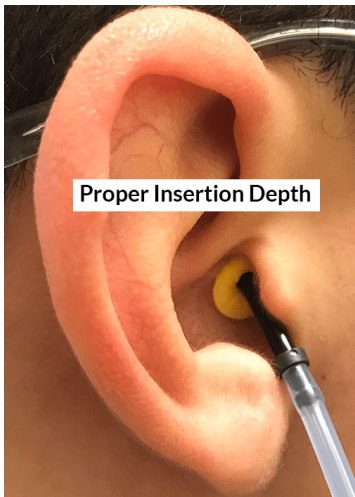
(1) Roll the eartips between your fingers to form a narrow cylinder prior to insertion.
(2) Proper insertion of eartips is easier if the ear canal is straightened and enlarged by gently pulling the participant's outer ear (pinna) outward and upward during eartip insertion. Pull the pinna gently but firmly in the direction that the ear extends from the head.
(3) An example of a well inserted eartip, with no foam visible outside of the ear.
(4) An example of an eartip with a shallow insertion.

xi) Attach the earphone cable clips to the participant's shirt, positioned at the top of their shoulders. You may also drape a towel over the chair and attach the clip to the towel.

xii) On the computer, press the spacebar to continue, or the "A" key to go back.

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g) Check the EEG Channels:

  i)   Monitor the incoming EEG data on the display.

   (1) Press the spacebar if the data looks good on all the channels.

   (2) Otherwise, press the "A" key to return to the Impedance screen and continue preparing any bad EEG channels.

  ii) Demonstrate potential artifacts for the participant.

   (1) Ask participant to briefly clench jaws.
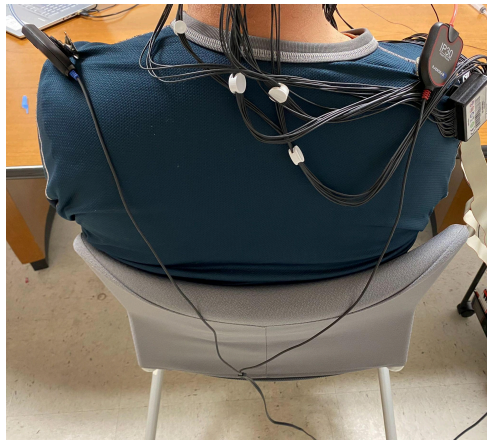
(2) Ask participant to look from side to side.
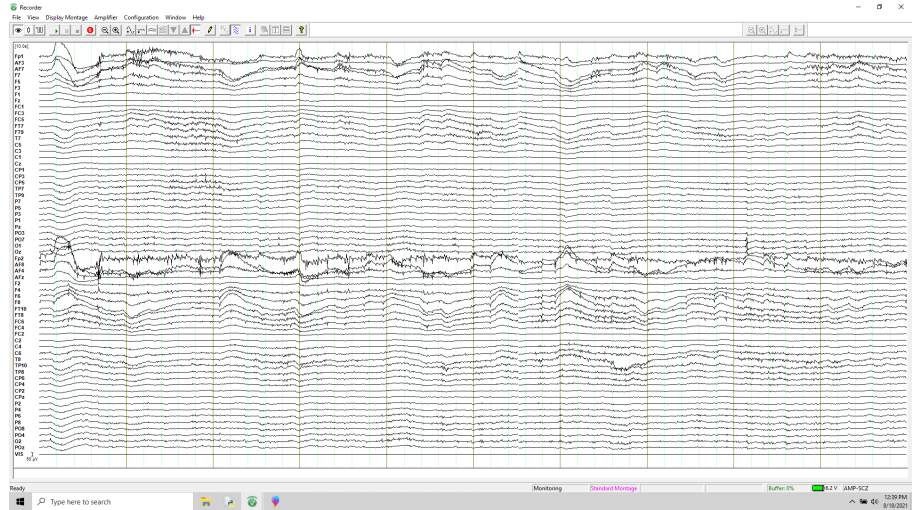
h) Check the Sound:

i) Tell the participant that the recording session will begin after the instructions and that it will take roughly 1 hour. Be sure to inform the participant how long each run will be, as well as check in with them periodically to let them know how much time is left in the session.

ii) Turn on the lights but block out any windows that may cause distractions before recording begins.

iii) Read the instructions that appear on the screen to the participant:

I'm going to play some tones.

