

# Additional information for ORHA\_EEG

## Software

Matlab: version R2021a (9.10.0.1602886)

Psychtoolbox: version 3, flavor beta

## Hardware

Screen: Samsung Model 2233RZ

Computer: HP EliteDesk 800 G5 TWR

Processor: Intel Core i5-9500 CPU 3 GHz

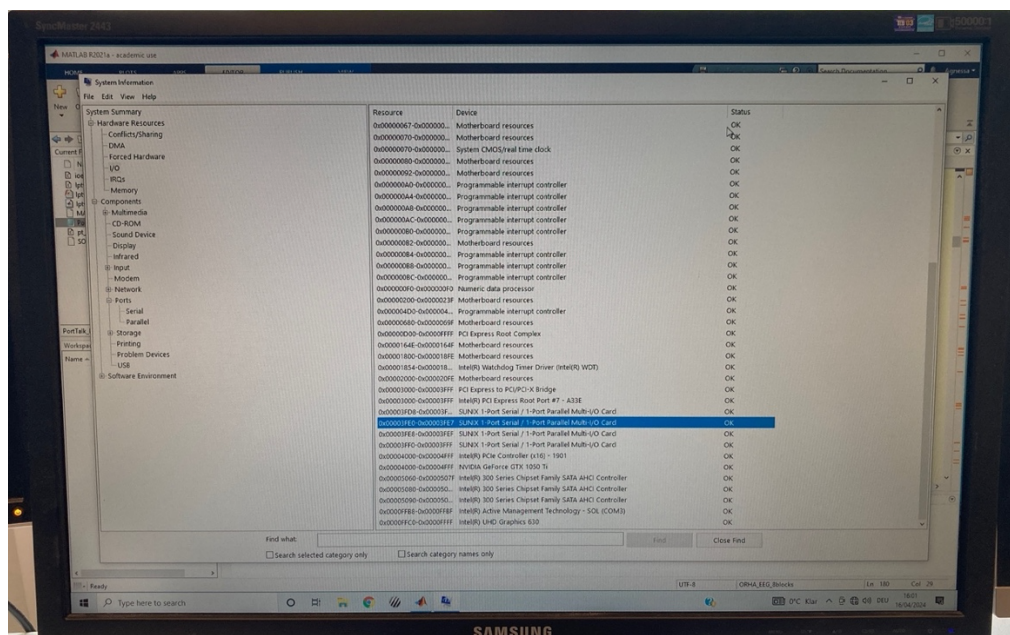
RAM: 64 GB

Operating system: Windows 10 Home, version 20H2, 64bit

Port: SUNIX 1-Port Serial / 1-Port Parallel Multi-I/O Card (allows to use serial as well as parallel devices)

How to get port information:

- Search for “system information” on your Windows computer
- a new window will open
- on the left, navigate to Hardware Resources
- expand the Hardware Resources section and navigate to I/O
- scroll through the list on the right until you find an entry under “device” that says “port”
- the “device” section will tell you whether you are using a parallel or serial port
- the “resource” section will tell you the port address (ignore all the additional zeros)
- in our case we can use both types of ports (serial and parallel) and the port address is “3FE0”



How to measure trigger delay time:

- we have once measured this time for our lab setup which is why you will find the number 0.01367 in my script
- one can measure the duration of this delay with a photodiode by comparing the time point when the image appears (by sending a photodiode pulse) and the time point when the trigger is sent (by registering that time in Matlab)
- in case you want to go down that road, this might be starting point:  
<https://benediktehinger.de/blog/science/latency-measurements-in-a-vision-lab/>

## Experimental Setup

Distance eyes-screen: 60cm

Screen size: 47cm x 30cm

Screen resolution: 1680x1050

Image size: 223x223 pixels

- these are the values we used for the visual angle calculation
- we ended up with an image size of 4.6cm and a fixation cross size of 0.7cm on the screen
- please calculate the visual angle for your setup using `visualanglecalculation.m` and adjust the value in the `ORHA_EEG.m` script

## Things to adjust in the experimental script

### Image size

```
%-----  
% Image size related settings  
%  
% Important: these settings have to be adapted to your setup  
%  
% see: visualanglecalculation.m  
%-----  
  
exp.pix_per_deg = 37.4032; %adapt this based on the visualanglecalculation  
script  
exp.font_size = 20; %adapt this based on the visual needs of your  
participants
```

