

Papers

Laura: **Purkinje Cells Directly Inhibit Granule Cells in Specialized Regions of the Cerebellar Cortex**
Chong Guo, Laurens Witter, Stephanie Rudolph, Hunter L. Elliott, Katelin A. Ennis, Wade G. Regehr
Neuron, corrected proof 2016



Available online at www.sciencedirect.com



Brain Research 996 (2004) 148–158

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www.elsevier.com/locate/brainres

Research report

Discharge of inferior olive cells during reaching errors and perturbations

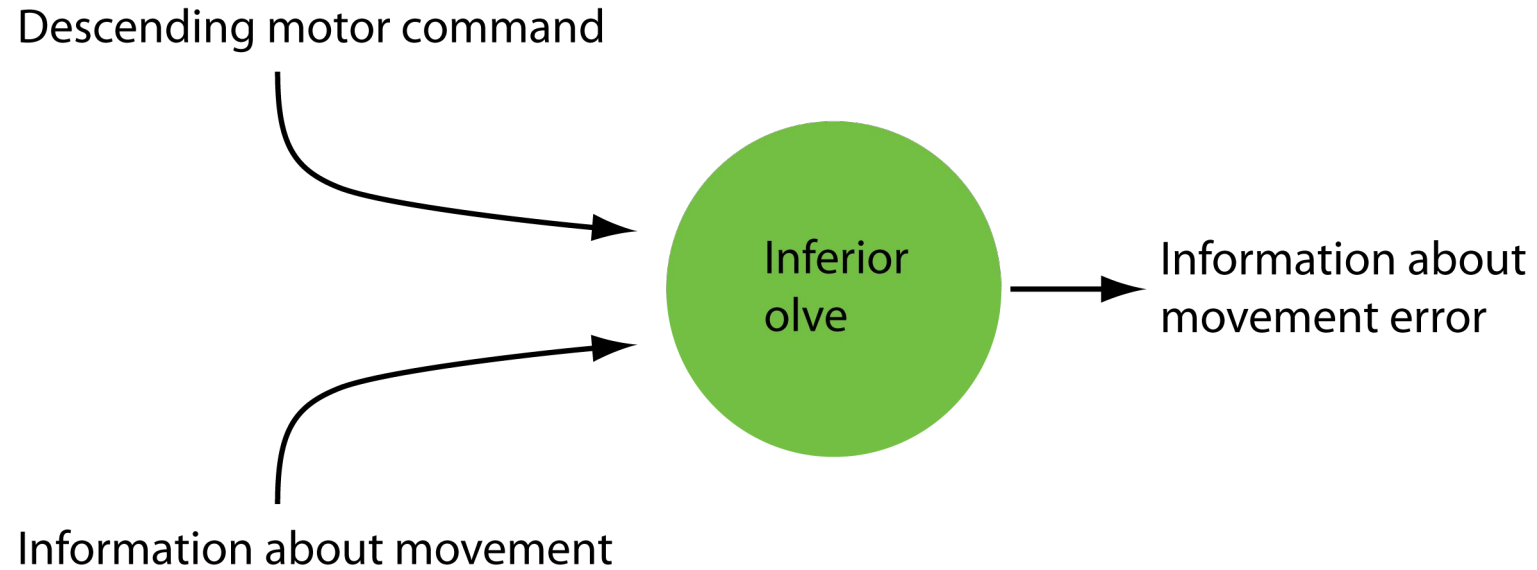
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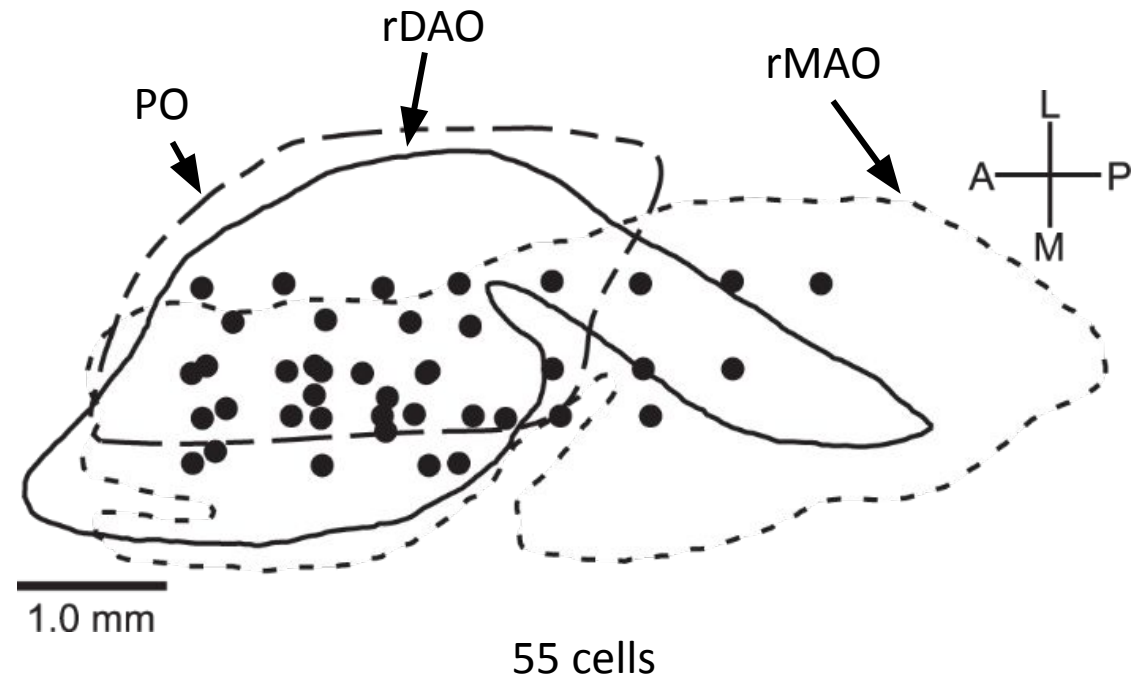
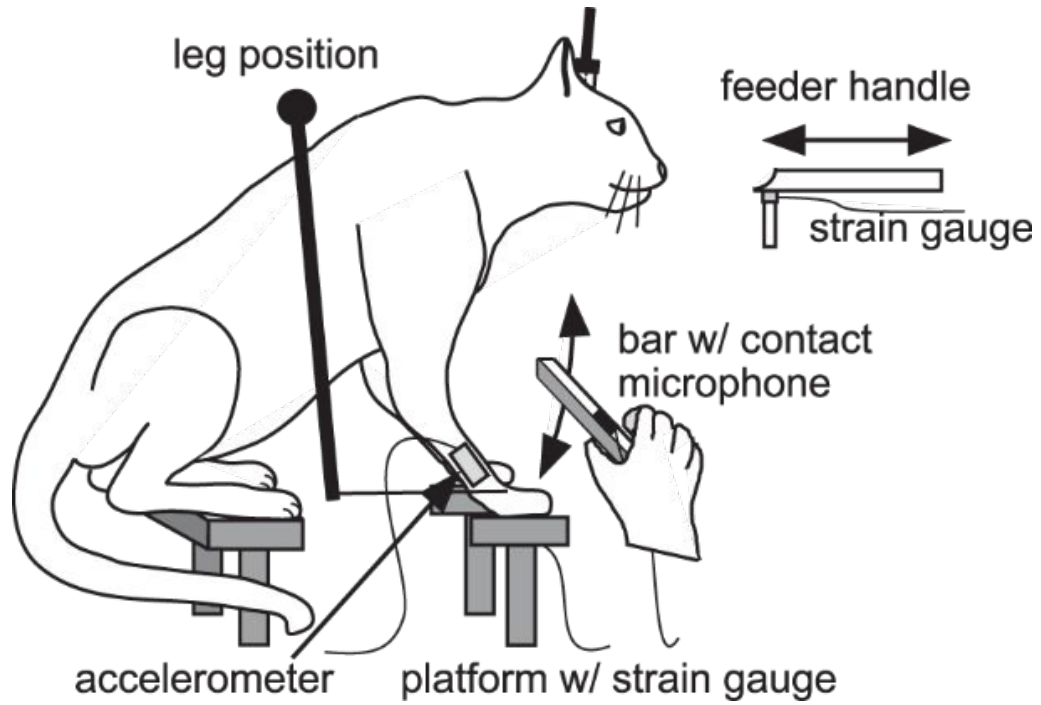
Daniil Markov

