Activity in Human Substantia Nigra During Sensorimotor Decision-making Task Reflects Motor Planning

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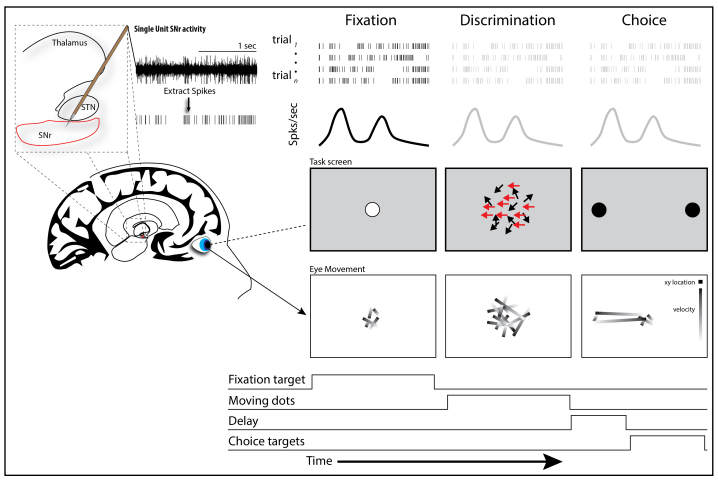
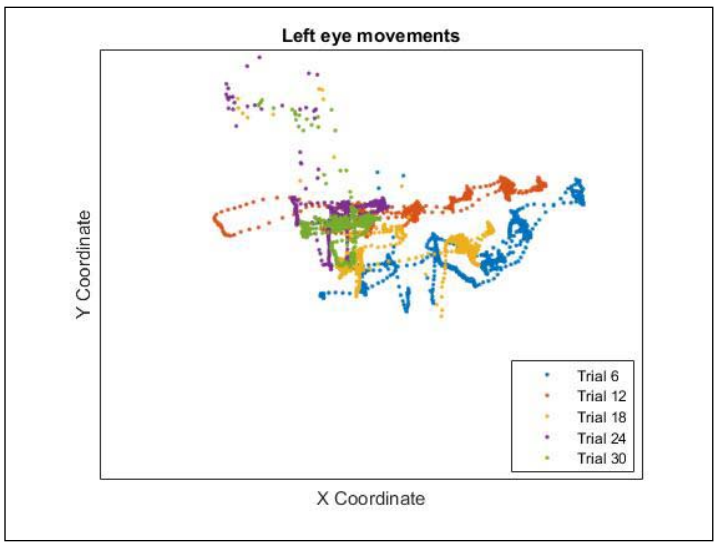


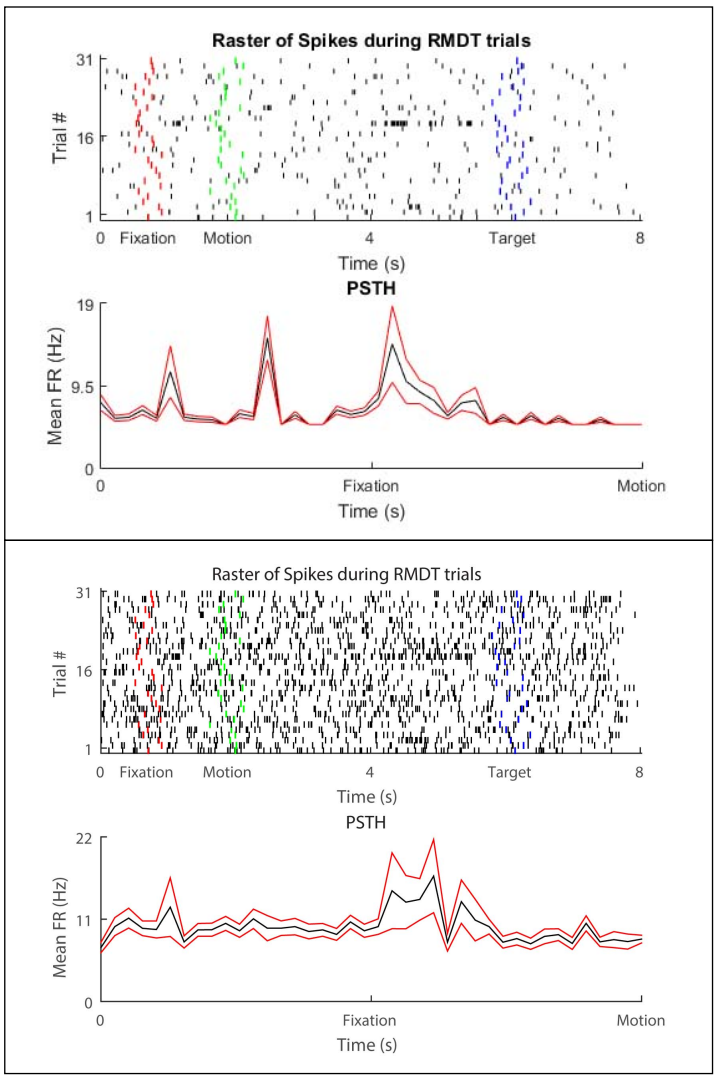
Introduction

Parkinson's disease (PD) is known to result in altered activity in basal ganglia motor regions, but such activity has not been studied under controlled conditions in which precise, goal-directed movements are cued by stimuli. The substantia nigra pars reticulata (SNr) provides a convenient window into basal ganglia output, as it plays a similar role in orienting movements across mammalian species.



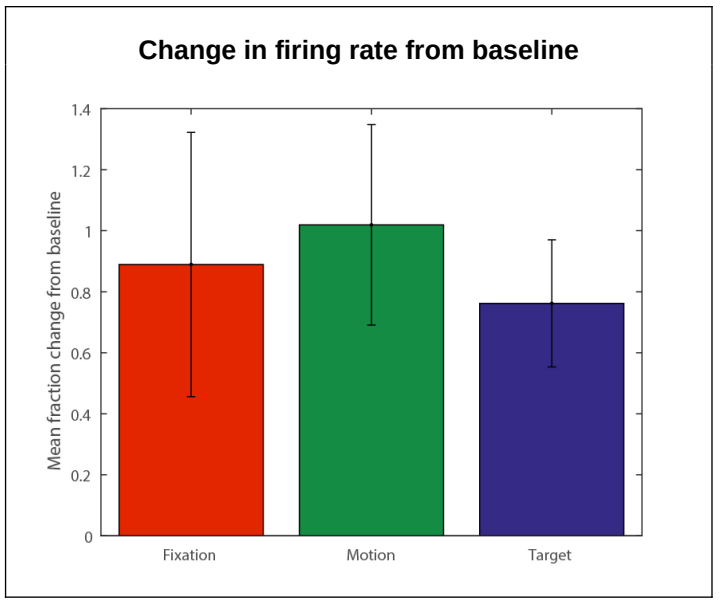
Methods

In this study, during the microelectrode recording portion of deep brain stimulation (DBS) surgery for PD, we recorded from single SNr neurons while subjects (N = 4) engaged in a sensorimotor decision -making task (random motion dot task; RMDT).



Results

We were able to recored from human SNr single neurons during RMDT. Two SNr neurons appeared to increase activity during motor planning in preparation for an eye movement. 4 subjects were recorded with a total of 12 isolated neurons; only 2 showed responses.



Conclusions

These data provide the first support for the role of SNr, in humans, for initiating and controlling movements.

Learning Objectives

By the conclusion of this session, participants should be able to describe the role of the SNr in movement initiation.

Support:

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