Let me know if you can hear them in both ears.

iv) Press the spacebar to play the tones and check the sound, or the "Z" key to skip the sound check.

v) Watch the screen to confirm that Event Marker "S1" is appearing on the bottom of the main screen underneath the continuous EEG data.

vi) Ask the participant: "**Could you hear the tones in both ears**?"

(1) Press the spacebar if (a) the participant says they could hear the tones in both ears, and if (b) Event Marker "S1" appeared on the bottom of the main screen.

(2) If Event Marker "S224" appeared, the NeuroSig Stimulus Box is not plugged in. Check the connection of the system cables, wait at least 1 minute for the system to initialize, then press the "A" key to play the sample tones again.

(3) If the participant couldn't hear the tones in both ears, check the connection of the earphone cables, then press the "A" key to play the sample tones again.

i) Blue Circle Task Instructions:

    i) Record session start time on the EEG Run Sheet

    ii) Read the instructions that appear on the screen to the participant:

        During this task you will see a series of images on the screen, including a large blue circle and a small blue circle.

    iii) Press the spacebar to show the blue circles, or the "Z" key to skip this run.

        (1) Watch the screen to confirm that Event Markers "S32" and "S64" are appearing on the bottom of the main screen when each of the circles appear.

j) Blue Circle Task Practice:

    i) Give the participant the response button.

    ii) Read the instructions that appear on the screen to the participant:

        Now that you know what both of the circles look like, press the button whenever you see the LARGE blue circle. Go ahead and press the button with your thumb a few times to see what it feels like. If you are right-handed use your right thumb. If you are left-handed use your left thumb.

    iii) Record the participant's handedness on the EEG Run Sheet.

    iv) Watch the screen to confirm that Event Marker "S9" appears when the button is pressed.

        (1) If "S9" doesn't appear, check the connection of the response button cable and have the participant press the button again.

    v) Read the instructions displayed on the laptop screen to the participant to initiate the practice session:

        OK, now we will do a short practice. You will see other images but only press the button when you see the LARGE blue circle. There will also be tones playing throughout your earphones. Try to ignore these tones and concentrate on the images. Remember, only press the button when you see the LARGE blue circle.

    vi) Press the spacebar to start the practice.

vii) Watch the screen to monitor the participant's performance. If they are performing correctly, you will only see "S17" Event Markers AFTER "S64" Event Markers.

viii) Decide whether the participant understands the task:

    (1) If the participant was performing correctly, press the spacebar to continue.

    (2) Otherwise, press the "A" key to have the participant practice again.

k) <u>Blue Circle Task Run:</u>

i) Read the instructions that appear on the screen to the participant:

> **Now we are ready to begin. Please keep your eyes on the screen.**
> **Try not to move. Find a comfortable position that you can maintain throughout each task run.**
> **Do not fall asleep.**
> **Please press the button whenever you see the LARGE blue circle.**
> **Sometimes you will hear tones, or see other images,**
> **but only press the button when you see the LARGE blue circle.**
> **Press as quickly as you can without making errors.**

ii) Press the spacebar to start the task, or the "Z" key to skip this run.

iii) You should see on the screen: "Blue Circle Task Data are Saving".

    (1) Confirm that the red "SAVING" indicator is displayed on the bottom of the main screen.

iv) Monitor the incoming EEG data on the display throughout the recording.

    (1) Watch for the Event Markers "S16", "S18","S32", "S64", and "S128" on the bottom of the main screen.

    (2) Watch for Event Marker "S17", which indicates button responses by the participant.

v) If you encounter a problem, press the " . " key to pause the stimuli and recording; otherwise, recording will end automatically when the session is complete.

