# I – Using the OpenWMB

1 – Open the folder containing all the files from the OpenWMB.

2 – Double-click on the file "WM_Battery_v1_EN_Win" to open the battery.

3 – Before each administration, it is important to verify that OpenSesame has correctly loaded the images used by the battery. To this end, left-click on the icon that contains the image of a folder (highlighted in the print screen below).
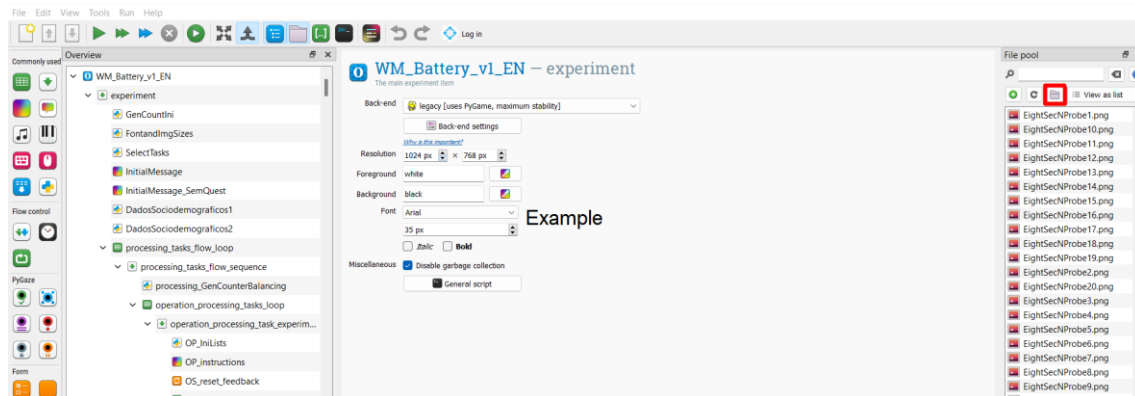
4 – If the images are correctly loaded, this folder should contain 180 images (you can check how many images are inside the folder in the bar highlighted in the print screen below). If this folder is empty or does not contain 180 images, OpenSesame has not loaded the images correctly. If you encounter the latter scenario, you should return to the main folder of the OpenWMB and locate the folder called "Backup_Images". Open this folder. Copy