

# Cognition and Parkinson's Disease

Johannes Rothlind, Ph.D.  
Clinical Psychologist  
San Francisco VA Medical Center

## Goals

- Describe difficulties in cognitive functioning that may arise in Parkinson's Disease.
- Review what is known about the relationship of cognitive impairment to everyday functioning
  - driving safety
  - work
  - social problem solving
  - other activities of daily living
- Coping strategies

## **Cognitive Difficulties in Early and Moderately Advanced Parkinson's Disease**

- Complex Attention
- Working Memory
- "Executive" Functioning
- Speed of Processing
- Learning efficiency

## **Areas of Preserved Cognitive Function**

- Basic Language
- Perception
- Long Term Memory
- Fund of knowledge and skills

## Visuospatial Problem Solving

- A commonly reported problem.
- May reflect deficits in manual dexterity
- May reflect executive functioning difficulties
- May reflect visual impairment
- In more severe cases it may be an indicator of more pronounced cognitive impairment.

## Cognitive Functioning in Parkinson's Disease

- Varies greatly
- Global, severe cognitive impairment is uncommon early in illness and in younger patients.
- Early onset of PD may be associated with more *subjective* experience of distress about cognitive difficulty, possibly relating to significant impact in role functioning.

## Methods of Evaluation

- Patient interview
- Family input
- Mental Status Exam
- Neuropsychological Testing

## Subjective Complaints

- Some Common Complaints
  - Forgetfulness
  - Concentration difficulties
  - Difficulty following conversations with several people
  - Writing difficulty

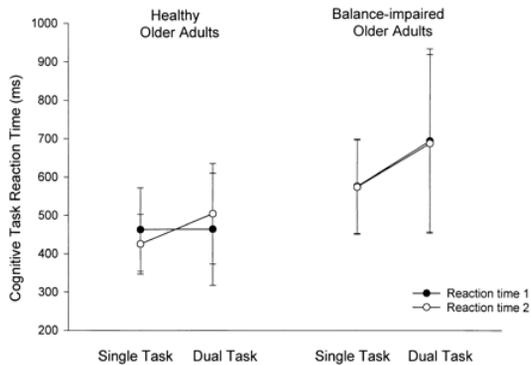
## Formal Neuropsychological Testing

- Many tests available.
- Domains Assessed: Attention, Processing Speed, Executive Functioning, Language, Learning and Memory, Sensory and Motor Functioning, Mood and Personality.

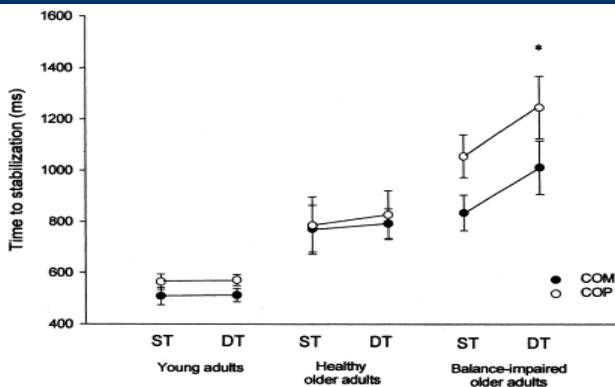
## Attention

- “Trail Making” Test: Connect the numbers in order
- Symbol Search: Do any of these shapes match?
- Digit Span (repeat forwards, backwards):
  - 2,1,8
  - 4,2,7,9
  - 5,1,8,6,3,
  - 3,8,2,5,7,1,9

**Cognitive performance is lower in balance test in balance-impaired older adults while balancing (Woollacott and Shumway-Cooke, 2002).**



**Balance is worse in balance-impaired older adults when concentrating. (Woollacott and Shumway-Cooke, 2002)**



DT = Dual Task: Answer "High" or "Low" to tones presented over headphones

## Memory Testing by Neuropsychological evaluation

Wechsler Memory Scale – III

Short, detailed Paragraphs (stories)

Pictures of people engaged in a variety of activities in different settings

Faces

Word-pairs (for example: “Gold-Walk... Curtain-Gasoline..) When I say “Gold” you say...?

