Parkinson’s Disease and Cognition
Historical Overview

James Parkinson

- English physician and paleontologist
- First reported disease - *An Essay on the Shaking Palsy* (1817)
- Asserted that cognitive function was “unimpaired” in Parkinson’s disease (PD)
Dementia in PD

- **Prevalence**: approximately 10 to 15 % PD patients meet clinical criteria for dementia
- **Risk factors**: increased age, duration of PD, stage of PD (Mayeuz et al., 1988)
- **Mini Mental State Examination (MMSE)**: a brief and quantitative measure of cognitive status in adults
- **Blessed Dementia Scale (BDS)**: measures the presence and severity of dementia
Depression in PD

• Approximately 30-50% of PD patients meet clinical criteria for depression.

• Measurement Tests:
  • Beck Depression Inventory (BDS): a self-report rating inventory measuring characteristic attitudes and symptoms of depression
  • Geriatric Depression Scale (GDS) - a basic screening measure for depression in older adults
Specific cognitive impairments in PD

• Cognitive control processes
  – Set-shifting
  – Attention
  – Performance monitoring

• Working memory

• Processing speed
Prevalence of specific cognitive impairments in PD

• Growden, Corkin & Rosen (1990): the proportion of patients with ≥1 specific cognitive impairment increases with PD stage:

  Stage 1: 40%  Stage 3: 75%
  Stage 2: 65%  Stage 4: 86%
Cognitive control in PD

- **Set shifting**: the ability to display flexibility in response to changing patterns of reinforcement

- Set shifting is impaired in PD (Cools et al., 2001; Cronin-Golomb et al., 1994)
Cognitive control in PD

- **Attentional control**: the ability to concentrate selectively on one of many sensory inputs and to switch the locus of attention on command.
- Attention is compromised in PD (Woodward et al., 2002; Hodgson et al., 2002; Sharpe, 1996)
Cognitive control in PD

- **Performance monitoring**: the ability to maintain and update information in working memory while completing a sequence of interrelated tasks
- Assessed using self-ordered pointing tasks
- Impaired in PD (Gabrieli et al., 1996)
Visuospatial working memory in PD

- PD patients are impaired on tests of spatial working memory but not object working memory (e.g., Postle et al., 1997)
- Unclear how selectively PD targets specific component processes of working memory (manipulation, maintenance)
Processing speed

- **Processing speed:**
  - the amount of time an individual requires to process a given amount of information
  - or
  - the amount of information an individual can process in a set period of time
- **Processing speed is sometimes slowed in PD (bradyphrenia)**
Relation of cognitive variables to clinical variables

- **Medication status**: Medicated PD patients have a different cognitive profile from unmedicated patients (Cools et al., 2001; Cools et al., 2006)
- **Motor fluctuations**: severity of motor symptoms correlated with cognitive impairment (Brown et al., 1984)
- **Age of onset**: conflicting reports (e.g., Katzen et al., 1998; Locascio, 2003)
- **Side of onset of motor symptoms**: conflicting reports (e.g., Growdon et al., 1990)