Hypothesis

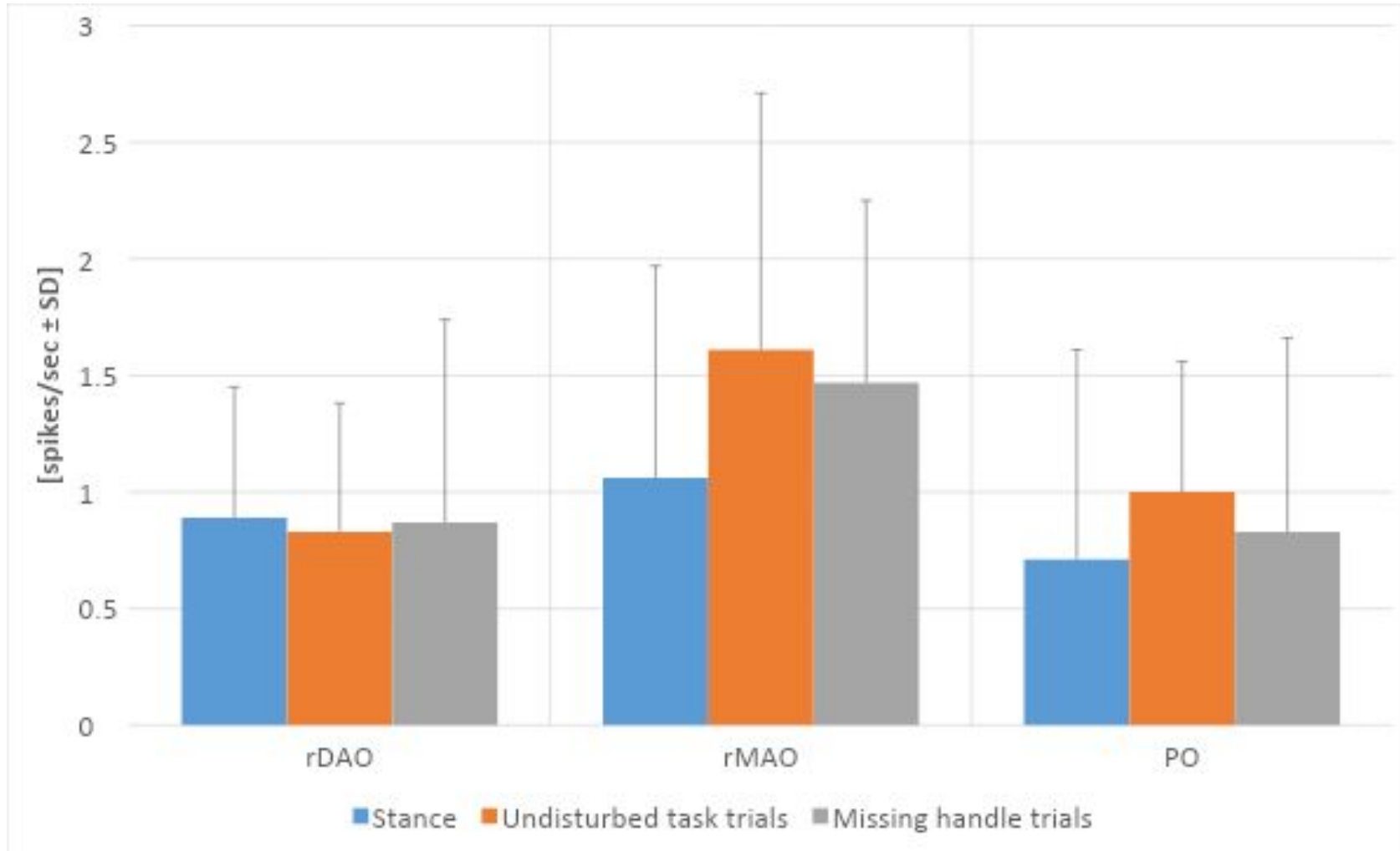


“The IO compares descending motor commands with information about movement and detects mismatches”

Behavioral paradigm

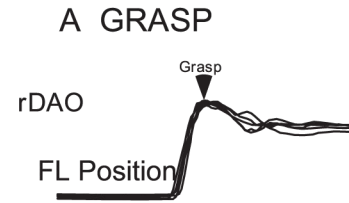


Average discharge rate during different behaviors



... is the same. But the average discharge rate is a bad measure for the IO.