List Learning: Examples: CVLT, HVL, RAVLT

Design Recall

## Memory Test (List Learning):

Grapes

Airplane

Painter

Boat

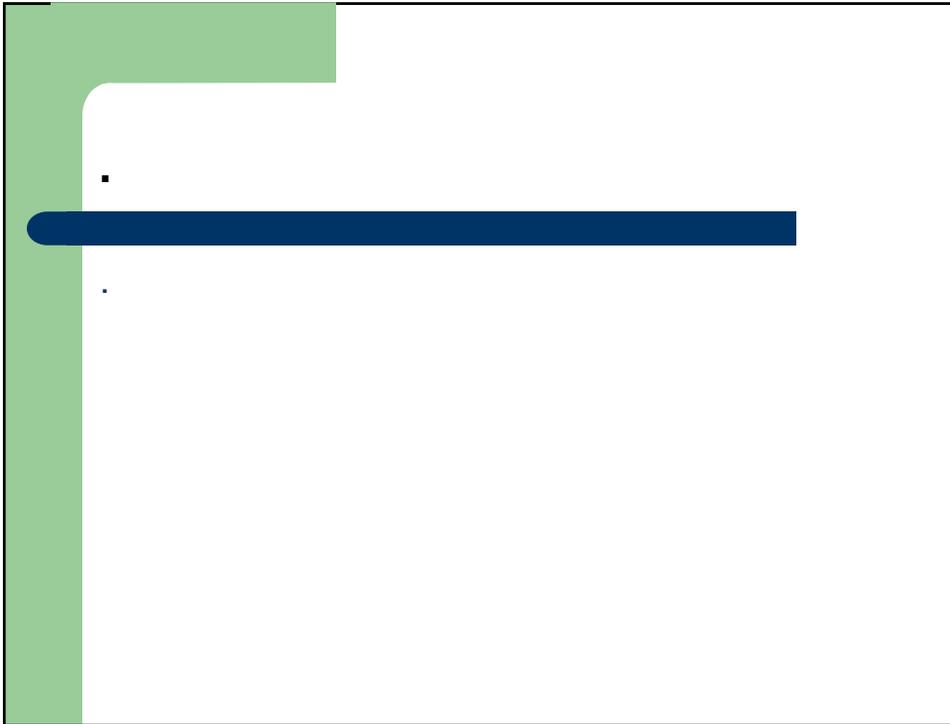
Banana

Train

Manager

Tangerine

Dentist



**Ordered list Improves learning and memory in Parkinson's Disease.**

Manager    Painter    Dentist  
Grapes    Tangerine    Banana  
Airplane    Train    Boat

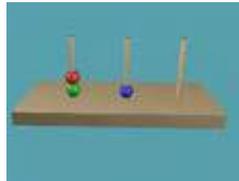
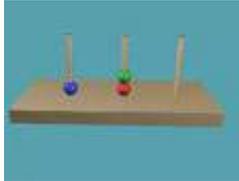
## Executive Functioning

- Planning, Sequencing, Organization,
- Control of cognitive and behavioral responses to situations
- Cognitive flexibility

## Clock Drawing

- Instructions:
- “Draw a clock, include all the numbers, place them as they should be arranged, and set the hands at 20 minutes after 7 o’clock.”

## Tower of London



## Complex Attention and Problem Solving

► Wisconsin Card Sorting Test



## PD Medication and Cognition

- Evidence for beneficial effect of levadopa on cognition unclear - some functions may improve, others do not.
- Some medications may interfere with optimal cognitive functioning.

## Effects of Deep Brain Stimulation

- Small decrements in some measures of speed/efficiency.
- Complications result in larger decline in rare instances.
- Most patients do not show obvious changes.

