

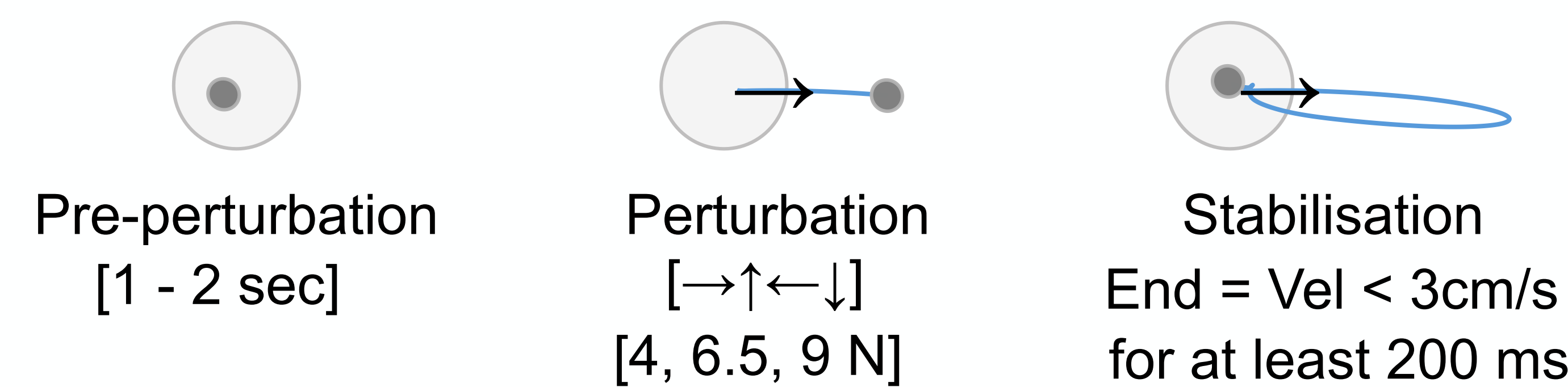
Overview

- Motor adaptation impairments in Essential Tremor (ET) are due to impaired movement control not anticipation. Is feedback control impaired in ET?
- Following a postural perturbation task : EMGs and Kinematics have an intact initial response, perturbation-dependent deficits are visible during stabilization.
- Conclusion: Deficits suggest the tremor comes from the feedback controller. All results are supported by the hypothesis of an erroneous compensation of sensorimotor delays leading to oscillations during movement.