    (1) If the session is paused, you should see on the screen: "Blue Circle Task is Paused!"

    (2) Press the " . " key when the participant is ready to resume stimuli and recording.

l) <u>Tone Task Instructions:</u>

i) Read the instructions that appear on the screen to the participant:

> **During this task you will hear a series of sounds through your earphones.**
>
> **The very first tone you hear will sound like this:**

    ii)   Press the spacebar to play the frequent high-pitch tone, or the "Z" key to skip this run.

        (1) Watch for Event Marker "S1" on the bottom of the main screen.

    iii)   Read the instructions that appear on the screen to the participant:

> **You will also hear a different tone that has a lower pitch.**
>
> **Here is what it will sound like:**

    iv)   Press the spacebar to play the target low-pitch tone.

        (1) Watch for Event Marker "S2" on the bottom of the main screen.

    v)   Read the instructions that appear on the screen to the participant:

> **Now that you know what both of the tones sound like,**
>
> **press the button with your thumb whenever you hear the LOW-PITCH tone.**
>
> **If you are right-handed use your right thumb. If you are left-handed use your left thumb.**
>
> **OK, now we will do a short practice.**
>
> **You will hear other sounds,**
>
> **but remember to only press the button when you hear the LOW-PITCH tone.**

    vi)   Press the spacebar to start the practice.

    vii)   Watch the screen to monitor the participant's performance. If they are performing correctly, you will only see "S5" Event Markers AFTER "S2" Event Markers.

    viii)   Decide whether the participant understands the task:

        (1) If the participant was performing correctly, press the spacebar to continue.

        (2) Otherwise, press the "A" key to have the participant practice again.

m) <u>Tone Task Run:</u>

    i)   Read the instructions that appear on the screen to the participant:

> **Now we are ready to begin.**
>
> **Please keep your eyes fixed on the plus sign. Do not fall asleep.**
>
> **Try not to move. Find a comfortable position that you can maintain throughout each task run.**
>
> **Please press the button whenever you hear the LOW-PITCH tone.**

> **Sometimes you will hear other sounds,**
> **but only press the button when you hear the LOW-PITCH tone.**
> **Press as quickly as you can without making errors.**

    ii)   Press the spacebar to start the task or the "Z" key to skip this run.

    iii)   You should see on the screen: "Tone Task Data are Saving".

        (1) Confirm that the red "SAVING" indicator is displayed on the bottom of the main screen.

    iv)   Monitor the incoming EEG data on the display throughout the recording.

        (1) Watch for Event Markers "S1", "S2", and "S4" on the bottom of the main screen.

        (2) Watch for Event Marker "S5", which indicates button responses by the participant.

    v)   If you encounter a problem, press the " . " key to pause the stimuli and recording; otherwise, recording will end automatically when the session is complete.

        (1) If the session is paused, you should see on the screen: "Tone Task is Paused!"

        (2) Press the " . " key when the participant is ready to resume stimuli and recording.

n) <u>Click Task Instructions:</u>

    i)   Read the instructions that appear on the screen to the participant:

> **During this task, you will hear clicking sounds through your earphones.**
> **You do not need to press the button during this task, just listen to the sounds.**
> **Please keep your eyes focused on the plus sign. Do not fall asleep.**
> **Try not to move. Find a comfortable position you can maintain throughout this run.**

    ii)   Take away the response button from the participant and set it aside. The response button can be left plugged into the NeuroSig stimulus box.

o) <u>Click Task Run:</u>

    i)   Press the spacebar to start the task, or the "Z" key to skip this run.

    ii)   You should see on the screen: "Click Task Data are Saving"

        (1) Confirm that the red "SAVING" indicator is displayed on the bottom of the main screen.

    iii)   Monitor the incoming EEG data on the display throughout the recording.

        (1) Watch for Event Marker "S8" on the bottom of the main screen.

iv) If you encounter a problem, press the " . " key to pause the stimuli and recording; otherwise, recording will end automatically when the session is complete.

