

Three programs are included in the repository, to allow a complete reproduction of all results, with suitable parameter choices.

It is worth noting that all parameters in the present codes refer to the simulation of panel 5 a in the manuscript, and to the plot of the overall Fig. 5. All other data analysed in the manuscript, can be generated, and all figures re-drawn, by changing the parameters in the programs and repeating the processing, as illustrated below.

### **Data\_Generation.m**

The program “**Data\_Generation.m**” allows the simulation of the Neural Mass Model, and the memorization of results in a file. In the present example the file is named “sim\_data\_Fig5\_0a.mat” (line 165) and this name should be changed in all simulations.

The parameters of the Neural Mass Model that should be changed to allow different simulations are:

*Npop* : number of interconnected regions; (Fig. 3, Fig. 4, Fig. 5, Fig. 6, Fig. 7)

*Wp* : array containing the excitatory synapses (dimension *Npop* x *Npop*) where the rows represent the target ROIs and the columns the source ROIs; (Fig. 3, Fig. 4, Fig. 5, Fig. 6, Fig. 7)

*Wf* : array containing the inhibitory synapses (dimension *Npop* x *Npop*) where the rows represent the target ROIs and the columns the source ROIs; (Fig. 3, Fig. 4, Fig. 5, Fig. 6, Fig. 7)

*m1* : mean value of the input noise to ROI 1; (first panel row in Fig. 8)

*m2* : mean value of the input noise to ROI 2; (Fig. 9)

*sigma\_p1* : power density of the input noise to ROI 1; (second panel row in Fig. 8)

*sigma\_p* : power density of the input noise to ROI 1 and 2; (third panel row in Fig. 8)

*D* : delay between interconnected ROIs; (Fig. 10)

*tend* : signal length; (Fig. 11)

The program performs 10 simulations with different noise and memorizes 10 EEG signals, the time vector, and the connectivity arrays, *Wp* and *Wf*.

### **TE\_calculation.m**

The program “**TE\_calculation.m**” reads the data from a previous simulation. In this example, loads the file “sim\_data\_Fig5\_0a.mat” (line 8) previously generated with the program “*Data-Generation.m*” and computes the values of Transfer entropy. All results are stored in a file. In the present example this is named “TE\_data\_Fig5\_0a.mat” (line 81). In particular, the data structure 'TGA\_results' contains all results generated with the software Trentool, as specified in the Supplementary Material 1. It is worth noting that, before running, this program, the user must install the Trentool software package (see [tp://www.trentool.de/](http://www.trentool.de/) for more details).

It is worth noting that Trentool also generates additional mat files, that are not used by us.

## Figure5.m

This program generates all panels in Fig. 5, starting from the values of Transfer Entropy previously computed by the program “*TE\_calculation.m*” and stored in different files. By way of example, all mat files used to produce the figure are included in the directory. These files can also be generated by the user as suggested above. These mat files are an example of how files should be generated and structured to produce all data and plot figures.

In the case of Figs. 8 and 9 of the manuscript, entropy is also computed from the simulated EEG data, using the matlab command “entropy” contained in the Image Processing toolbox.

Fig. 7 contains bar figures, generated with the Matlab command Bar.

Finally, in order to reproduce figures contained in the Supplementary Material 2, the user should replace the computation of TE with the computation of the delayed correlation coefficient. This is computed using the Matlab command “corr”, with the target signal delayed by two steps (20 ms) with respect to the source signal. Only in case of the first and third panels of Fig. 10, the delays were one step (10 ms) and three steps (30 ms), respectively.

In the following, a list of *parameters* to be used in the program “*Data\_Generation.m*” is given per each figure:

Parameters configuration for data generation:

Signal Length = 60 sec

Delay = 16.5 ms

Mean Value of Noise Input = 0

Power Density of Noise Input = 9;

N° of ROIs:

- Npop=2:

$$Wf = \begin{bmatrix} 0 & Wf_{12} \\ Wf_{21} & 0 \end{bmatrix}; \quad Wp = \begin{bmatrix} 0 & Wp_{12} \\ Wp_{21} & 0 \end{bmatrix};$$