all the images inside "Backup_Images" and paste them into the folder that should contain the images loaded by OpenSesame. You can close the latter after pasting the images.
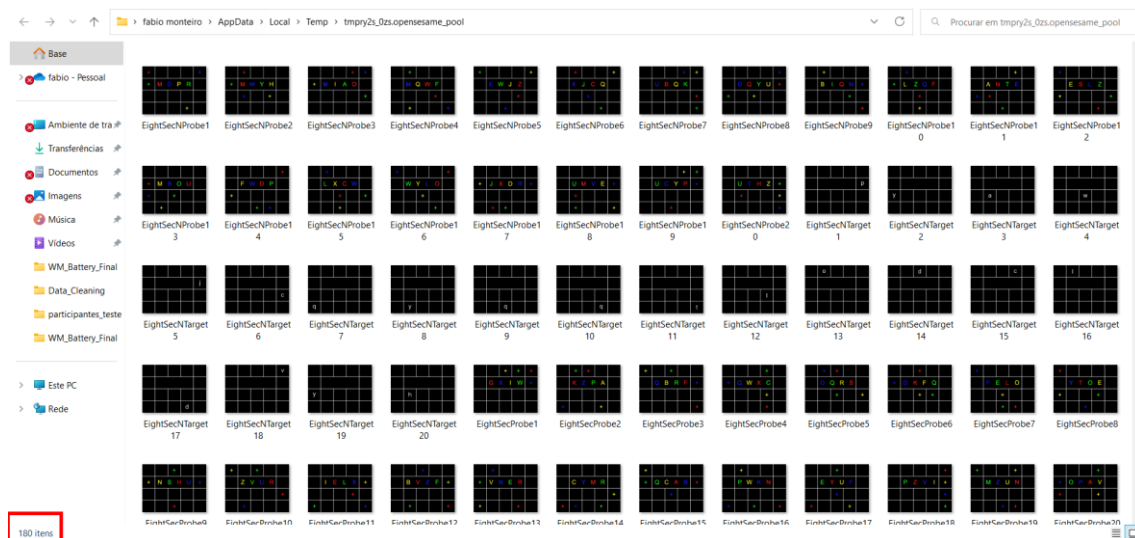
5 – Next, you will launch the battery in full-screen mode. To do so, press the green button highlighted in the print screen below.
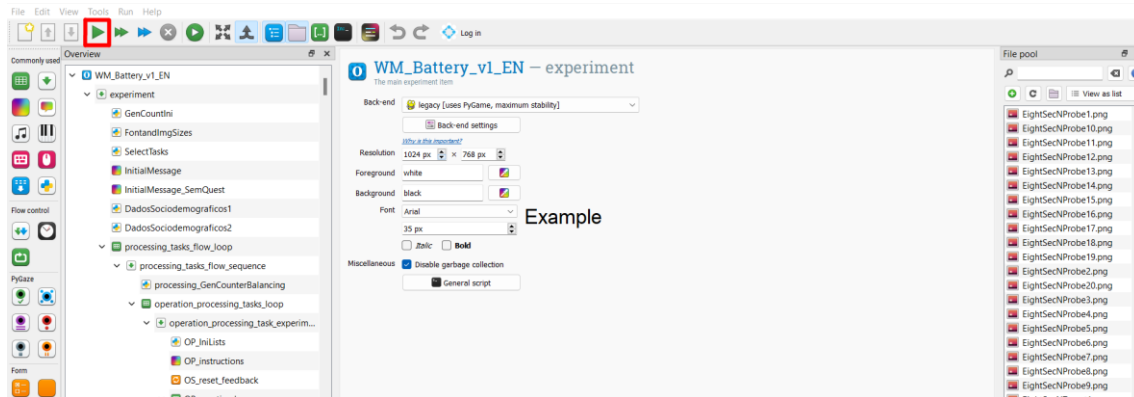
6 – A window requesting the subject ID will pop up when you press the "launch in full screen" button (as highlighted in the print screen below). The OpenWMB includes an algorithm that counterbalances the order of the tasks between-subjects. The subject ID will determine the presentation order of the tasks. All possible presentation orders for complete administrations of the OpenWMB — administration of the 6 WM tasks included in the battery — are presented below. X can only be replaced by integers:

Order 1 — Subject number = 1 + (X*6): Memory Updating Task, Binding and Maintenance Task, Operation Span, N-Back Task, Multimodal Span, Symmetry Span.
Order 2 — Subject number = 2 + (X*6): Binding and Maintenance Task, Operation Span, N-Back Task, Multimodal Span, Symmetry Span, Memory Updating Task.
Order 3 — Subject number = 3 + (X*6): Operation Span, N-Back Task, Multimodal Span, Symmetry Span, Memory Updating Task, Binding and Maintenance Task.
Order 4 — Subject number = 4 + (X*6): N-Back Task, Multimodal Span, Symmetry Span, Memory Updating Task, Binding and Maintenance Task, Operation Span.
Order 5 — Subject number = 5 + (X*6): Multimodal Span, Symmetry Span, Memory Updating Task, Binding and Maintenance Task, Operation Span, N-Back Task.
Order 6 — Subject number = 6 + (X*6): Symmetry Span, Memory Updating Task, Binding and Maintenance Task, Operation Span, N-Back Task, Multimodal Span.

Type the subject number on the textbox and press "OK".
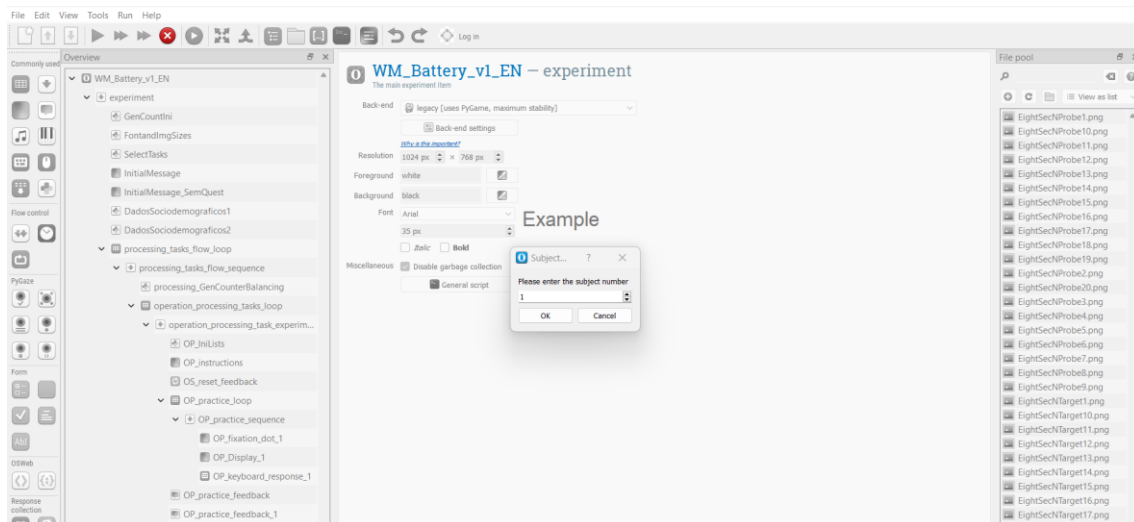
7 – Then, the application will request that you select the folder in which you intend to save the file containing all data collected. It is paramount that you save this file in the folder called "data_participants". The OpenWMB includes a data processing script called "Script_Organize_Log_Files" that converts the data collected by the battery into an easily interpretable format that is ready for data analysis (in platforms like R or SPSS). This script will only function properly if the data files are stored in the folder "data_participants".
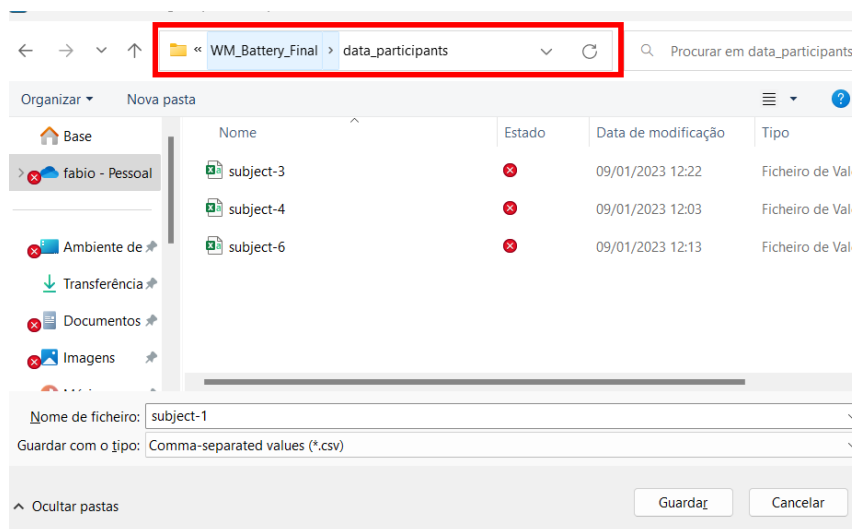
8 – Then, the battery will be launched in full-screen mode. The first menu of the battery will allow you to choose which tasks you want to administer. By default, the OpenWMB will administrate the six tasks included in the instrument and a brief socio-demographic questionnaire. However, it is possible to only employ a portion of the tasks. To deactivate one

or more tasks, you simply need to change the tick in the corresponding checkbox(s) to "No". You may also deactivate the sociodemographic questionnaire.

Select the tasks you intend to use:

1 - Updating Task:	☑ Yes	☐ No
2 - Binding Task:	☑ Yes	☐ No
3 - Operation Span:	☑ Yes	☐ No
4 - N-Back Task:	☑ Yes	☐ No
5 - Multimodal Span:	☑ Yes	☐ No
6 - Symmetry Span:	☑ Yes	☐ No
7 - Sociodemographic Quest:	☑ Yes	☐ No

Press this button when you finish selecting the tasks

9 – After selecting the tasks you want to use, a canvas with the general instructions of the battery should appear (see print screen below). When this canvas is presented, you can start to administrate the battery to your participants. The battery is completely automatized and contains detailed instructions for each task. Thus, the participants should be able to complete the battery independently from this point forward.