(1) If the session is paused, you should see on the screen: "Click Task is Paused!"

(2) Press the " . " key when the participant is ready to resume stimuli and recording.

p) **Rest (Eyes Open) Instructions:**

i) Read the instructions that appear on the screen to the participant:

During this next task, there will be no sounds and no images.
Please keep your eyes focused on the plus sign.
Keep your eyes open.
Try not to move. Find a comfortable position that you can maintain throughout this run.
Do not fall asleep.

q) **Rest (Eyes Open) Run:**

i) Press the spacebar to continue, or the "Z" key to skip this run.

ii) You should see on the screen: "Rest (Eyes Open) Data are Saving"

(1) Confirm that the red "SAVING" indicator is displayed on the bottom of the main screen.

iii) Monitor the incoming EEG data on the display throughout the recording.

(1) Watch for Event Marker "S20" on the bottom of the main screen.

(2) BE SURE THAT THE PARTICIPANT'S EYES ARE OPEN

iv) If you encounter a problem, press the " . " key to pause the stimuli and recording; otherwise, recording will end automatically when the session is complete.

(1) If the session is paused, you should see on the screen: "Rest (Eyes Open) is Paused!"

(2) Press the " . " key when the participant is ready to resume stimuli and recording.

r) **Rest (Eyes Closed) Instructions:**

i) Read the instructions that appear on the screen to the participant:

This is the last task. Again, there will be no sounds and no images.
Try not to move. Find a comfortable position that you can maintain throughout this run.
This time keep your eyes CLOSED.
Do not fall asleep.

s) Rest (Eyes Closed) Run:

    i)   Press the spacebar to continue or the "Z" key to skip this run.

    ii)   You should see on the screen: "Rest (Eyes Closed) Data are Saving"

        (1) Confirm that the red "SAVING" indicator is displayed on the bottom of the main screen.

    iii)   Monitor the incoming EEG data on the display throughout the recording.

        (1) Watch for Event Marker "S24" on the bottom of the main screen.

        (2) BE SURE THAT THE PARTICIPANT'S EYES ARE CLOSED

    iv)   If you encounter a problem, press the " . " key to pause the stimuli and recording; otherwise, recording will end automatically when the session is complete.

        (1) If the session is paused, you should see on the screen: "Rest (Eyes Closed) is Paused!"

        (2) Press the " . " key when the participant is ready to resume stimuli and recording.

t) End of Recording Session or Incomplete Recording Session:

    i)   When the session is completed:

        (1) You should see on the screen: "Session Recording Complete!" and "Saving data files to zip file..."

        (2) Record the session end time on the EEG Run Sheet.

        (3) Thank the participant and remove the cap.

        (4) Connect the battery to the charger once the EEG system has fully shut down.


IMPORTANT:
Please be sure to disconnect
the PowerUnit from
actiCHamp and recharge it
at the end of use.

ii) If you need to abort the session because the participant wants to end early, press the " . " key to pause the stimuli and recording, then press the "esc" key to view the quit menu.

iii) Ask the participant: "Are you sure you want to quit?"
    (1) If they say yes, press the "Y" key.
    (2) If they say no, press the "N" key.

iv) If you need to abort the session because of a problem, or because the participant needs to temporarily leave the recording room (e.g., bathroom break), end the session.
    (1) End session
    (2) Remind the participant to keep the splitter box and ribbon cables dry.
    (3) When the participant returns, start a new session. Use the "Z" key to skip through the instructions and tasks until you reach the place where the first session was aborted, then continue with the remaining tasks.

4) Clean Up:

a) Electrode Cap Cleaning Guide:

i) Tips: Clean the electrodes and cap immediately after the EEG session, as the cleaning process becomes much harder when the gel dries out. To avoid damaging the splitter box, never let it come into contact with water.

