Neural covariability under the attentional modulation

Background: Each individual neuron in brain networks fires irregularly for most of the time. However, people do observe a certain amount of covariability in various of cortical area under different cognitive states. Evidences have been reported that different cognitive functions might participate in changing the neural covariability, such as attention and arousal. In this project, we mainly focus on attentions. One of the conventional postulation of attentional mechanism is a selective top-down signal modulating the gain of neurons in primary sensory cortex. To test the hypothesis, we ask the question that whether different attentional-modulated subtypes can emerge from the circuity interactions plus top-down regulating inputs? If not, what new hypothesis and mechanism might be the candidate for attentional modulations.

Project setups: We provide the experimental measures of neural covariability under different task states. Also we provide the Wilson-Cowan model that can primarily explain the results as a first step towards modeling. [Jupyter Notebook demo]

Project map: The project core is covered by Q1-4 ; subsequent questions can be taken in any order.