

Simultaneous extracellular electrophysiology data

Supporting data for “An orderly single-trial organization of population dynamics in premotor cortex predicts behavioral variability”

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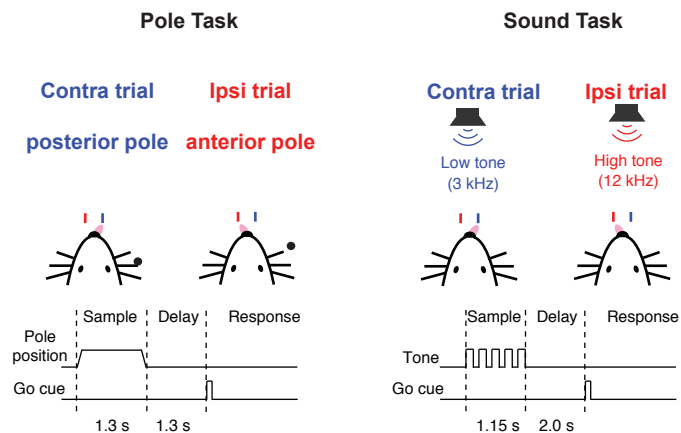
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Dataset Description

Task description

The data set was acquired in mice performing a "delayed response task". Recordings were made in the premotor cortex using 64ch silicon probes.

- Sensory information was presented to the whiskers during a "sample epoch". Two variants were analyzed: a pole and sound task. In the pole task the location of a pole instructs the animal which licking direction to choose (lick left or lick right). In the sound task a frequency of the tone instructs the animal. Because recordings were made in the left hemisphere, left and right are referred to as ipsi- and contra-lateral directions.
- The sample epoch was followed by a "delay epoch", during which the mouse has to maintain a memory of future licking direction or past stimulus information.
- At the end of the delay epoch, and signaling the beginning of a "response epoch", a brief "go cue" (100ms) instructs the animal to move.
- When the animal licks in the correct direction it receives water reward (correct trials). Licking in the wrong direction results in reward omission (error trials).
- Neurons in premotor cortex show preparatory activity during the delay epoch. Preparatory activity is the neural correlate of motor planning. Preparatory activity correlates with movements, sometimes long before the movements occur.



Pole position task structure

- Pre-sample: -3.1 to -2.6 sec.
- Sample: -2.6 to -1.3 sec.
- Delay: -1.3 to 0.0 sec.
- Response: 0.0 to 2.0 sec.

Auditory task structure

- Pre-sample: -3.65 to -3.15 sec.

- Sample: -3.15 to -2.0 sec.
- Delay: -2.0 to 0.0 sec.
- Response: 0.0 to 2.0 sec.

Data structure

This repo contains data from 56 recording sessions. Each session contains hundreds of behavioral trials with different trial types. Multiple units (neurons) were recorded simultaneously. We did not provide the raw extracellular waveforms, but only 'sorted' spikes used in the manuscript.

- Spikes are stored in a structure array named **nDataset**.
- sessionIndex: index of the session in which each neuron was recorded.
- nUnit: index of the neuron(unit) in each recording session.
- unit_yes_trial: spike rate in right-lick trial; for correct trial, the behavior is right lick; for error trial, the behavior is left lick. Spikes were binned into 67 ms bins.
- unit_no_trial: spike rate in correct left-lick trial; for correct trial, the behavior is left lick; for error trial, the behavior is right lick. Spikes were binned into 67 ms bins.
- unit_yes_trial_index: trial index of each correct right-lick trial.
- unit_no_trial_index: trial index of each correct left-lick trial.
- firstLickTime: time of first lick after “go” cue (sec).

Data source and associated files

- Electrophysiological recording in pole task by Nuo Li at Janelia Research Campus (Guo, Z, Li, N et al. 2014 Neuron; Li, N et al. 2015 Nature; Li, N, Daie, K et al. 2016 Nature)
 - Correct trials: **Simultaneous_Spikes.mat** (Session 1-8)
 - Error trials: **SimultaneousError_Spikes.mat** (Session 1-8)
- Electrophysiological recording in pole task by Nuo Li at Baylor College of Medicine (Wei et al. Nat. Commun. 2018)
 - Correct trials: **Simultaneous_Spikes.mat** (Session 9-22)
 - Error trials: **SimultaneousError_Spikes.mat** (Session 9-22)
- Electrophysiological recording in pole task by Hidehiko Inagaki at Janelia Research Campus (Inagaki et al. J. Neurosci. 2018)
 - Correct trials: **Simultaneous_HiSpikes.mat**
 - Error trials: **SimultaneousError_HiSpikes.mat**
- Electrophysiological recording in sound task by Hidehiko Inagaki at Janelia Research Campus (Inagaki et al. J. Neurosci. 2018)
 - Correct trials: **Simultaneous_HiSoundSpikes.mat**
 - Error trials: **SimultaneousError_HiSoundSpikes.mat**

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