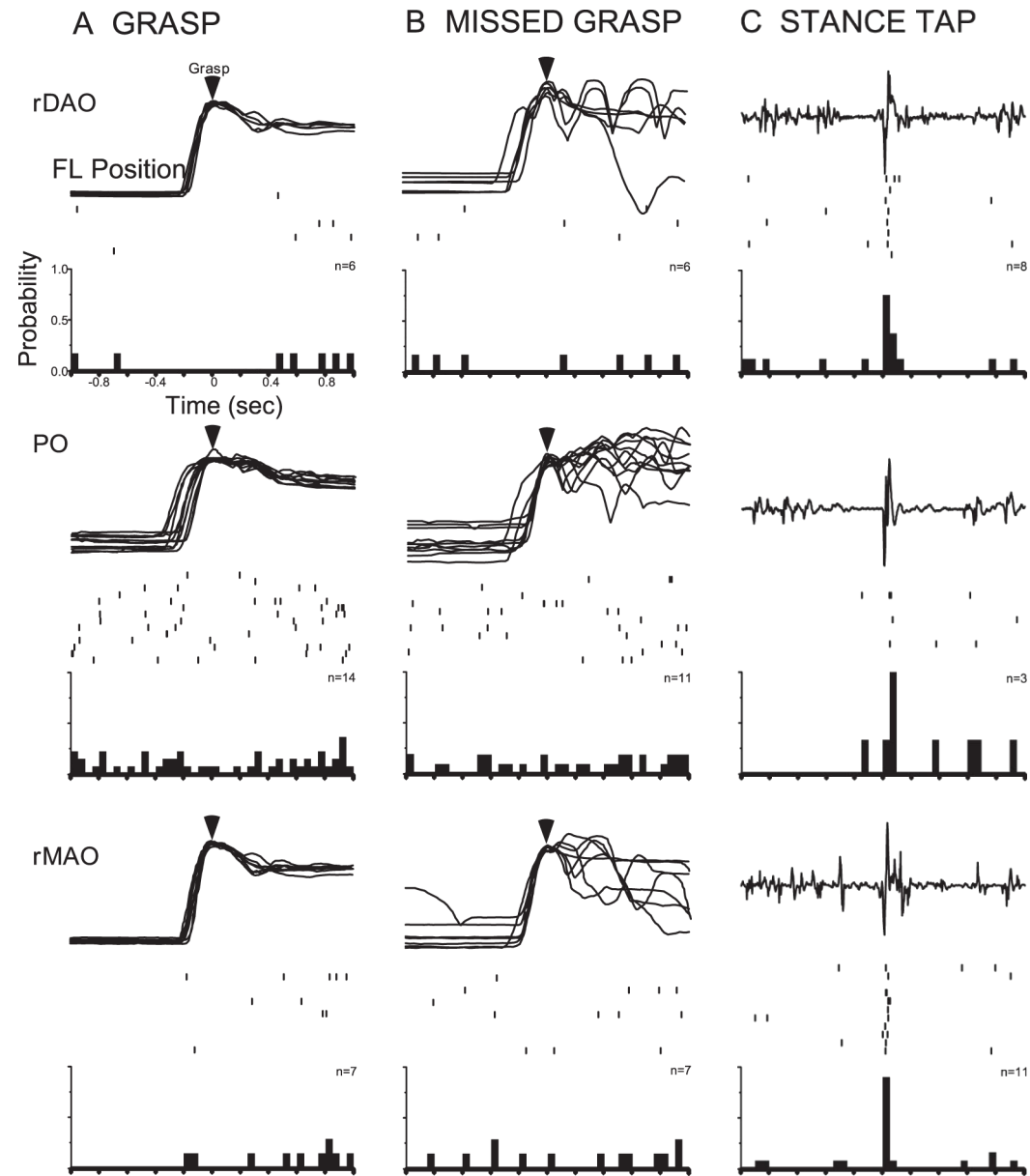
Reaching for a missing handle



Almost no discharge related to any particular phase of the undisturbed reaching task

No discharge modulation during the multiple attempts to grasp the missing handle

Reaching for a missing handle



Almost no discharge related to any particular phase of the undisturbed reaching task

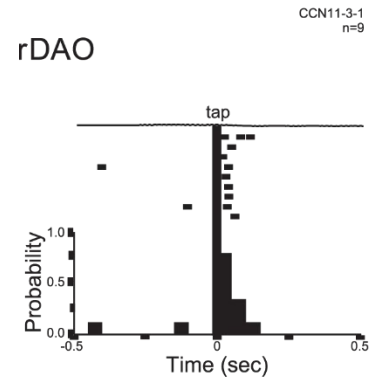
No discharge modulation during the multiple attempts to grasp the missing handle

The same cells showed discharge increase when the limb was mechanically stimulated during stance

A mismatch between motor command and expected movement outcome is not sufficient to elicit olivary discharge; stimulation is required.