Greetings!

Throughout this session you will complete several cognitive tasks. These tasks measure some functional aspects of working memory - simultaneous storage and processing of information, updating of mental representations, and the capacity to bind multiple features of the stimuli.

Some instructions will be provided at the start of each task. The instructions will brief you about the goals of each task, and the keys you will have to press to complete each task. Read the instructions carefully. If you have any questions do not hesitate to call the technician that is applying the battery. He/she will answer your questions.

You will also need to fill out a brief sociodemographic questionnaire.

Press any key to continue!

II – Using the script Script_Organize_Log_Files

1 – As previously stated, the OpenWMB includes a data processing script called "Script_Organize_Log_Files". This script converts the data collected by the battery into an easily interpretable format that is ready for data analysis (in platforms like R or SPSS). This script also calculates some descriptive statistics (e.g., mean, standard deviation) for the scores of the WM tasks and some socio-demographic variables. However, this script will only function properly if the data files are stored in the folder "data_participants".

2 – To use this script, you must double-click on the icon called "Script_Organize_log_files". This file is in the main folder of the OpenWMB.
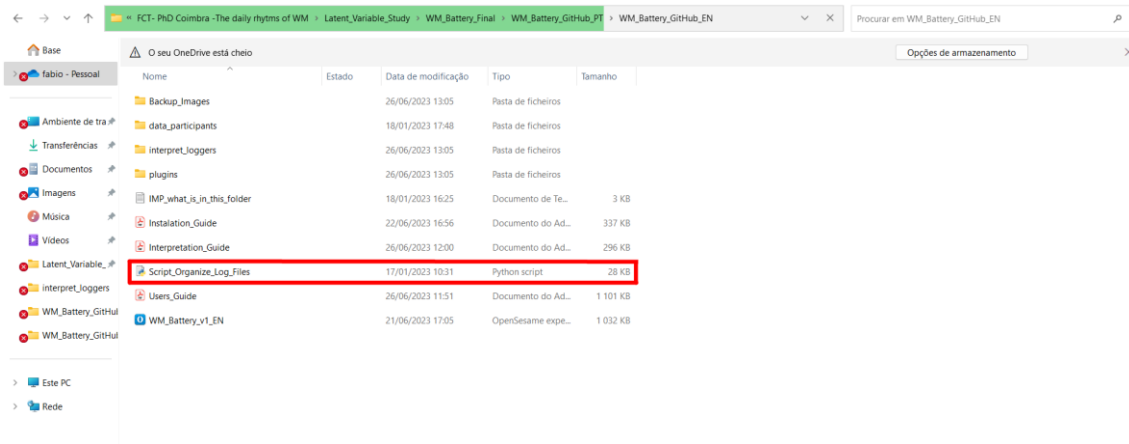
3 – To run this script, press the green button with the Play symbol (see the print screen below).
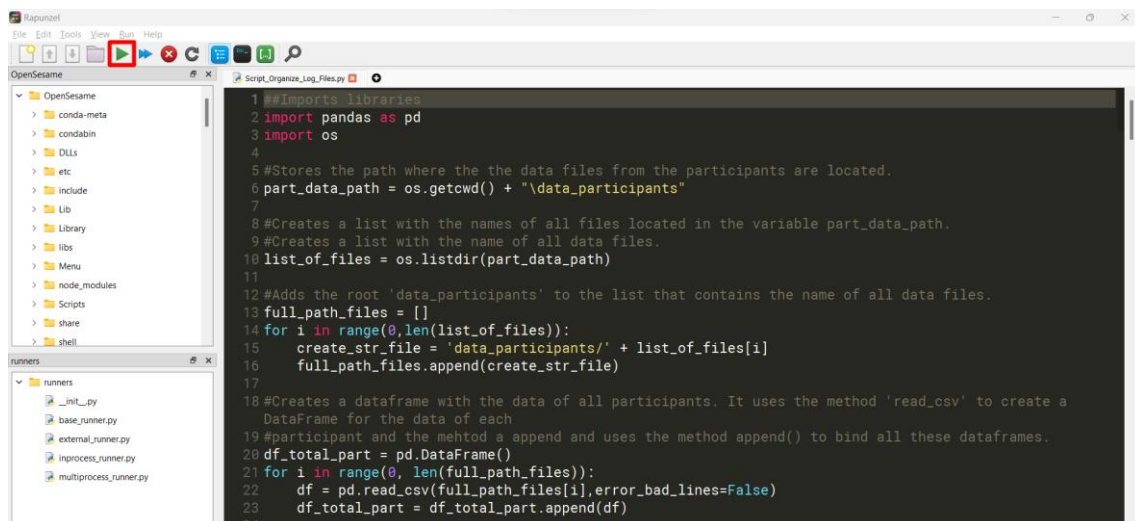
4 – When the script is executed, a file called "BD_WM_Battery" will appear in the main folder of the OpenWMB. This file will contain the data of all participants in an easily interpretable format. To get detailed explanations of all sheets and variables inside the file "BD_WM_Battery", read the document called "Interpretation_Guide" and the notepads inside the folder "interpret_loggers".