1) Disconnect the splitter box from the amplifier by opening the clamps on the ribbon cable, then pulling the plug from the socket. Never disconnect the ribbon plug from the amplifier by pulling on the ribbon cable.

2) Untie the chin strap and remove the cap (with electrodes attached) from the participant's head.
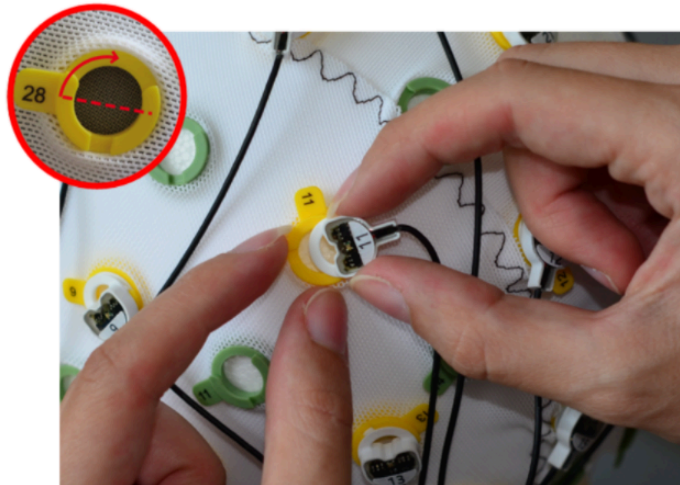
3) Set the electrodes aside and cover the splitter box with a towel in order to ensure that the splitter box does not come in contact with water.

4) Fill two plastic bowls (or one large plastic bowl) with lukewarm water. Do not use hot or boiling water (water temperature must not exceed 50°C/122°F). Do not use metal bowls as this can damage the sensitive electrodes.

5) Remove each electrode from the cap using the tag on the electrode holder as an orientation: the opening is located at a 90° angle to the tag. Take each electrode head between your thumb and index finger and slide it carefully out of the holder in this direction. Never pull the electrode cables to remove the electrodes from their holders, and don't remove the electrode holders from the cap.

6) Place the cap in one water bath and the electrodes in the other water bath (or together if using one bowl). While they're in the water bath, gently clean the electrodes and the cap's electrode holders with a toothbrush to remove any residue. If the electrodes are particularly dirty,

you can use a mild cleaning agent. Baby shampoo has proved to be the most suitable product.
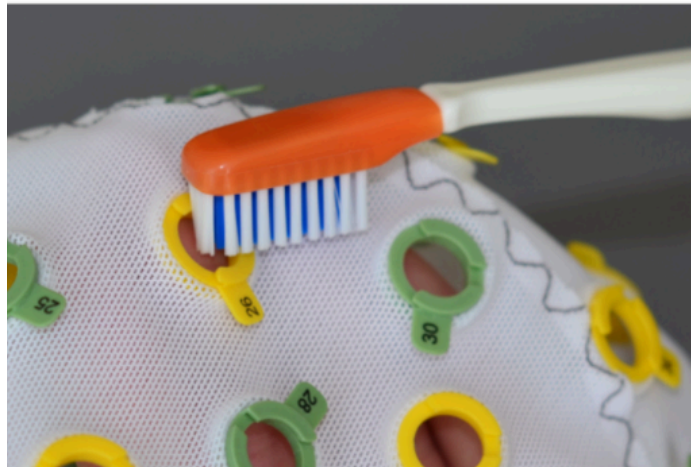
7) Turn the cap inside out and repeat the previous step for the cap's electrode holders.

8) Rinse the electrodes and cap with clean, lukewarm water (~32°C/90°F) to remove any residue left by the cleaning agent.

9) Remove the electrodes and cap from the bowls. Remove excess water from the cap by gently squeezing it with your hands.

10) Empty the bowls of water and return the electrodes and cap to a small plastic bowl. Pour just enough disinfectant into the bowl until the electrodes and cap are immersed, then let them soak for 3 minutes. It is recommended that you use gloves when handling the disinfectant.

    a) Recommended disinfectants: "Perfektan TB" (within the EU) or "Envirocide" (outside of the EU). Please note that stronger agents will speed up deterioration of products. Do not use an alcohol- or chlorine- based disinfectant.