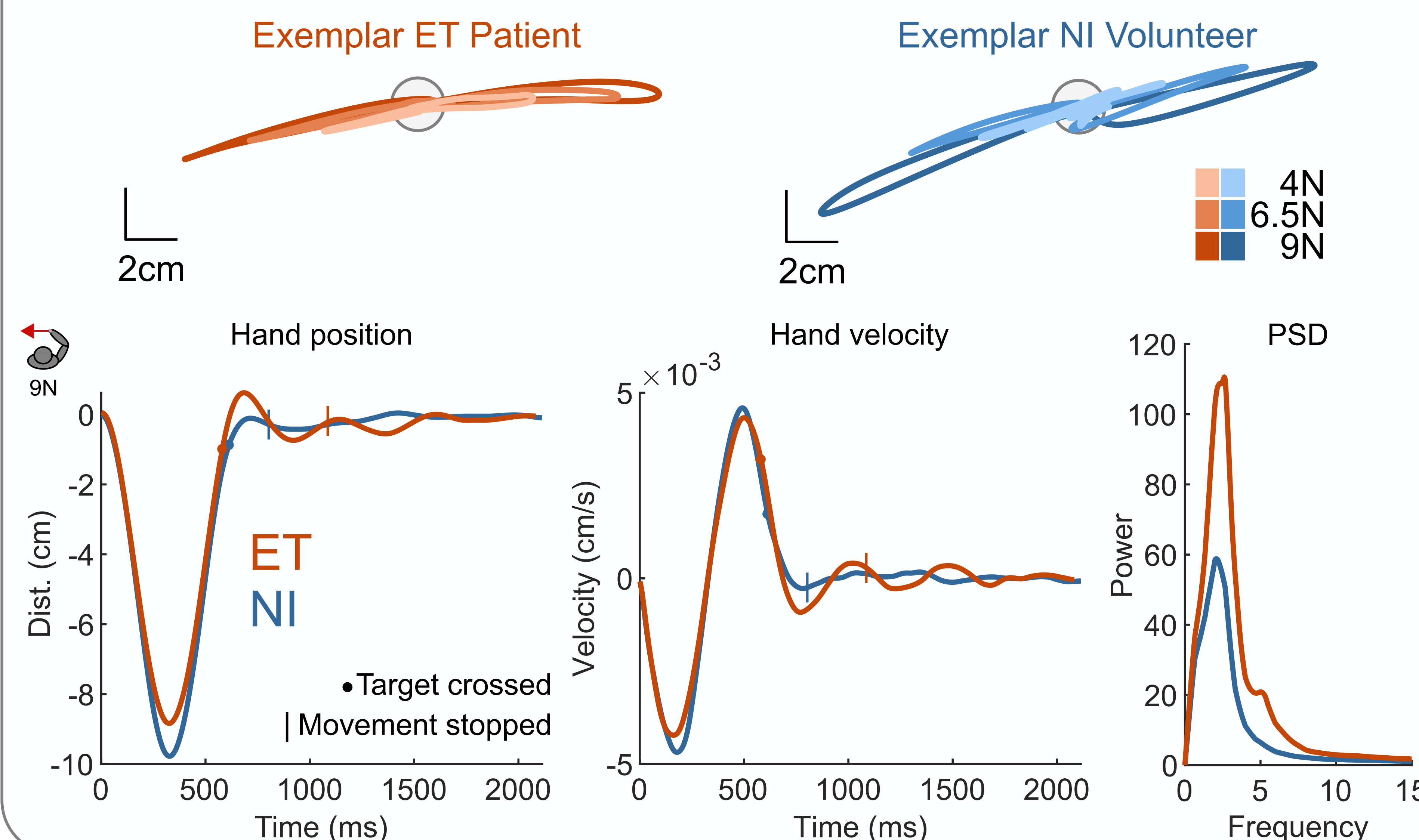
Methods - Postural perturbation task

- Participants :
28 Neurologically Intact (NI) volunteers