- Npop=3:

$$Wf = \begin{bmatrix} 0 & Wf_{12} & Wf_{13} \\ Wf_{21} & 0 & Wf_{23} \\ Wf_{31} & Wf_{32} & 0 \end{bmatrix}; \quad Wp = \begin{bmatrix} 0 & Wp_{12} & Wp_{13} \\ Wp_{21} & 0 & Wp_{23} \\ Wp_{31} & Wp_{32} & 0 \end{bmatrix};$$

- Npop=4:

$$\begin{aligned}
 Wf = & \begin{bmatrix} 0 & Wf_{12} & Wf_{13} & Wf_{14} \\ Wf_{21} & 0 & Wf_{23} & Wf_{24} \\ Wf_{31} & Wf_{32} & 0 & Wf_{34} \\ Wf_{41} & Wf_{42} & Wf_{43} & 0 \end{bmatrix} ; & Wp = & \begin{bmatrix} 0 & Wp_{12} & Wp_{13} & Wp_{14} \\ Wp_{21} & 0 & Wp_{23} & Wp_{24} \\ Wp_{31} & Wp_{32} & 0 & Wp_{34} \\ Wp_{41} & Wp_{42} & Wp_{43} & 0 \end{bmatrix} ;
 \end{aligned}$$

**Figure 3:** Npop=2

$$\begin{aligned}
 \text{a) } Wf = & \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} ; & Wp = & \begin{bmatrix} 0 & Wp_{12} \\ 0 & 0 \end{bmatrix} ; & Wp_{12} = & 0, 10, 20, 30, 40, 50, 60, 70, 80 \\
 \text{b) } Wf = & \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} ; & Wp = & \begin{bmatrix} 0 & Wp_{12} \\ 20 & 0 \end{bmatrix} ; & Wp_{12} = & 0, 10, 20, 30, 40, 50, 60, 70, 80 \\
 \text{c) } Wf = & \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} ; & Wp = & \begin{bmatrix} 0 & Wp_{12} \\ 40 & 0 \end{bmatrix} ; & Wp_{12} = & 0, 10, 20, 30, 40, 50, 60, 70, 80 \\
 \text{d) } Wf = & \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} ; & Wp = & \begin{bmatrix} 0 & Wp_{12} \\ 60 & 0 \end{bmatrix} ; & Wp_{12} = & 0, 10, 20, 30, 40, 50, 60, 70, 80
 \end{aligned}$$

**Figure 4:** Npop=2

$$\begin{aligned}
 \text{a) } Wf = & \begin{bmatrix} 0 & Wf_{12} \\ 0 & 0 \end{bmatrix} ; & Wp = & \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} ; & Wf_{12} = & 0, 5, 10, 15, 20, 25, 30, 35, 40 \\
 \text{b) } Wf = & \begin{bmatrix} 0 & Wf_{12} \\ 10 & 0 \end{bmatrix} ; & Wp = & \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} ; & Wf_{12} = & 0, 5, 10, 15, 20, 25, 30, 35, 40
 \end{aligned}$$

$$\begin{aligned} \text{c) } Wf &= \begin{bmatrix} 0 & Wf_{12} \\ 20 & 0 \end{bmatrix} ; & Wp &= \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} ; & Wf_{12} &= 0, 5, 10, 15, 20, 25, 30, 35, 40 \end{aligned}$$

$$\begin{aligned} \text{d) } Wf &= \begin{bmatrix} 0 & Wf_{12} \\ 30 & 0 \end{bmatrix} ; & Wp &= \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} ; & Wf_{12} &= 0, 5, 10, 15, 20, 25, 30, 35, 40 \end{aligned}$$

$$\begin{aligned} \text{e) } Wf &= \begin{bmatrix} 0 & Wf_{12} \\ 40 & 0 \end{bmatrix} ; & Wp &= \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} ; & Wf_{12} &= 0, 5, 10, 15, 20, 25, 30, 35, 40 \end{aligned}$$

