Cognitive Control Processes and Working Memory in Parkinson’s Disease (PD)
Early Stage Idiopathic PD

Motor Symptoms

1. Rigidity
2. Tremor
3. Bradykinesia - extreme slowness of movement
Core Pathological Hallmark

• Progressive loss of dopamine (DA) neurons in the ventrolateral tier of the substantia nigra pars compacta which primarily projects to the dorsal striatum
Severe SNpc DA Neuron Loss in PD

- Cortex
- Striatum
- Pallidum
  - SNr
- Thalamus
Severe dopamine depletion in dorsal striatum affects signals traveling via the nigrostriatal pathway from the striatum to the supplementary motor area and dorsolateral PFC.
Progressive Loss of Dopamine Neurons

- Depletion of fronto-striatal dopamine
  - Slowed psycho-motor processing speed
    - Reduced working memory capacity
      - Impaired Reasoning ability
Less Severely Affected

Direct dopaminergic projections from the ventral tegmental area (VTA) to the PFC via the mesocortical pathway are relatively spared.
Executive Deficits

Due to strong reciprocal connections between the striatum and specific areas of the frontal cortex, PD pathology results in a host of executive deficits, such as planning, attention set-shifting, and working memory.