**Research Assistant Protocol**

**SONA: Neurocognitive mechanisms behind reduced attentional blink in meditators**

Materials

* Master participant ID sheet, informed consent, debrief
* SONA
  + <https://utscpsych.sona-systems.com/>
  + Account: inzlichtlab
  + Password: pilot0615
* Behavioral lab computer login information
  + Account: inzlichtuser
  + Password: neurosocial162
* Links (saved as bookmarks in Chrome on the acquisition computer)
* Questionnaires: [**JohnQuestionnaires**](https://drive.google.com/drive/folders/1ffKXPhs4S5iZ0cx6YOrPvPZ-5smV7ixo?usp=sharing)

What is this study about?

* You'll be running EEG rapid serial visual presentation and finger-tapping tasks that studies how a mindfulness meditation intervention can impact attentional resource distribution, as measured by the attentional blink.
* I'm using ASA for EEG recording, and PsychoPy to present experimental stimuli (and to synchronize timing across the two computers). So, you'll have to be proﬁcient in operating these apps on two separate computers.
* You will run the provided python script using PsychoPy to run the experiment.

What do you need to know about the computers in EEG3?

* There are three computers (3 Desktops and 3 monitors).
* **Desktop/monitor closest to the main door that leads into the EEG room**
  + **EEG acquisition computer running ASA.**
  + New EEG data will be stored in the DATA folder (shortcut to it on the desktop). You might be able to access the Internet from this computer.
* **Desktop/monitor closest the room the participant is sitting in**
  + **Presentation computer running PsychoPy.**
  + No Internet on this computer. Behavioral data (e.g., choices, accuracy, reaction times, questionnaire responses) will be stored on this computer.

**Before the participant arrives**

Record the online log (John RSVP Blink Log; or <http://bit.do/rsvpblinklog>) if anything goes wrong or you're using experiment setups that deviate from the default procedure (e.g., didn’t get impedances below 5).

What should you do ﬁrst?

* Ensure you have informed consent form, pen, gel, syringe, pumice ﬁnger, lemon prep, alcohol pads, small washer adhesive for face electrodes, etc.
* Place the informed consent form next to the keyboard. Provide a pen.
* Check on SONA who is coming and write the participant's name on the participant list.

Load questionnaires on the EEG computer

* Open the following link: [**JohnQuestionnaires**](https://drive.google.com/drive/folders/1ffKXPhs4S5iZ0cx6YOrPvPZ-5smV7ixo?usp=sharing)

Pause *NextCloud* background sync on the EEG acquisition computer.

* Right-click on the NextCloud icon at the bottom right of the task bar on the EEG acquisition computer. Click pause synchronization.

How to set up all the EEG?

* EEG: Turn on the EEG ampliﬁer and attach the EEG cap to the amp. Push the connectors together snugly and hold them together for a few seconds.

How to set up ASA on the EEG acquisition computer (leftmost monitor/CPU)?

* Open ASA on the EEG acquisition computer (click on the red/yellow ASA icon on the desktop).
* Click 'Setup Recording'.
* In the new window with the blue background, set the following:
  + File Name (recording 1): **John\_RSVP\_1001\_r1.cnt**,  **JohnRSVP\_1001 r1\_.cnt**, and so on (the four digits at the back refer to the participant number, and 1 indicates the run number)
  + File Name (recording 2): **John\_RSVP\_1001\_r2.cnt**, **John\_RSVP\_1002\_r2.cnt**, etc.
  + Sampling Rate: 512
  + Montage: **HauseMontage**
  + Leave everything else empty. All checkboxes at the bottom should be UNCHECKED. ⁃ Click 'OK'.
* A Dialog window with blue background should appear. It should have *'Check Impedances*,' '*Show EEG*,' and '*Proceed*' on it. At the background, you should see a big '*Not Recording!*'.
* Click '*Check Impedances*'. Then > 30 red circles referring to different electrodes should appear:
  + > 20 electrodes on the head
  + 2 electrodes on the earlobes for referencing: M1, M2
  + 2 electrodes for eye movements: VEOG1 (above eyes/yellow wire) and VEOG2 (below eyes/green wire)



How to set up PsychoPy to present stimuli on the presentation computer?