**Figure 5:** Npop=3

$$\begin{aligned} \text{a) } Wf &= \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} ; & Wp &= \begin{bmatrix} 0 & Wp_{12} & 0 \\ 40 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} ; & Wp_{12} &= 0, 20, 40, 60, 80 \end{aligned}$$

$$\begin{aligned} \text{b) } Wf &= \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} ; & Wp &= \begin{bmatrix} 0 & Wp_{12} & 20 \\ 40 & 0 & 20 \\ 0 & 0 & 0 \end{bmatrix} ; & Wp_{12} &= 0, 20, 40, 60, 80 \end{aligned}$$

$$\begin{aligned} \text{c) } Wf &= \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} ; & Wp &= \begin{bmatrix} 0 & Wp_{12} & 40 \\ 40 & 0 & 40 \\ 0 & 0 & 0 \end{bmatrix} ; & Wp_{12} &= 0, 20, 40, 60, 80 \end{aligned}$$

$$\begin{aligned} \text{d) } Wf &= \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} ; & Wp &= \begin{bmatrix} 0 & Wp_{12} & 60 \\ 40 & 0 & 60 \\ 0 & 0 & 0 \end{bmatrix} ; & Wp_{12} &= 0, 20, 40, 60, 80 \end{aligned}$$

**Figure 6** (38 points): Npop=3

$$\begin{array}{l} 1) \quad Wf = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 5 \\ 0 & 15 & 0 \end{bmatrix} ; \quad Wp = \begin{bmatrix} 0 & 15 & 20 \\ 30 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix} \end{array}$$

$$\begin{array}{l} 2) \quad Wf = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 20 \\ 0 & 15 & 0 \end{bmatrix} ; \quad Wp = \begin{bmatrix} 0 & 15 & 20 \\ 30 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix} \end{array}$$

$$\begin{array}{l} 3) \quad Wf = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 5 \\ 0 & 15 & 0 \end{bmatrix} ; \quad Wp = \begin{bmatrix} 0 & 15 & 20 \\ 15 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix} \end{array}$$

$$\begin{array}{l} 4) \quad Wf = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 5 \\ 0 & 15 & 0 \end{bmatrix} ; \quad Wp = \begin{bmatrix} 0 & 15 & 20 \\ 45 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix} \end{array}$$

$$\begin{array}{l} 5) \quad Wf = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 20 \\ 0 & 15 & 0 \end{bmatrix} ; \quad Wp = \begin{bmatrix} 0 & 15 & 20 \\ 15 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix} \end{array}$$

$$\begin{array}{l} 6) \quad Wf = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 20 \\ 0 & 15 & 0 \end{bmatrix} ; \quad Wp = \begin{bmatrix} 0 & 15 & 20 \\ 45 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix} \end{array}$$

$$\begin{array}{l} 7) \quad Wf = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 20 \\ 0 & 15 & 0 \end{bmatrix} ; \quad Wp = \begin{bmatrix} 0 & 15 & 20 \\ 30 & 0 & 0 \\ 15 & 0 & 0 \end{bmatrix} \end{array}$$

$$8) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 20 \\ 0 & 15 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 15 & 20 \\ 30 & 0 & 0 \\ 45 & 0 & 0 \end{bmatrix}$$

$$9) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 5 \\ 0 & 25 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 15 & 20 \\ 30 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix}$$

$$10) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 5 \\ 0 & 0 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 15 & 20 \\ 30 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix}$$

$$11) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 5 \\ 0 & 10 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 15 & 20 \\ 30 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix}$$

$$12) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 5 \\ 0 & 35 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 15 & 20 \\ 30 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix}$$

$$13) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 5 \\ 0 & 25 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 0 & 20 \\ 30 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix}$$

$$14) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 5 \\ 0 & 25 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 30 & 20 \\ 30 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix}$$

$$15) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 5 \\ 0 & 25 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 45 & 20 \\ 30 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix}$$

$$16) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 5 \\ 0 & 25 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 15 & 0 \\ 30 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix}$$

$$17) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 5 \\ 0 & 25 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 15 & 30 \\ 30 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix}$$

$$18) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 5 \\ 0 & 25 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 15 & 45 \\ 30 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix}$$

$$19) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 5 \\ 0 & 25 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 15 & 20 \\ 60 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix}$$

$$20) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 15 \\ 0 & 25 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 15 & 20 \\ 60 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix}$$

$$21) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 5 \\ 0 & 25 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 15 & 20 \\ 45 & 0 & 0 \\ 45 & 0 & 0 \end{bmatrix}$$

$$22) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 30 \\ 0 & 15 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 15 & 20 \\ 30 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix}$$

$$23) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 30 \\ 0 & 15 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 30 & 30 \\ 30 & 0 & 0 \\ 30 & 0 & 0 \end{bmatrix}$$

