
Homeostasis at different backgrounds: The roles of overlayed feedback structures in vertebrate photoadaptation

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Supporting Information S1 Programs

Although all shown computations were performed in Fortran, we provide here a set of python scripts to make the documentation more accessible. The python scripts describe results for motifs m1 (Fig 4a), m7 (Fig 6a), m2 (Fig 8a), m8 (Fig 11a), m3 and m5 (S1 Text, Figs S2a and S4a), m4 (S2 Text, Fig S2), m6 (S2 Text, Fig S4a), Fig 15, Fig 16a,b, Fig 17b, and Fig 19. The scripts are located in their respective folders.

How to run the python scripts

The python scripts require the installation of python (<https://www.python.org/>), NumPy (<https://numpy.org/>), SciPy (<https://scipy.org/>), and matplotlib (<https://matplotlib.org/>). The python scripts can then be run from a Terminal (MacOSX, Linux, Unix, or Chromebook computers) or from the Command Prompt (computers running Windows). To run the scripts, locate the actual folder with the Terminal or Command Prompt, for example the folder 'm1 python', and write:

```
python m1.py
```

and press RETURN

This will run the 'm1.py' script inside this folder and will create a plot showing the A concentration as a function of time for the actual parameter values. The 'plots' folder contains the plots for the applied perturbation with different backgrounds (here k_4).

The scripts 'plot_xx_A_merged.py' read the A-data from local folders A-data and plot A as a function of time as a function of the backgrounds. 'xx' stands for the motifs 'm1', 'm2',..., etc.

The scripts 'plot_xx_A-MaxResponse' read the A-data from local folders A-data, calculate the maximum excursion ΔA_{max} , and plots ΔA_{max} as a function of the different backgrounds. 'xx' stands for the motifs 'm1', 'm2',..., etc.

Copies of the graphical outputs are found in the plots folders.

All python scripts can be run in the Terminal or Command Prompt by the command:

```
python name.py
```

where 'name' is the name of the python script. Rate constants and initial concentrations are set within the scripts.