* Run PsychoPy (icon image to the right).
* Close any existing opened tabs in PsychoPy.
* Click ‘File’ > ‘Open’
  + Navigate to the **John RSVP Blink Study** directory on the desktop.
  + Click on the appropriate script for the current condition
* Do not rename or edit anything in the script or you'll crash everything! **Beware**.
* Later, you can begin the study by clicking on the green running man icon at the top.

Test the display switch box to make sure you can switch displays (to control/switch the display/monitor in the participant’s room).

If you've done everything above, then just wait for your participant to arrive.

**Setting up the participant**

What to do first?

* Welcome them to the lab and show them to the testing area. Introduce yourself and ask them for their names (so that you can check it's the correct participant — same as name on SONA).
* Tell the participant something about the study (something like that):
  + This is a neuroscience study. We’re going to take neural recordings with an electroencephalogram, or EEG for short. You will do two runs of a rapid visual presentation tasks and will get 2 credits for completing the study. We will be ﬁtting an EEG cap on your head with a small amount of gel. You can wash, style, and dry your hair in our lab at the end of the study. Any questions about anything?
* Then get them to read and sign the informed consent sheets.

Present participants with the **Toronto Mindfulness Scale** and the **Philadelphia Mindfulness Scale** (*Pre-Intervention*) to assess trait and state mindfulness, respectively, and the Big Five Inventory.

What to do before ﬁtting the cap?

* Ask them to switch off their phones or make sure it's in Airplane mode. Explain this is to reduce interference with the EEG and eye-tracking systems.
* If participant is wearing a watch, ask them to remove it and put it in their bag.
* If they need go to the washroom, let them go quickly.
* If chewing gum, ask them to discard it.
* If wearing earrings, ask them to take them off because you need to attach electrodes.
* If they have their hair up, untie it.
* Tell participant sit comfortably in the chair.

How to put on the cap and apply gel? (Just a few timesaver tips to make life easier for you and the participant!)

* Use the display switch box to show the EEG impedance display on the participant’s display.
* Often, it's much easier to get participants to put on the cap themselves. So, you might want to get them to help you with that when you're trying to put on the cap. Show them the cap and tell them you're going to start ﬁtting it.
* Use your subjective judgement to ﬁnd the mid-point of their head, press on that point, and ask them speciﬁcally, 'Does this feel like the center of your head?' We are usually really good at sensing whether someone or something is pressing down the center of our heads. Try it for yourself! If they say that's not the center, ask them where the center is. Then adjust the cap accordingly. After that, then use the measuring tape (ensure to mid-point = to mid-point, and left pre- to mid-point = right pre-auricular to mid-point) to check whether that's indeed the center and adjust accordingly again. At the end of the day, trust the measuring tape, not the participant because participants can get it wrong.
* Once cap is in the correct position, secure the strap under the chin.
* Tell participant you're going to start applying gel. Tell them you're going to use a blunt needle. Show them the needle's blunt.
* To avoid contamination, use separate needles on the participant’s scalp and the container with gel.
* Before you apply the gel, use the tip of the needle to scratch the scalp and to lift off the hair ﬁrst. THEN you apply gel. By scratching the scalp ﬁrst and trying to lift the hair, the gel makes better and more direct contact with the scalp immediately, making life much easier for you.
* First, gel the second electrode (this is the ground electrode) from the front, located on the midline. If you don't gel this electrode ﬁrst, you won't see impedances for all the other electrodes.
* Make sure all impedances decrease (becomes blue) when you start gelling. Continue gelling, twisting, and turning the needle to scratch the scalp until all impedances are below 5.
* Use lemon prep to clean the ears, around the eyes, and corrugator electrodes (only if using these electrodes). Wipe off lemon prep with alcohol pad and pumice ﬁnger. Make sure no lemon-prep debris is left over. Earlobes and face should be very clean now. Otherwise, we won't get clean recording.
* Attach electrodes to the ear, then eyes, and ﬁnally (if using these electrodes).
* **Ensuring the impedances are close to or equal to 0 for the ear electrodes is REALLY IMPORTANT!**
* To attach eye and corrugator electrodes, use the small washer adhesive.
* After attaching any electrode on the face (e.g., eye, corrugator), press and hold for at least 5 seconds before releasing. This will help stabilize the connection and keep the electrodes ﬁrmly attached. Refer to facial and corrugator electrodes manual for more information on how to attach these electrodes.
* Talk to the participant when you're gelling. Engage them. Get them to look at the image of their eyes on the display. Keep them happy. Happy participants = clean data = good results!
* Explain to participants we're measuring brain activity, so it's very important to keep still. Explain that movement of the jaws, shoulders, and neck will appear in our measurements.
* Show participants their neural activity in the background. Get them to blink and look around to show them the effects of eye movements and moving. Remind them once to try not to blink or move too much during the experiment. Tell them to just be natural.

