Deep brain electrical neurofeedback allows Parkinson patients to control pathological oscillations and quicken movements

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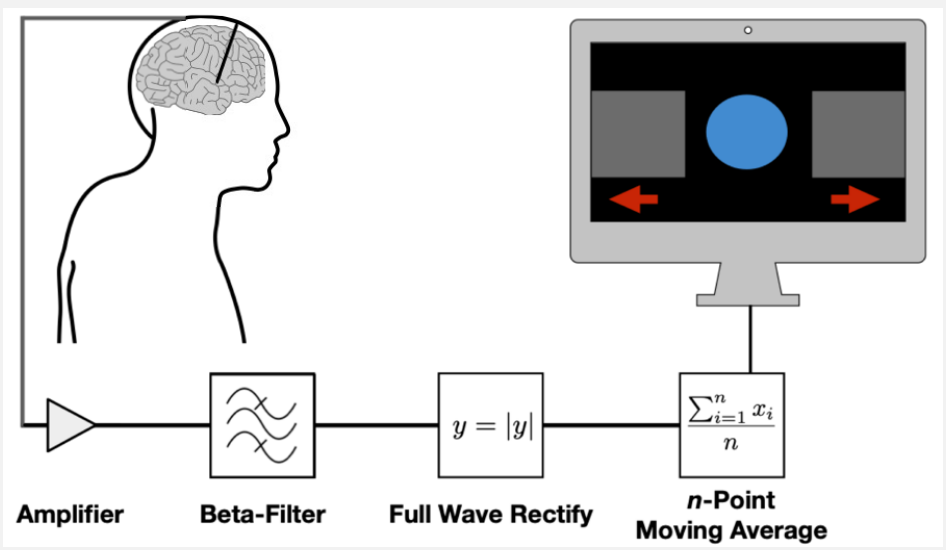
1 Introduction

Parkinsonian motor symptoms are linked to pathologically increased β-oscillations (13–35 Hz).

Neurofeedback relies on the real-time extraction of relevant features from neuronal activity, which are then presented to the subject.

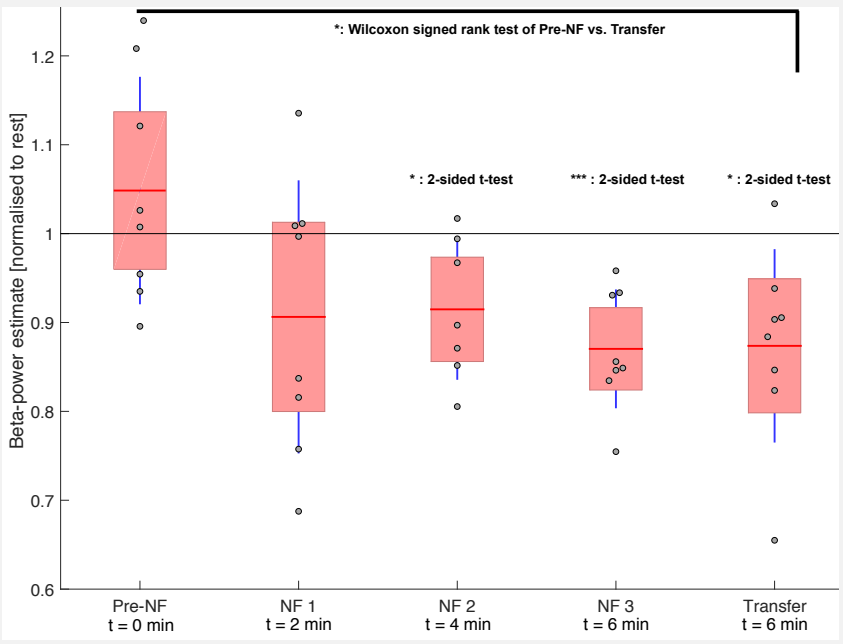
Can deep brain electrical neurofeedback reduce pathological oscillations?

2 Experimental Setup



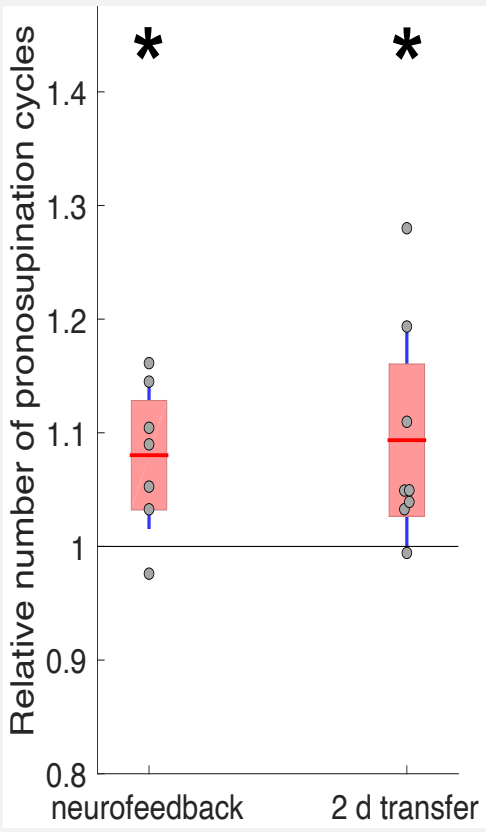
- 8 Patients with Parkinson's disease (PD) undergoing DBS implantation into the subthalamic nucleus

3 Real-time neurofeedback modulation of β-oscillations in the STN



- Through visual neurofeedback, patients learnt to reduce pathological deep brain oscillations within minutes.
- Neurofeedback-learnt strategies were successful even in the absence of visual neurofeedback (transfer).

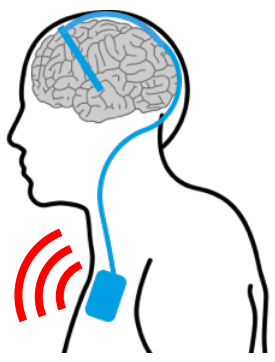
4 Alleviation of bradykinesia through DBS electrode-guided neurofeedback



5 Outlook

Fully implanted system

- Multiple training sessions
  → stronger neurofeedback effects
- Easier to use
  → towards clinical application



References

Bichsel, Stieglitz, Oertel, Baumann, Imbach, Gassert, Scientific Reports, 2021
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