11) Remove the electrodes and cap from the disinfectant and discard the disinfectant solution. Return the electrodes and cap to the bowls.

12) Thoroughly rinse the electrodes and cap under cool, running water.

13) Remove the electrodes and cap from the bowls, and remove excess water from the cap by gently squeezing it with your hands.

14) Put the cap onto a clean, dry towel and gently pat to remove excess water.

15) Turn the cap inside out and repeat the previous step.

16) If the electrode cables and splitter box are dirty, wipe them clean using a damp cloth.

17) If the plug on the splitter box is dirty, clean it with compressed air. (never wipe the plugs or sockets with a damp cloth).

18) Hang the electrodes and cap to air-dry on a drying rack or wall hooks. Make sure that the cables and especially the splitter box are placed higher than the electrodes to prevent any water from dripping from the electrodes into the splitter box and connectors.

b) **Amplifier/Battery Cleaning Guide:**

- Tips: Never clean the amplifier or battery under running water or with aggressive/corrosive cleaning agents. Never clean the amplifier when the participant is connected to it or when the amplifier is connected to the battery.

1) After disconnecting the electrode cap from the amplifier, disconnect the amplifier from the battery.

2) Use a soft, slightly moist cloth to clean the casing of the amplifier and battery every few weeks or as needed.

3) For disinfecting the surfaces of the amplifier and battery, wipe their surfaces with a soft cloth dampened with 70% isopropyl alcohol. Never spray, pour, or spill any liquid on the amplifier or battery (including their connectors, switches, or openings).

4) Charge the battery at room temperature. The battery and charger heat up during charging, so make sure that as much free space as possible is available around both components so that the heat can dissipate freely.
   a) It typically takes approximately 10 hours to charge an empty battery at room temperature.
   b) [Battery should be kept charging when not in use. Be careful not to deplete the battery.](#)

5) Data Uploads:

Upon completion of an EEG session, the EEG technician collecting the data will transcribe check marks and text notes from the EEG Run Sheet into a database version of the form on the day the data are acquired. The EEG data, stimulus delivery, and response log files, all of which contain only the participant's study ID and date stamps for the recording session, will be transferred from the EEG computer to a thumb drive. The thumb drive is then used to upload the data to a central server for each network hub. This data upload should occur on the same day as the EEG data are collected, or the next morning at the latest for data acquired late in the day. Leave the data file on the laptop as well in order to have a backup of the data file. The laptop should have enough storage to maintain all the files.

6) Quality Control:

Quality control (QC) procedures involve implementation of an automated processing pipeline to generate preliminary EEG measures, including ERP waveforms, EEG Time-Frequency maps, scalp topography maps, and various checks on data quality. Reports are generated to flag any problems with the EEG data, with immediate notifications sent to the site research assistant, their supervisor or PI, the network EEG leads, and the Data Processing and Coordinating Center (DPACC) EEG team. Depending on the nature of the problems, sites may be asked to repeat a session for a participant, and will be guided about which techniques and procedures need to be reviewed and improved to avoid the problem in future EEG sessions. The DPACC monitor will verify that the appropriate consent was in place before EEG data is collected.

7) Troubleshooting Electrodes:

To check the quality of an electrode, a bucket test can be performed. Before performing a bucket test, a visual inspection of the electrode in question is recommended. This is to ensure that there are no signs of corrosion, dried gel that was missed during cleaning, or broken wires that are causing the bad data. This video explains how to perform a bucket test. Here are additional instructions on how to perform the bucket test on the NeuroSig laptop.

