<project name> experimental Protocol

Version: X.XX (YYY-MM-DD)

*This is a template for writing the experimental protocol for projects at NatMEG. Fill in any extra information or remove sections as it applies to your project.*

# Before start (setup lab)

Make sure the MEG control room and waiting areas are clean and tidy.

Make sure there are extra copies of (mark with id number):

* Participant information
* Consent form (x2)
* Payment forms
* *Whatever addition test material you need*

## Prepare hardware

Check MSR and lab. If the gantry position is wrong or safty light is not green call for assistance.

Check equipment needed for experiment [might include]:

* Sound calibration: <specific calibration settings>
* Response devices: <which button pads, accelerometers, etc>
* Screen: …
* *Eye-tracker: …*
* *Air-pressure device: …*
* …

Find electrodes <number and type> and HPI coils and make them ready in the preperation area.

## Acquisition PC

Start Acquisition program. Load project <your project name>. Load project settings:

* *File* -> *Load Settings* -> **<name of setting>** (check correct channels are selected: <the channels you need> ;

Load tuning:

* In Acquisition: *Tools* -> *Tuning*… opens Tuner, then *File* -> *Load tuning*. Press ok to load default tuning. Press *measure noise*. Wait for the measurement to complete. The average noise should ideally be below 2.7. Heat single channels that might still be bad. If still bad: press Tune at let it run for ~15 min until the noise level is acceptable.

Start head position monitor: Open a terminal. Type: /data/MNE/mne\_visualize\_hpi

Start Lab Notebook: Click desktop icon *Notebook*\_*server*. Click desktop icon *Lab\_notebook*.

## On stimulus computer

Open Presentation:

* Find and load experiment(s) <file name> .
* Check it is the correct tasks: <task name(s)>

Set up/siable split-screen mode for monitor 1 and monitor 2 (DVI1) OR diable split-screen mode if using the eye-tracker.

Open any addition programs: *radio, video, etc*.

Test stimulus/response equipment and triggers from Presentation:

* *Sound …*
* *Response devices …*
* *Screen …*
* *…*
* Test triggers arrivse in Acqusistion: press “go” in acquisition, see if correct triggers arrive (channel(s): STIM*XXXX-* STIM*XXXX*)

# Preperation (before the experiment)

## Participant arrival

The participant arrives at the waiting room. If not, meet participants at the entrance and show them to the lab.

Ask participants to be seated at the table. Explain the procedure and what is going to happen during the session. Ask if there are any questions or anything unclear. Be prepared to answer questions.

* Get signed consent form.
* Fill out <*additional documents*> …

Show the participant to the changing room and find hospital clothes. Repeat that they should leave all metal objects (ask for earrings, piercings anywhere, bracers, jewellery, bra with metal, hairpins, etc.). They can leave it in the locker and bring the key. Ask the participant to use the toilet if necessary.

Set up Lab Notebook with the correct project name, participant number, and date.

When the participant is ready, they should be seated in the wooden chair in the preperation area. One experimenter prepares participant and the other prepares acquisition.

## MEG/acquisition

Register participant in Acquisition under “patients”. Note MEG id.

* Check MEG channels. Heat/reset channels as needed. If some channels keep being noisy, note bad channels in the lab notebook.
* Record 2 min of empty room. Save as: <**empty\_room\_before** [recommended filename]**>**
* Load preparation (when digitization is complete).
* [Optional] Record ~5 sec and save as “*dig\_test*” Open a new terminal. type ./scripts/assess\_hpi\_digitization.sh. Project: “parkinson\_motor” Subject: “Natmeg\_NNNN” *NNNN*=MEG id. Note the errors. If errors are too big (>4-5 mm?-ish) redo digitization.

## Participant preperation

* Scrub with abrasive gel and alcohol pads where the electrodes will be attached.
* Attach electrodes:
  + HEOG (side of eyes) and VEOG (above/below left eye)
  + ECG: right/left collarbone
  + EMG: <location> [if needed]
  + …
* EEG setup [*only if using EEG*]:
  + Measure head circumvenience. Find correct EEG cap (size+number of electrodes).
  + Put cap on participants head.
  + Place cap so Cz is exactly in the middle when measuring from nasion to inion and from ear to ear. Then fasten cap.
  + Gel electrodes by adding EEG gel, scrup with q-tip, then fill well with EEG gel.
* Test impedance: EOG/ref/gnd/*EEG* should be < 10. EMG/ECG should be < 30-35.
* Attach HPI according to the diagram on the wall. Make sure they are firmly fastened. Tape the cord and yellow coil to shoulder.
* Load preparation on digitizing computer. Digitize subject (fiducials + HPI + head shape points, ending with eyebrows and back of the nose).
  + First four and last four additional points should be HPI in the same order as the HPI digitization for quality control. The additional HPI point should be at the same location as the HPI points; if not, redo HPI digitization.
* Save preparation and load on digitizing computer (note time).

Show participant to the MSR. Ask if they need to go to the bathroom and remind them that they will be seated in the room for 1½ hours.

## Preparation in MSR

Seat participant. Ask the participant to be seated as comfortably as they can. Suggest having a pillow in the back of the chair. One experimenter can do the attaching of electrodes, etc. while the other explain and give instructions.