$$24) \quad Wf = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 30 \\ 0 & 35 & 0 \end{bmatrix}; \quad Wp = \begin{bmatrix} 0 & 60 & 60 \\ 60 & 0 & 0 \\ 60 & 0 & 0 \end{bmatrix};$$

$$25) \quad Wf = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 35 \\ 0 & 35 & 0 \end{bmatrix}; \quad Wp = \begin{bmatrix} 0 & 50 & 10 \\ 60 & 0 & 0 \\ 50 & 0 & 0 \end{bmatrix};$$

$$26) \quad Wf = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 10 \\ 0 & 30 & 0 \end{bmatrix}; \quad Wp = \begin{bmatrix} 0 & 10 & 50 \\ 60 & 0 & 0 \\ 10 & 0 & 0 \end{bmatrix};$$

$$27) \quad Wf = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 25 \\ 0 & 5 & 0 \end{bmatrix}; \quad Wp = \begin{bmatrix} 0 & 40 & 40 \\ 60 & 0 & 0 \\ 20 & 0 & 0 \end{bmatrix};$$

$$28) \quad Wf = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 30 \\ 0 & 30 & 0 \end{bmatrix}; \quad Wp = \begin{bmatrix} 0 & 50 & 40 \\ 60 & 0 & 0 \\ 50 & 0 & 0 \end{bmatrix};$$

$$29) \quad Wf = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 35 \\ 0 & 5 & 0 \end{bmatrix}; \quad Wp = \begin{bmatrix} 0 & 40 & 60 \\ 60 & 0 & 0 \\ 40 & 0 & 0 \end{bmatrix};$$

$$30) \quad Wf = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 10 \\ 0 & 5 & 0 \end{bmatrix}; \quad Wp = \begin{bmatrix} 0 & 60 & 10 \\ 60 & 0 & 0 \\ 40 & 0 & 0 \end{bmatrix};$$

$$31) \quad Wf = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 35 & 0 \end{bmatrix}; \quad Wp = \begin{bmatrix} 0 & 50 & 60 \\ 60 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix};$$



$$32) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 25 \\ 0 & 20 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 20 & 60 \\ 0 & 0 & 0 \\ 60 & 0 & 0 \end{bmatrix}$$

$$33) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 10 \\ 0 & 30 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 40 & 40 \\ 10 & 0 & 0 \\ 60 & 0 & 0 \end{bmatrix}$$

$$34) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 15 \\ 0 & 30 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 20 & 50 \\ 20 & 0 & 0 \\ 50 & 0 & 0 \end{bmatrix}$$

$$35) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 25 \\ 0 & 10 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 60 & 50 \\ 40 & 0 & 0 \\ 40 & 0 & 0 \end{bmatrix}$$

$$36) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 5 \\ 0 & 20 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 30 & 30 \\ 50 & 0 & 0 \\ 20 & 0 & 0 \end{bmatrix}$$

$$37) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 30 \\ 0 & 20 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 50 & 60 \\ 0 & 0 & 0 \\ 40 & 0 & 0 \end{bmatrix}$$

$$38) \quad W_f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 20 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 30 & 60 \\ 50 & 0 & 0 \\ 10 & 0 & 0 \end{bmatrix}$$

**Figure 7:** Npop=4

a)  $W_f = \begin{bmatrix} 0 & 30 & 0 & 0 \\ 20 & 0 & 0 & 0 \\ 0 & 0 & 0 & 30 \\ 0 & 0 & 20 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 0 & 10 & 15 \\ 0 & 0 & 0 & 10 \\ 50 & 15 & 0 & 0 \\ 60 & 50 & 0 & 0 \end{bmatrix}$

b)  $W_f = \begin{bmatrix} 0 & 30 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 30 \\ 0 & 0 & 0 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 0 & 10 & 15 \\ 0 & 0 & 0 & 10 \\ 50 & 0 & 0 & 0 \\ 60 & 50 & 0 & 0 \end{bmatrix}$

c)  $W_f = \begin{bmatrix} 0 & 20 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 30 \\ 0 & 0 & 0 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 0 & 0 & 25 \\ 0 & 0 & 0 & 10 \\ 50 & 20 & 0 & 0 \\ 25 & 40 & 0 & 0 \end{bmatrix}$