## Dementia Risk

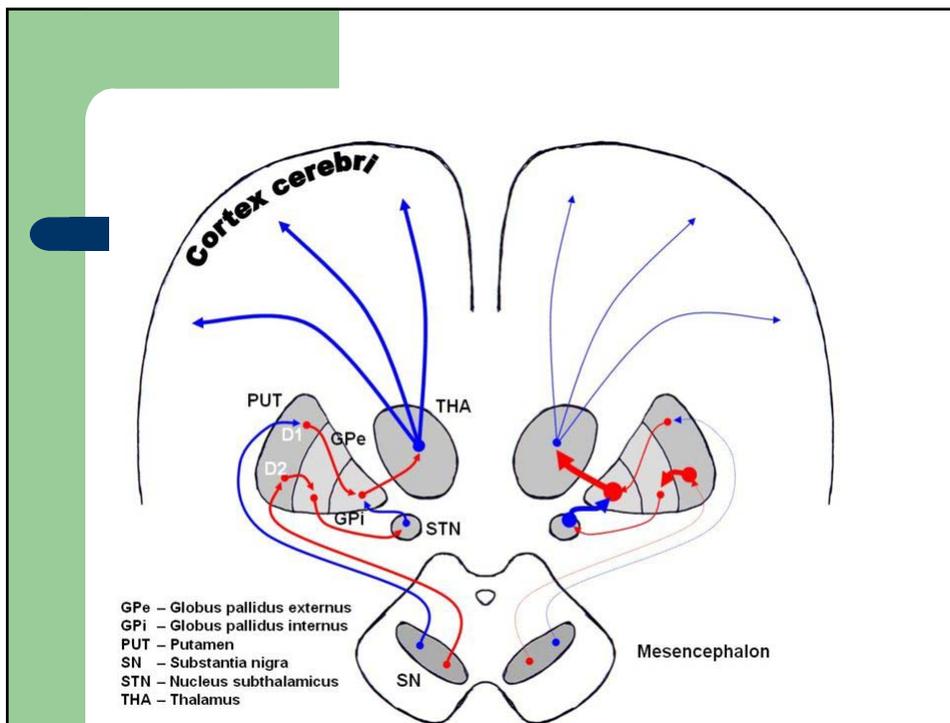
- Increases with age and disease severity:

## Pattern of Deficits in PD with Dementia

- Prominent deficits in executive functioning
- Slowed processing (“Bradyphrenia”)
- Attention deficits
- Learning impairment
- Deficits in Memory Retrieval
- Visuospatial problem solving impairment
- Psychiatric manifestations
- Deficits significantly interfere with everyday functioning beyond the impact of motor disability.

## Mechanisms

- Depletion of dopamine and other secondary to neurodegenerative changes.
- Progression of neurodegenerative changes to affect other neuromodulatory systems.
- Comorbidities



## DRIVING

- Some with PD are determined by road-test evaluation to be “marginal drivers”
- Marginal drivers showed disruptions in *timing of driving maneuvers*, and errors of attention and *judgement during driving maneuvers*.
  - Prolonged hesitation before turning
  - Not accelerating to appropriate speed
  - Failing to make smooth lane-changes
  - Failure to appreciate the effect of their driving on others.

## Neuropsychological Test Performance is associated with Driving proficiency in PD

- Marginal Drivers:
- Lower performance on tests of visuomotor speed (Connect-the numbers)
- Lower visuospatial problem solving (Copy a detailed design)

## **Clinical Evaluation:**

- Seek out evaluation and consultation from your neurologist as concerns arise.
- Consider neuropsychological evaluation/consultation if questions remain.
- Seek attention for other conditions that could affect cognitive performance.
- Consider formal driving evaluation if concerns arise.

## **Other Ideas for Coping and Adaptation**

- Aim for a non-distracting atmosphere when focus is required.
- Balance relaxing and demanding activities to minimize fatigue.
- Consider to-do lists?

## Other adaptations

- Supplement oral with written text, diagram, etc. to increase reliability of the communication.
- Carry out important activities during period when anti-parkinsonian medication is effective. Schedule for flexibility.
- Use computer keyboard to compensate for reduced handwriting proficiency.
- Balance, Prioritize.

## Contact:

- [johannes.rothlind@va.gov](mailto:johannes.rothlind@va.gov)