* Attach HPI and electrodes.
* Explain the microphone and intercom.
* Attach <accelerometers/addition electrodes/etc. - instructions>
* Give panic ball and instructions on how to use in case of emergency (press it once to demonstrate the alarm).
* [*if using sound tubes*] Give participant tubes and earplugs. Ask to put them in ears (provide plugs of different size if needed). Make sure the tubes do not drag.
* Set the table. Put cushions beneath their arms if needed (they should sit in a relaxed position). Provide pillows if needed.
* Raise chair. Ask participant to say when they feel the helmet at the scalp (not just the hair). Yo can ask the participant to stretch to see how much further you can raise the chair.
* Place screen to marks on the floor.
* [*if using eye-tracker*]Position eye-tracker: one experimenter positions the camera the other watches the eye-tracking PC and provides feedback.
  + Get camera position on screen: run eye-tracking paradigm on Stim. PC. Run the Presentation calibration. Then start one of the experiments. When the screen is grey, press ENTER to get camera on the screen.

Ask the participant if everything is ok. Tell that you are going to test that everything works from the outside, and the experiment will begin in a few minutes. Leave room and close MSR door.

## Final preparations

Test everything works (write in the lab notes if there is anything unusual):

* Intercom (use sound tube mixer). Talk to the participant immediately after closing the MSR door.
* Test signal on electrode channels:
  + EOG (blink + eye movements): as participant to blink three times and look from side to side.
  + ECG (see heartbeats?).
  + <*EMG (ask the participant to move finger/hand/etc)>*
  + …
* Inspect MEG channels. Heat/reset bad channels. Repeat. Note bad channels that cannot be fixed by heating in the lab notebook.

Go back into MSR room and raise participant if necessary (it probably is). Tell the experiment is ready to begin.

# Experimental procedure

Give instructions and inform participants about what will happen.

Ask and note sleepiness.

[*if running long experiments*] Ask occasionally if they need a short break after each part or if they need water, coffee, chocolate etc.

* If the participant starts to get sleepy, ask them to sit with their eyes closed for 30 sec or move their arms and legs in the breaks (remember to pause recordings).
* Pause recording (uncheck Record raw in Acquisition) during longer breaks. Stop and record as separate files if you need to enter the room during breaks.
* If the recordings are interrupted and must be saved as several files, save as <filename>\_*N*.fif where N is the chronological file order starting at 1.

Open script “PD\_long.exp”. Run. Constantly keep track of when and where the participant is in the protocol.

* Ask for sleepiness before starting the experiment and during breaks. Note in Lab Notebook.
* Save each task as one file unless there is a long break/issue.

|  |  |  |
| --- | --- | --- |
| **Condition** | **Instruction/procedure** | **Filename**  *All filenames in lowercase. No blankspace.* |
| <task name>  <approx. duration> | *<*Oral instruction for participant>  <instructions on how to run experiment: how to start/stop, when conditions change, what to be aware of, etc.>  Start scenario.  Keep an eye on the time.  Monitor participant performance and if they appear drowsy”  Record and save as <number of files> file. [*I usually recommend to save as one*]  Ask for sleepiness. | ***<filename(s)>*** |
| <task name>  <approx. duration> | *<same as above>* | ***<filename(s)>*** |
| … | … | ***…*** |

# After the experiment

When all tasks are over:

* Detach subject and help them out of the scanner.
* Ask if everything went ok or anything were difficult.
* Help participant to remove electrodes (disposable) and HPI coils (non-disposable).

Ask follow-up question and debriefing as needed:

* <instructions>

Give the participant a break. Give a glass of water, coffee, show bathroom, etc. Proceed with the neurological tests when the participant is ready.

When participants are ready, show them to the changing room to let them wash their facec/head amd change back to their regular clothes.

Confirm or arrange date and time for MR-scan <*and/or additional follow-up session*s>. Give MR-material to participants.

Fill out payment forms (if not done initially).

Thank participants for their cooperation and ask whether they have any questions. Make sure they have not left behind any items in the control room, waiting room, or changing room. Show them to the exit and once again thank them for participating.

# After session

Clean the lab and prepare for the next participant when the participant is out of the lab (either during testing or when he/she has left).

## MSR

* Clean MEG helmet and all equipment with disinfection alcohol.
* Clean room: remove and dispose of all tape pieces, used earbuds, cups, etc.
* Change pillowcases and cloth covers.

## Preperation- and control areas

* Clean HPI-coils and digitiser pen/receiver with disinfection alcohol (be gentle).
* Archive papers and forms (*and find new for the next participant*). This must be out of sight before the next participant arrives.
* Remove garbage, old coffee cups, etc.
* Prepare electrodes and HPI-coils for the next participant (see 1.1).

## Data

* Make sure all data files are named correctly (see 4).
* Upload raw data to Archive.
* Run MaxFilter script: run the following command (takes ~2 hours):  
  > cd ~/data\_scripts/20079\_parkinsons\_longitudinal  
  > . /run\_maxfilter.sh
* Upload all data to Archive.
* Copy presentation log-files.
* *<additional data>*

## End of the day

Close open programs and windows on Stim PC and Acquisition PC (let Maxfilter run in an open terminal if it is still running). Do not shut down any PC.

Turn off extra equipment *<screen/ air valve/etc.>.*

If you are not the next to use the lab, detach any additional equipment, put them in the box, and store in the supply room.