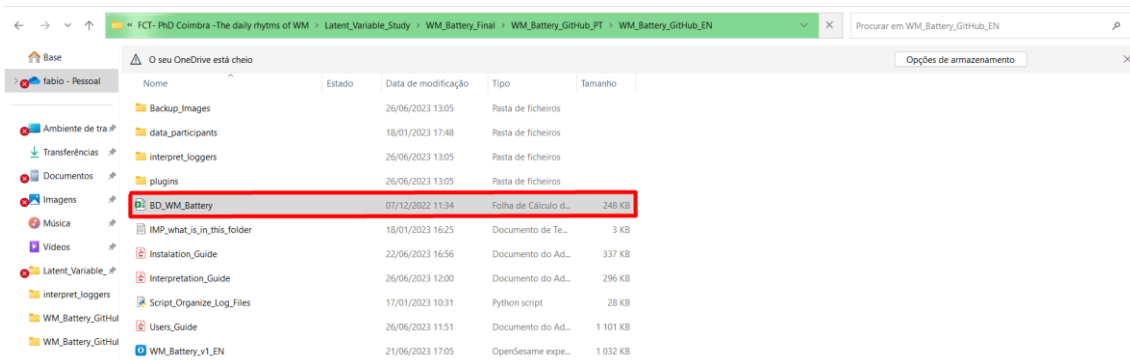
5 – WARNING: The preprocessing script will only work properly if all data files stored in the "data_participants" folder are homogenous. This means that all files must contain data regarding the same WM tasks (e.g., all data files must contain data regarding the reading span, the n-back task, and the multimodal span). If this is not the case, the preprocessing script will not run correctly (e.g., if the folder "data_participants" contains 9 data files from participants that completed the operation span, the n-back task, and the multimodal span, and a single data file from a participant that completed the multimodal span and the symmetry span the preprocessing script will not run properly).

III – Handling common errors

1 – The battery may crash from time to time, especially in long data-collecting sessions. However, OpenSesame saves all data collected until the moment the program crashes. Thus, if this happens to you, it is possible to continue to collect data without discarding the participant. To continue to collect data, you simply need to relaunch the battery and select the tasks that the participant was not able to complete until the moment of the crash. To do this, you simply need to change the tick of the completed tasks to "No" in the first menu of the OpenWMB. In this situation, you should give the same subject number to the participant and name the new data file "subject-XX-2.csv". Be careful not to save the two data files with the same name because it will override the oldest data file. The script "Script_Organize_Log_Files" will automatically merge all data files from the same participants.

ATTENTION: In situations in which you administrated the socio-demographic questionnaire and the program crashed, your participants must fill out this questionnaire again when you relaunch the OpenWMB.