What to tell the participant and what to do next?

* Tell them that the study will begin now.
* Close the door.

**Determining Task Order**

There are four potential combinations in which the task can be presented to participants, shown as rows in the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A. | RSVP\_1 | Tap\_1 | RSVP\_2 | Tap\_2 |
| B. | RSVP\_1 | Tap\_1 | Tap\_2 | RSVP\_2 |
| C. | Tap\_1 | RSVP\_1 | RSVP\_2 | Tap\_2 |
| D. | Tap\_1 | RSVP\_1 | Tap\_2 | RSVP\_2 |
|  |  |  |  |  |
|  |  | intervention | |  |

You should alternate between these potential orders for each participant, keeping separate counts for participants assigned to each of the two conditions (Somatic Relaxation & Mindfulness Meditation).

**Starting the experiment proper + during the study**

Make sure the participant is seeing the correct display (presentation display, not EEG display)! Close the door and start the experiment.

Tell the participant you’re starting the experiment now.

Start ASA EEG recording (Script/run 1; e.g., **John\_RSVP\_1001\_r2.cnt)**.

* On the EEG computer, return to the window with 'Check Impedances,' 'Show EEG,' and 'Proceed' on it.
* At the background you should see the large 'Not Recording'.
* Click Proceed. Then click Start. The large 'Not Recording' should disappear, which means you're recording EEG now.

# **Run 1**

## **RSVP**

Run **blink\_rsvp.py** script

*  Click the green man icon (EDITOR panel) in PsychoPy to run the study (see screenshots below).
* In the setup window (will pop up once experiment starting), provide the session number (e.g., r1 or r2) and the participant number (1001).
* This section of the study lasts about 11-14 minutes.
* When the task if over, please inform the experimenter.
* Stop EEG recording when this script is done.
  + In the Dialog window ASA EEG/ERP Recording, click 'Stop'. Then the large 'Not Recording' will appear again.

## **Finger-Tapping**

Run **finger\_tap.py** script

*  Click the green man icon (EDITOR panel) in PsychoPy to run the study (see screenshots below).
* In the setup window (will pop up once experiment starting), provide the participant number (1001, 1002, 1003, etc) and the session number (r1).
* This section of the study lasts about 5-7 minutes.
* When it says “This part is done. Please inform the experimenter,” press Escape on the keyboard.
* Stop EEG recording when this script is done.
  + In the Dialog window ASA EEG/ERP Recording, click 'Stop'. Then the large 'Not Recording' will appear again.

Once the first run is completed, inform them that they will now approximately 20 minutes of “Somatic Relaxation” (though keep in mind that half of the participants will be assigned to mindfulness meditation, even though we tell all of them it’s somatic relaxation).

# **Intervention:**

## **Mindfulness Meditation Condition:**

Run **somatic\_relaxation\_mm.py** script (*mm* for Mindfulness Meditation)

*  Click the green man icon (EDITOR panel) in PsychoPy to run the study (see screenshots below).
* In the setup window (will pop up once experiment starting), provide the participant number (e.g., 1001, 1002, etc.).
* In ASA, use the following filename template:
  + - John\_<participant\_id>\_mm

“Condition” in this case, mindfulness meditation, is labeled as “mm”.

* This section of the study lasts about 20 minutes.
* When it says “This part is done. Please inform the experimenter,” press Shift+Esc or Space on the keyboard.
* Stop EEG recording when this script is done.
  + In the Dialog window ASA EEG/ERP Recording, click 'Stop'. Then the large 'Not Recording' will appear again.

