Intro CCN outline

Intro

* CNN, DNN don’t incorporate real time
* Difficult to constrain and relate to human electrophysiological data
* We here embrace those
* Computational principle we can explore: temporal segmentation of simultaneously presented inputs
* Neuronal oscillations have long been suggested to play a key role in neural computation
* Fast rhythms such as the gamma rhythm, have repeatedly been linked to formation of cell assemblies (Olufsen, 2003; Kopell, 2010)
* It has been shown that slower oscillations in the theta, alpha, and beta range phasically modulate the amplitude of these gamma rhythms, as well as neuronal spiking, through functional inhibition (Haegens 2011, Iemi 2022, hippocampus work, miller work)
* This inhibition has been proposed to serve to implement a temporal code
  + Good evidence in hippocampus
  + Also beta-gamma modulation (Miller)
  + Similar mechanism proposed to organize processing in visual system (Jensen, 2014, 2023)
* Despite oscillations being ubiquitous in the occipital cortex, temporal dynamics have so far found little application in computer vision
* Here we present a fully connected neural network that embraces the oscillatory dynamics, to convert spatial information into a temporal code; organizing simultaneously presented inputs in time

Methods

Results