- please set `exp.pix_per_deg` to value calculated in `visualanglecalculation.m`
- adjust font size if required

### Port

```
%-----  
% Trigger related settings  
%  
% Important: these settings have to be adapted to your setup  
%  
% see: help document  
%-----
```

```
% add path to the functions sending triggers to EEG
% the functions under ./IOport work for a general input/output port on a
% Windows 64bit operating system
addpath(fullfile(exp.root_dir, 'IOport'))

% specify port address (see help document for more information)
address=hex2dec('3FE0');

% set trigger delay time (if required)
exp.trigger_delay_time = 0.01367;
```

- check if our port functions work for your setup
- get the port address (see above)
- measure the trigger delay time of your system and adjust

### Instructions

- the instructions can be changed in two functions called “draw\_instruction\_screen” and “draw\_wait\_screen” => both functions are located in the end of the ORHA\_EEG.m script

### Response keys

- the response keys can be changed in load\_settings.m

```
exp.response_keys = [KbName('b') KbName('space')];
%specify all the keys that should evoke a response
exp.quit_key      = KbName('q'); % key to quit experiment
exp.pause_key     = KbName('space'); % key to press to end pause
exp.scanner_trigger = KbName('q');
```

### Screen number

- please indicate the number of the screen on which the experiment should be presented in load\_settings.m

```
exp.screen_num = 0;
```

### Structure of folder and scripts

#### make\_image\_path\_eeg.m

- script to create image\_paths\_eeg.csv file
- does not need to be adjusted if you use the same stimuli and same folder structure

#### image\_paths\_eeg.csv

- relative paths to all stimuli used in the study
- does not need to be adjusted if you use the same stimuli and same folder structure

#### make\_expdesign\_eeg.m

- creates experimental design for a specific participant before you start the experiment
- needs to be adjusted

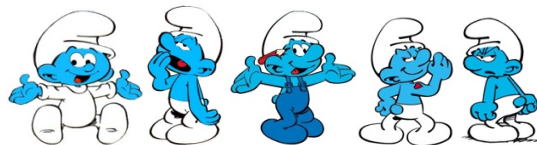
#### load\_settings.m

- defines specific settings for your experiment like response keys and screen

- needs to be adjusted
- visualanglecalculation.m
- calculates the visual angle needed for the experiment script
  - needs to be adjusted
- ORHA\_EEG.m
- main experimental script
  - needs to be adjusted
- load\_experimental\_design.m, natsort.m, natsortfiles.m, KbCheckM.m
- these functions are being called by ORHA\_EEG.m
  - do not need to be adjusted
- stim\_EEG
- images used as stimuli
- design
- design files (created with make\_expdesign\_eeg.m)
- results
- result files in one folder per participant
- IOport
- port and trigger sending related functions

## Participant instructions

I chose smurfs as catch images because I expected them to be a widely known category of sorts and because they can easily be described to people who do not know them. So please ask your participants whether they know what smurfs are and show them the pictures of different smurf exemplars in case they are unfamiliar with the concept.



I instructed participants to fixate on the cross in the center of the screen and try not to blink until a smurf image appears. Whenever they see a smurf, they should blink and press the response button (space bar in our version). It does not matter whether they blink or respond first or do it at the same time. In my experience, the instruction to blink first and then press the button worked best. Participants were also confused by the fixation part. So, I prepared them by saying that the fixation process will feel artificial at first but that the smurfs appear regularly and that they will get into some kind of rhythm.

Side note: I did not record eye tracking data but could see a video recording of their eyes which helped to check in the first 1 or 2 blocks whether they blinked at the right moment. If not, then I would kindly remind them during the break. So, if you have the chance to do that, it would probably enhance data quality; but it is not a must.

I let participants know that every block lasts about 6mins and that the experiment consists of 8 blocks. They should know that there are automatic breaks in between blocks during which they can rest for as long as they want and can reach/talk to the experimenter.

Currently, the breaks are self-timed, meaning that participants press the space bar whenever they want to continue to the next block. You could, of course, change the instructions and then start the next block from the experimenter side.

#### EEG triggers

- the EEG system should receive the following triggers
- 99: button press
- image number (1-69): stimulus presentation
- 101 + run number: start of run
- 199: end