d)  $W_f = \begin{bmatrix} 0 & 20 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 30 \\ 0 & 0 & 0 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 50 & 20 & 0 & 0 \\ 25 & 40 & 0 & 0 \end{bmatrix}$

e)  $W_f = \begin{bmatrix} 0 & 30 & 0 & 0 \\ 20 & 0 & 0 & 0 \\ 0 & 0 & 0 & 20 \\ 0 & 0 & 40 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 0 & 30 & 20 \\ 0 & 0 & 0 & 20 \\ 60 & 0 & 0 & 0 \\ 60 & 50 & 0 & 0 \end{bmatrix}$

f)  $W_f = \begin{bmatrix} 0 & 40 & 0 & 0 \\ 30 & 0 & 0 & 0 \\ 0 & 0 & 0 & 10 \\ 0 & 0 & 40 & 0 \end{bmatrix}; \quad W_p = \begin{bmatrix} 0 & 0 & 20 & 10 \\ 0 & 0 & 0 & 40 \\ 60 & 60 & 0 & 0 \\ 50 & 40 & 0 & 0 \end{bmatrix}$

**Figure 8:** Npop=2

$W_f = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$  ;  $W_p = \begin{bmatrix} 0 & 30 \\ 30 & 0 \end{bmatrix}$

a) varying the mean value of the input noise to ROI 1:

```
m(1,1)= x    % with x = 0, 25, 50, 75, 100, 125, 150, 175, 200;  
m(2,1)=0;
```

b) varying power density of the input noise to ROI 1:

```
% N=length(t);  
% Npop=2;  
% sigma_p1 = sqrt(x/dt);    % with x = 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144  
% sigma_p2 = sqrt(9/dt);  
% nptot=randn(Npop,N);  
% np1 = nptot(1,:)*sigma_p1;  
% np2 = nptot(2,:)*sigma_p2;  
% np=[np1;np2];  
% sigma_f = sqrt(9/dt);  
% nf = randn(Npop,N)*sigma_f;
```

c) varying power density of the input noise to ROI 1 and 2:

```
% N=length(t);  
% Npop=2;  
% sigma_p = sqrt(x/dt);    % with x = 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144  
% np = randn(Npop,N)*sigma_p;  
% sigma_f = sqrt(9/dt);  
% nf = randn(Npop,N)*sigma_f;
```

**Figure 9:** Npop=2

```
Wf = [ 0 0 ; Wp = [ 0 40 ;  
      0 0 ]      40 0 ]  
  
% m(1,1)=0;  
% m(2,1)=x; % with x = -200, -150, -100, -50, 0, 50, 100, 150, 200
```

**Figure 10:** Npop=2

```
Wf = [ 0 0 ; Wp = [ 0 Wp_12 ; Wp_12 = 0, 10, 20, 30, 40, 50, 60, 70, 80  
      0 0 ]      40 0 ]
```

a) Delay between interconnected ROIs: 10 ms

```
% Npop=2;  
% D = 0.010*ones(1,Npop);  
remind to change the cfgTEP parameters in the code TEcalculation.m:  
% cfgTEP.predicttime_u=10;  
% cfgTEP.predicttimemax_u=12  
% cfgTEP.predicttimemin_u=8;
```

b) Delay between interconnected ROIs: 16.6 ms

```
% Npop=2;  
% D = 0.0166*ones(1,Npop);
```

c) Delay between interconnected ROIs: 23 ms

```
% Npop=2;  
% D = 0.023*ones(1,Npop);  
remind to change the cfgTEP parameters in the code TEcalculation.m:  
% cfgTEP.predicttime_u=20;  
% cfgTEP.predicttimemax_u=25  
% cfgTEP.predicttimemin_u=15;
```

**Figure 11:** Npop=2

$W_f = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$  ;       $W_p = \begin{bmatrix} 0 & W_{p\_12} \\ 40 & 0 \end{bmatrix}$  ;       $W_{p\_12} = 0, 10, 20, 30, 40, 50, 60, 70, 80$

a) signal length= 2 sec

tend=3;

b) signal length= 3 sec

tend=4;

c) signal length= 4 sec

tend=5;

d) signal length= 10 sec

tend=11;

e) signal length= 30 sec

tend=31;

f) signal length= 60 sec

tend=61;