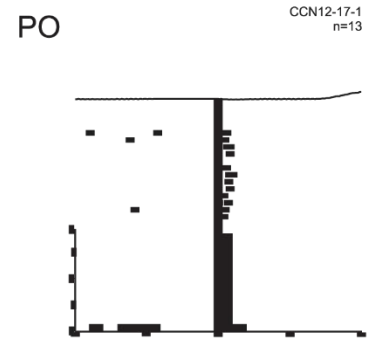
Responses to perturbations

A TAPS -STANCE



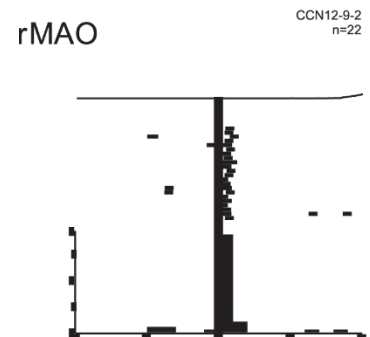
During stance all cells responded to tapping with probability approaching 100 %

Almost no discharge related to any particular phase of the undisturbed reaching task



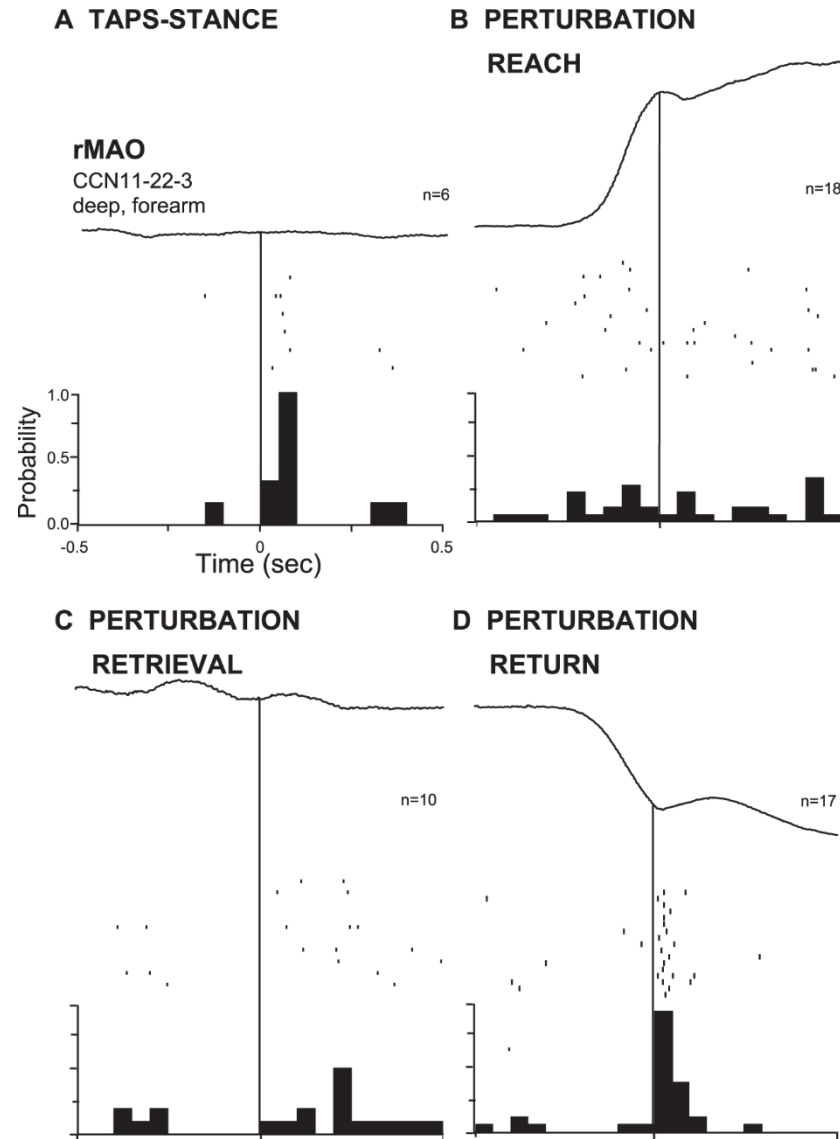
rDAO cells didn't respond to unexpected perturbation

PO cells and rMAO cells increased discharge probability after contact with the obstructing bar



Unexpected stimulus, but not the unexpected absence of stimulus, can activate IO cells in some of its subdivisions.

Responses of rMAO cell to perturbations at different phases of the task



Responses of some IO cells to unexpected perturbations depend on the phase of the behavior

Outlook

- IO cells respond to external stimuli during stance period
- This responsiveness disappears during active movement, i.e. they do not respond to self-generated stimuli
- During active movements, some IO cells can still be activated by unexpected perturbations presented during some (not all) behavioral phases
- IO cell do not respond to unexpected absence of stimuli during active movement (motor errors) and are unlikely to provide any information about movement
- IO cells are often activated by stimuli which also elicit reflexes (US stimuli).