24 participants with Essential Tremor (ET)
- Kinematics + EMG recordings

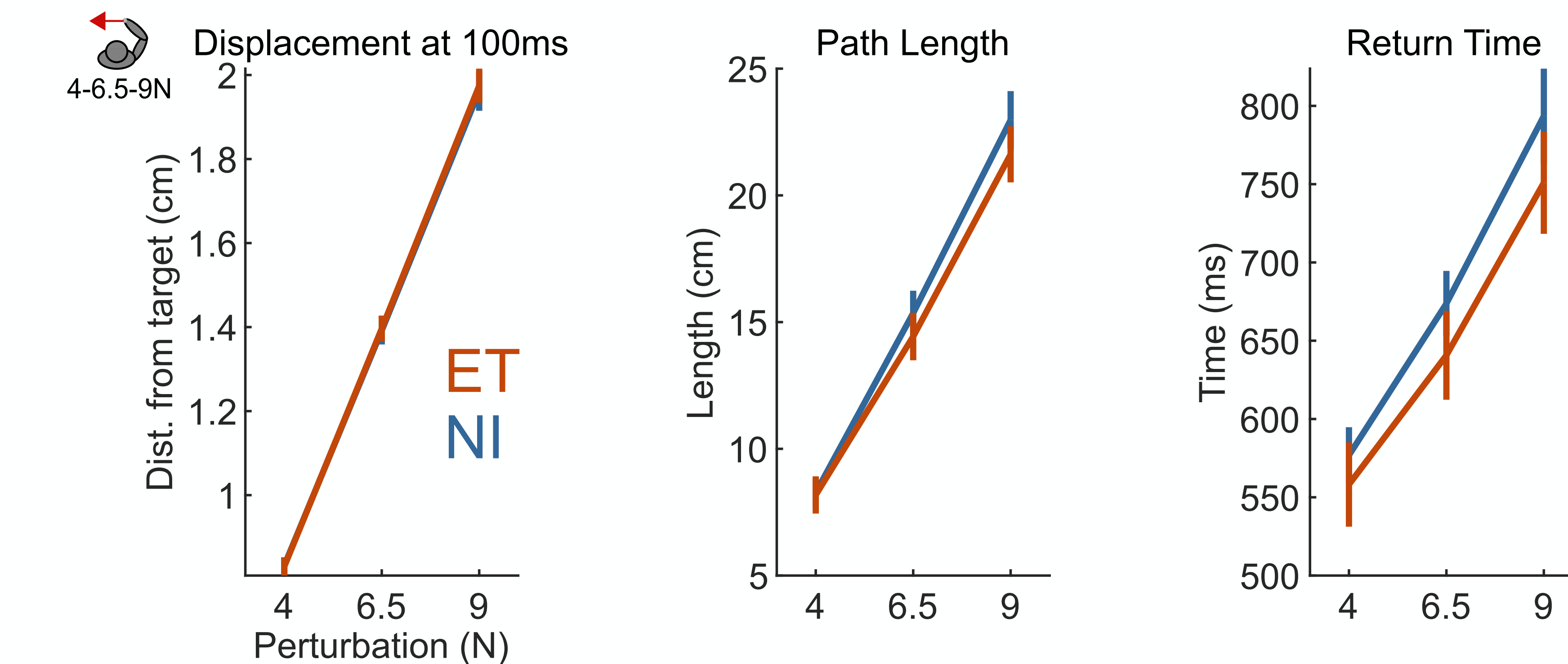
Time course of events:



Exemplar participants - Kinematics

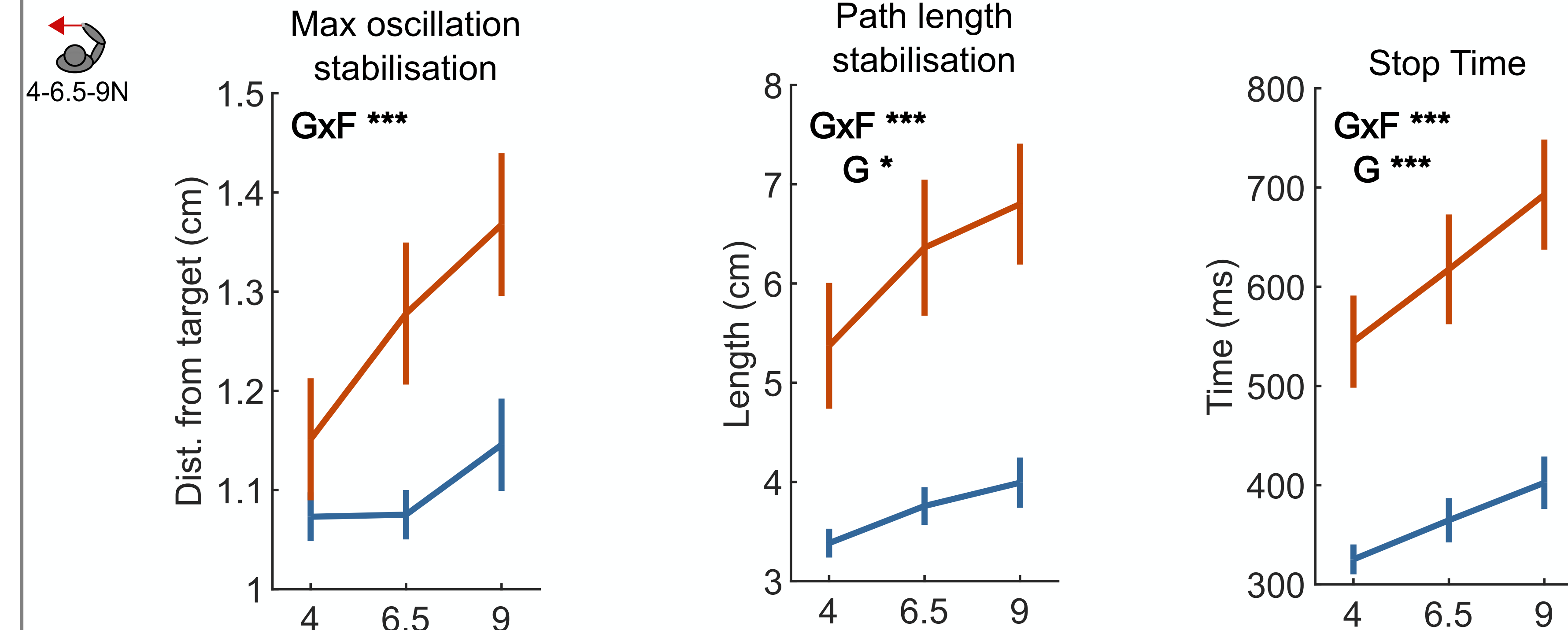


Group Results : Initial Response



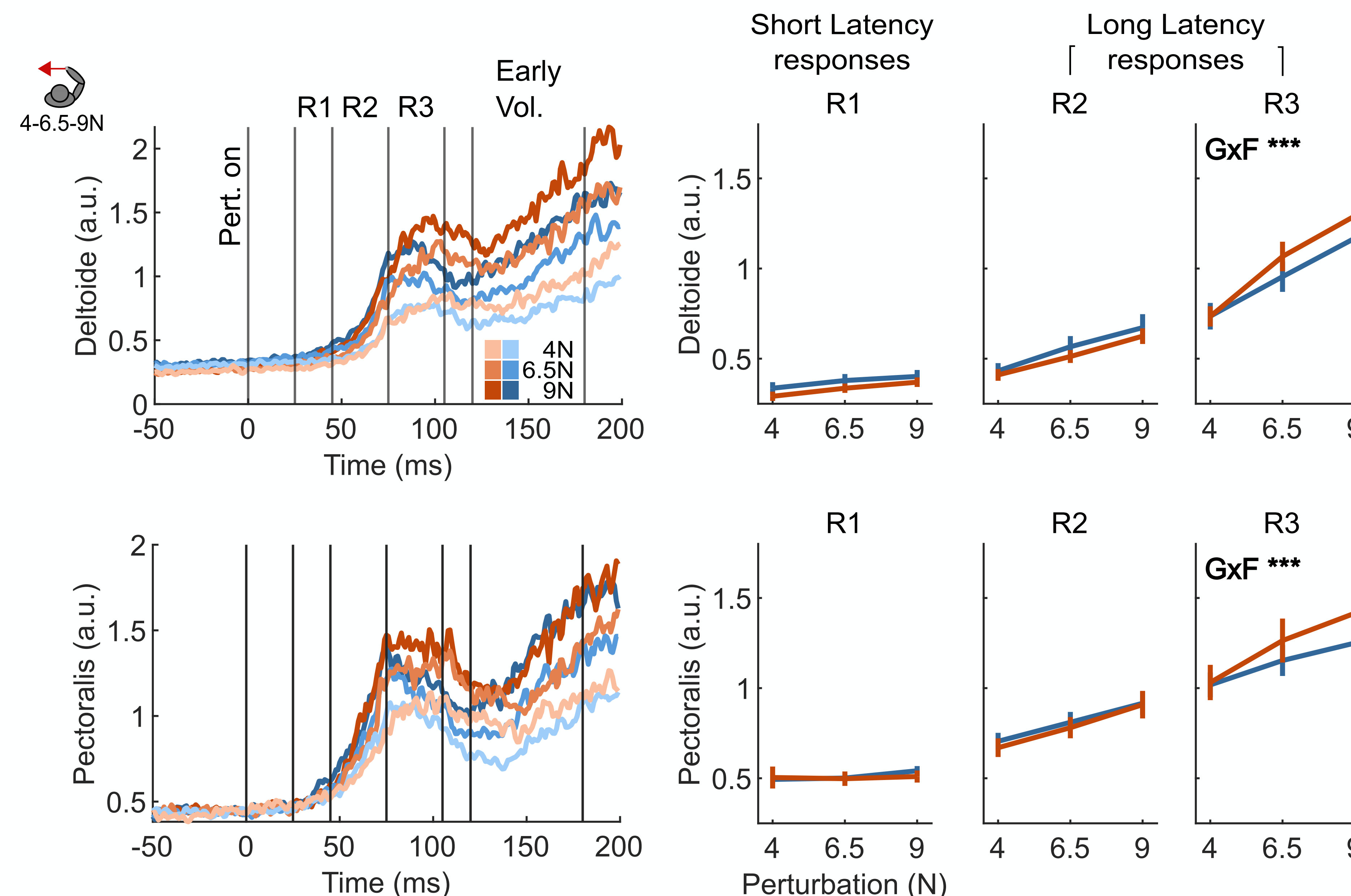
Effects of the force and direction but no group effect

