# The SOM’s of silence: project plan

In this project, we will want to see how the connectivity of SOM interneurons affects the correlation between excitatory neurons in the network. To do so, we will compare four different networks.

1. E ↔PV, but with more realistic E/PV ratio and connection probabilities than in Brent’s exercise.

* Population ratio: ¼ PV and ¾ E
* Connections probability in V1 2/3 layers:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Post-synaptic | | |
|  |  | E | PV | SOM |
| Pre-synaptic | E | 0.06 | 0.42 | 0.3 |
| PV | 0.35 | 0.39 | 0.09 |
| SOM | 0.23 | 0.18 | 0.05 |

1. E ↔PV **+** SOM→E, such that each SOM inhibits multiple E
2. E ↔PV **+** SOM → E **+** SOM → PV
3. E ↔PV **+** SOM → E **+** SOM → PV **+** E-> SOM

**2**

**1**

**32**

**4**

In each network, we will want to quantify the correlation between the spike trains of pairs of excitatory neurons. For E ni and nj:

Note: practically, we won’t calculate all the pair correlations, just randomly sample some of them.

Then, we will plot the distribution of .

In the first network, we expect to distribute as a gaussian with a mean around zero ( ~), and a variance of .

Another thing worth looking at is the mean of as a function of time window: bin the spikes in different time windows and see how the mean changes as a function of window size.

**Steps:**

* Organize Brent’s code
* Do network 1
* Do network 2
* Do network 3
* Do network 4

**Hypothesis:**

* In the E ↔PV **+** SOM→E network, since the same SOM diverge to multiple E, adding SOM will cause an increase in correlation between E cells.
* In the E ↔PV **+** SOM → E **+** SOM → PV (we added SOM→PV), we would expect the network to re-balance.