## **Somatic Relaxation Condition:**

Run **somatic\_relaxation\_sr.py** script (*sr* for Somatic Relaxation)

*  Click the green man icon (EDITOR panel) in PsychoPy to run the study (see screenshots below).
* In the setup window (will pop up once experiment starting), provide the participant number (e.g., 1001, 1002, etc.).
* This section of the study lasts about 20 minutes.
* In ASA, use the following filename template:
  + - John\_<participant\_id>\_sr

“Condition” in this case, somatic relaxation, is labeled as “sr”.

* When it says “This part is done. Please inform the experimenter,” press Shift+Esc or Space on the keyboard.
* Stop EEG recording when this script is done.
  + In the Dialog window ASA EEG/ERP Recording, click 'Stop'. Then the large 'Not Recording' will appear again.

Once the intervention (somatic relaxation or mindfulness meditation) is complete, instruct the participant that he/she will now be asked to complete another RSVP and Finger-Tapping session.

Start ASA EEG recording (Script/task 2: **blink\_rsvp.py**; e.g., ASA: e.g., **John\_RSVP\_<participant\_id>\_r1.cnt**).

* Open a new ASA recording session and prepare it for the RSVP.
* On the EEG computer, return to the window with 'Check Impedances,' 'Show EEG,' and 'Proceed' on it.

# **Run 2**

## **RSVP**

Run **blink\_rsvp.py** script

*  Click the green man icon (EDITOR panel) in PsychoPy to run the study (see screenshots below).
* In the setup window (will pop up once experiment starting), provide the participant number (e.g., 1001, 1002, 1003, etc) and the session number (2).
* This section of the study lasts about 15-19 minutes.
* When it says “This part is done. Please inform the experimenter,” press Escape on the keyboard.
* Stop EEG recording when this script is done.
  + In the Dialog window ASA EEG/ERP Recording, click 'Stop'. Then the large 'Not Recording' will appear again.

## **Finger-Tapping**

Run **finger\_tap.py** script

*  Click the green man icon (EDITOR panel) in PsychoPy to run the study (see screenshots below).
* In the setup window (will pop up once experiment starting), provide the participant number (e.g., 1001, 1002, 1003, etc) and the session number (2).
* This section of the study lasts 4 minutes and 10 seconds.
* When it says “This part is done. Please inform the experimenter,” press Escape on the keyboard.
* Stop EEG recording when this script is done.
  + In the Dialog window ASA EEG/ERP Recording, click 'Stop'. Then the large 'Not Recording' will appear again.

After finishing the Run 2, stop recording and present the **Toronto Mindfulness Scale** (*Post-Intervention*).

**At the end of the study**

What to do at the end of the study?

* Direct participant to the sink, provide towel, and tell them how to go about washing their hair. Remember to tell them where the shampoo and everything else are!
* When they are washing their hair, check if all data have been saved:

On the acquisition (ASA recording) computer:

* Look within the **DATA** folder (shortcut on the desktop) to make sure the new EEG data (8 new ﬁles: .cnt, .sen, .evt, .trg) have been recorded and saved.
  + e.g., John\_RSVP\_1002\_r1.cnt, John\_Tap\_1002\_r1.cnt etc.
* Open the **John RSVP** folder on the desktop and go into the appropriate **data** folder. Drag and drop all the new ﬁles created in the **DATA** folder for this participant to this folder.

Unpause NextCloud background sync on the EEG acquisition computer.

* Right-click on the NextCloud icon at the bottom right of the task bar on the EEG acquisition computer. Click unpause synchronization.

How to debrief and pay participants?

* Show them debrieﬁng form. Ask if they have any questions. Let them know we're still running the experiment during the semester so don't mention our methods to anyone.
* Tell them they’ve earned $20 and get them to sign on all the forms to indicate they’ve received payment.
* What to do before you leave?
* Wash the cap and the face electrodes. After washing the corrugator electrodes, dry them and reattach them to the ampliﬁer and place them neatly between the monitor and eye tracker.
* **Turn off the ampliﬁer**. This step is extremely important, as it may burn out if left on overnight.
* Make sure the place is clean and tidy.

**How to assign SONA credits**

Options

* Participated: participant has participated and completed study
* Unexcused: participant didn’t show up
* Excused: participant didn’t show up but had a legitimate excuse for not showing up

Click **Update Sign-Ups** at the bottom.

