

Methods and tools for accessing the spatio-temporal organization of cortical processing during natural behavior

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We aim at getting an understanding of the processing of the cortical network during natural behavior. Such a task requires a number of components. The cortical network needs to be observed during complex behavior, such as reaching and grasping an object (Riehle et al, 2013). In order to observe the cortical network in action, many neurons are recorded simultaneously while the monkey is performing the task. Such massively parallel data require analysis methods that enable the analysis in a time resolved, trial-by-trial manner to relate the time varying features of the neuronal activities to the behavior. Network interactions and their dynamics are analyzed by identification of correlations between the activities of neurons and groups of neurons. We develop methods that extract synchrony patterns across neurons and propagating neuronal activities and calibrate them by use of stochastic simulations. Preliminary results of their application to massively parallel experimental data will be shown. Intense collaboration with experimental labs, data sharing and the interest in analyzing the very same data by various approaches led us to develop steps towards reproducible workflows and related required software.

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