

Reproducing results of Meier et al. (2022)

This manual provides all the necessary information to make it possible for interested researchers to re-run the analysis in the study of Meier et al. (2022).

(1) Input data

The data needed to run the notebooks is stored here:

https://github.com/the-virtual-brain/tvb-multiscale/tree/Meier_etal_ExpNeur2022/examples/data/basal_ganglia

(2) explanation of how to set up software environment

download the docker image:

```
docker pull thevirtualbrain/tvb-nest:Meier_etal_ExpNeur2022
```

and run it:

```
docker run -p 8888:8888
```

```
docker.io/thevirtualbrain/tvb-nest:Meier_etal_ExpNeur2022
```

(3) explanation of different notebooks

Find the notebooks used for producing the results here

https://github.com/the-virtual-brain/tvb-multiscale/tree/Meier_etal_ExpNeur2022/examples/tvb_annarchy/notebooks

https://github.com/the-virtual-brain/tvb-multiscale/blob/Meier_etal_ExpNeur2022/examples/tvb_annarchy/notebooks/Meier_etal_2021-ANNarchy-Izhikevich-cortex.ipynb

is the notebook used for only-Annarchy simulations inside the tvb-multiscale environment, in the paper this model is named the BG model

https://github.com/the-virtual-brain/tvb-multiscale/blob/Meier_etal_ExpNeur2022/examples/tvb_annarchy/notebooks/Meier_etal_2021-ANNarchy-poisson-corr-cortex.ipynb

is the notebook corresponding to the in-between model for validation purposes, which is named the spiking-cortex model in the paper. The cortex is here substituted with a spiking generating device.

https://github.com/the-virtual-brain/tvb-multiscale/blob/Meier_etal_ExpNeur2022/examples/tvb_annarchy/notebooks/Meier_etal_2021-TVB-corr-cortex-opt.ipynb

notebook for the full multiscale model where the cortex is substituted by a TVB model. In the paper this is called the TVB-cortex model.

https://github.com/the-virtual-brain/tvb-multiscale/blob/Meier_etal_ExpNeur2022/examples/tvb_annarchy/notebooks/notebooks_for_some_paper_figs_and_10_repetitions/execute_repetitions.ipynb

auxiliary notebook for running 10 repetitions of the notebooks and averaging over the spiking rates.

https://github.com/the-virtual-brain/tvb-multiscale/blob/Meier_etal_ExpNeur2022/examples/tvb_annarchy/notebooks/notebooks_for_some_paper_figs_and_10_repetitions/load_data_plot_figs.ipynb

This notebook loads the simulated data and plots figures needed for the paper figures

https://github.com/the-virtual-brain/tvb-multiscale/blob/Meier_etal_ExpNeur2022/examples/tvb_annarchy/notebooks/notebooks_for_some_paper_figs_and_10_repetitions/load_data_dict_ts_to_DataArray_and_compute.ipynb

loads the results of the simulations and generates some extra plots needed for the paper