Group Results : Stabilization



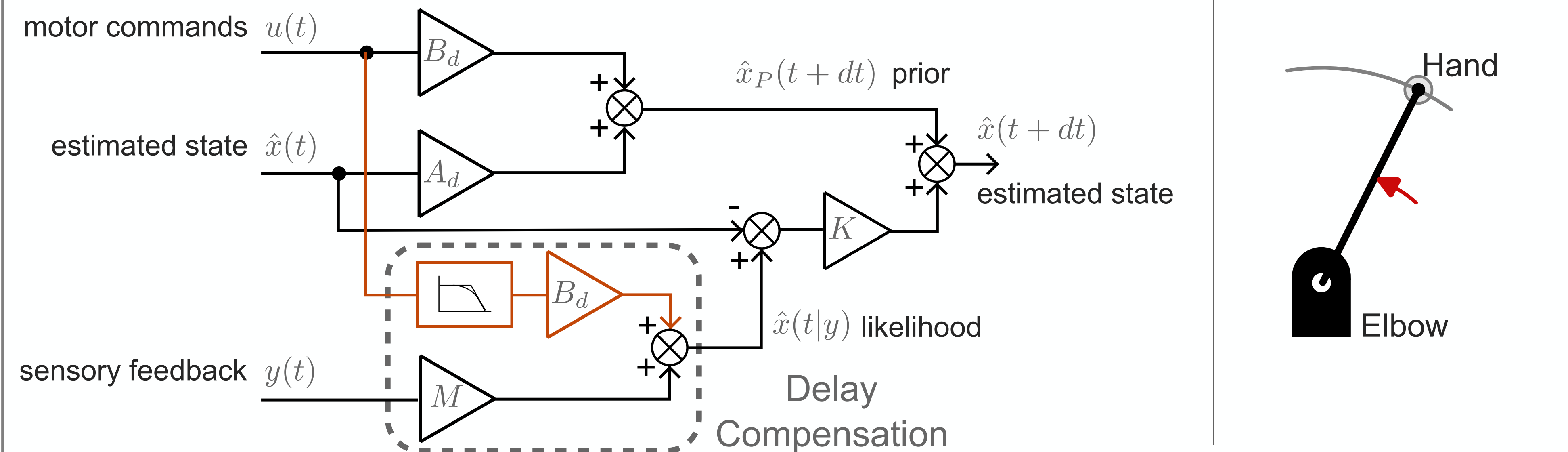
Perturbation-dependent deficit in ET: feedback control is altered