If an electrode is deemed faulty after performing a bucket test, it can be replaced using the self-repair kit included in the BrainVision suitcase. Here is more information on this: https://pressrelease.brainproducts.com/keeping-active-electrodes-fit-and-well#:~:text= In%20our%20video%20tutorial%2C%20you%20will%20see%20how%20to

8) Additional Information/Documents:

https://drive.google.com/drive/u/2/folders/1NhLcG5C7aP-jBkORDJL55gNCbeGGbv7

<u>Appendix: Preparing for Your EEG Session Handout</u>

<u>What is EEG?:</u> EEG (electro-encephalogram) is a technique for recording electrical activity generated by your brain, using highly sensitive sensors that rest on your scalp. These sensors are held in place by a "cap" fitted to your head. It looks like a swimming cap. Wires connect the sensors to a computer and allow us to view and record your "brain waves" in real time. You will actually be able to see them on the computer screen.
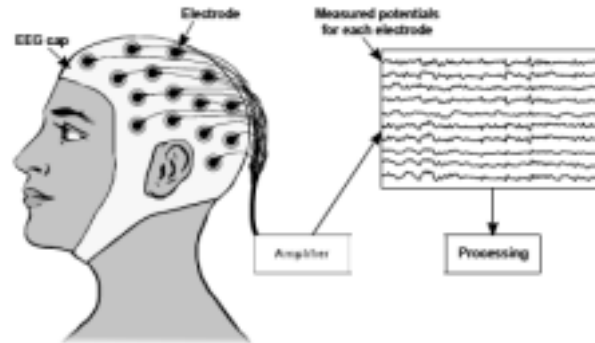
<u>What will I be doing?:</u> While we record your brain waves, you will perform various computer tasks. Some are visual, involving looking at images on a computer screen. Others are auditory, involving hearing sounds through earphones. You will be making decisions about what you see and hear. All this will take place while you are comfortably seated, as shown in the photo here.
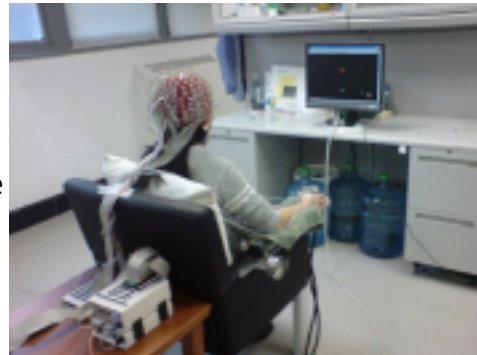
<u>Common questions participants have are:</u>

<u>Is there any discomfort?:</u> During placement of the EEG cap, we will need to gently scrub your scalp to make the EEG sensors work, but it is not harmful and should not hurt. The EEG session can be a bit boring. For this reason, we recommend that you sleep well the night before to make sure that you don't fall asleep during the session.

<u>What about my hair?:</u> During the session, we will squirt a little bit of gel under each sensor to ensure good contact between the sensors and your scalp. This gel is similar to hair gel and can be washed off with water and shampoo, so we recommend that you go back home after the session to wash your hair.

- It's very **important that your scalp is as clean as possible** before your EEG. By following the instructions below you can help ensure that your EEG will be efficient and successful.
- If you have **braided hair** please let us know so that we may discuss options with you.

Please make sure to...

The night before or day of your EEG, shampoo your hair, making sure to massage your scalp vigorously.

Use only shampoo when washing your hair before your EEG. Do not use conditioner, 2-in-1 shampoo/conditioner, or styling products such as hairspray or gel.

After washing, brush your hair using firm strokes, making sure that the bristles are touching your scalp.

Dry your hair and make sure it's dry by the time you arrive for your EEG.

Remove all hair clips and attachments prior to arriving because these interfere with the signal and affect the quality.

If you use prescription eyeglasses or contact lenses, please bring them or wear them to the session.

You might want to **bring a hairbrush or comb with you**, as your hair may be a bit messy when the test is finished.

Some people **bring a hat** to cover their hair until they can wash it at home. **Alcohol and recreational drugs** may influence your brain activity, so please do not consume any on the day before your EEG session, and limit your caffeine intake to no more than two cups. You can however keep taking your prescribed medication without a problem.