Group Results : EMG activity

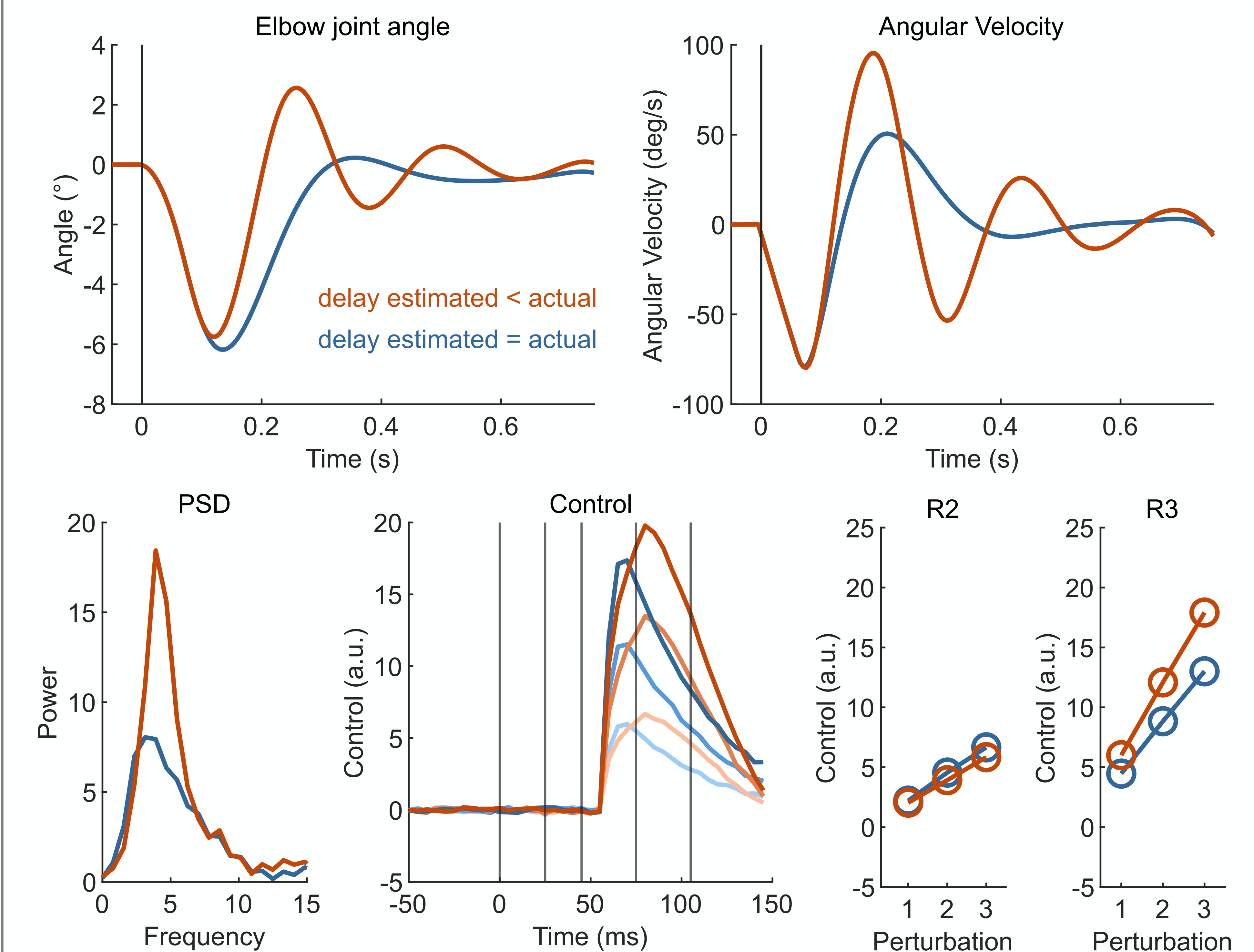


Initial reflex responses intact, perturbation dependent deficit in R3

Model



Simulation

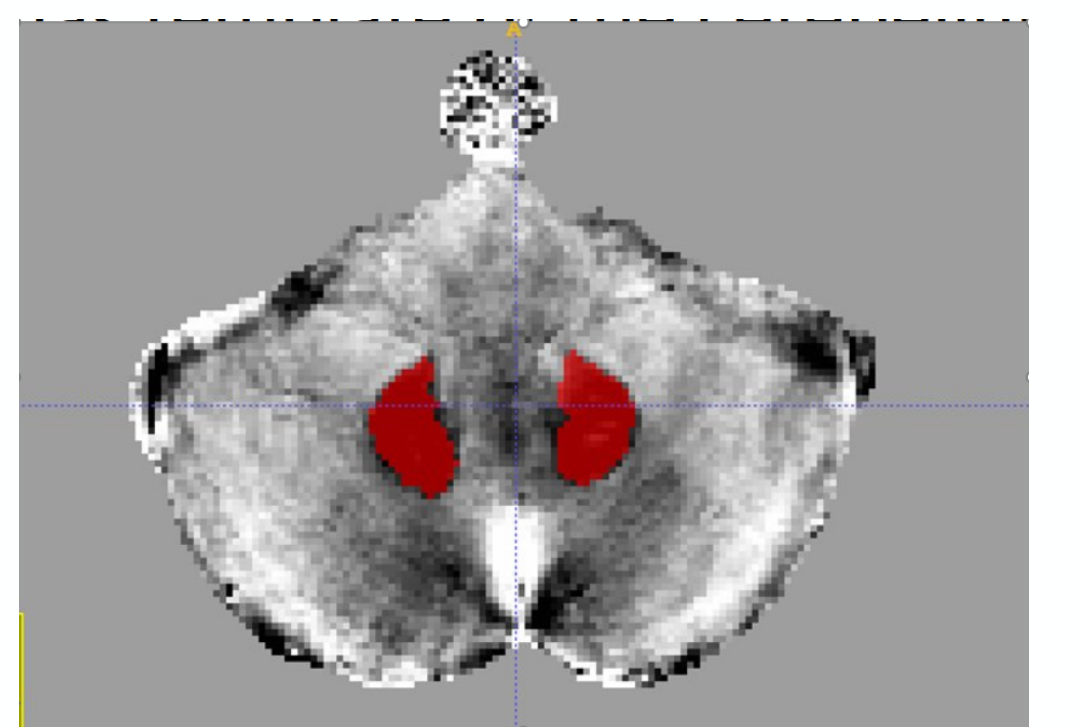


ET could be due to an underestimation of the long-latency delays

Future directions - Cerebellum connectivity

Inspired from Tikoo 2020 - fMRI study with a subgroup of 20 ET & 20 NI

- **QSM**: masks of the Dentate Nucleus (DN)
- Resting state **functional connectivity** analyses using DN as seed
- Tractography based on DTI
- DN connectivity <-> Performances in the task



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