

Cognition and Parkinson's Disease

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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

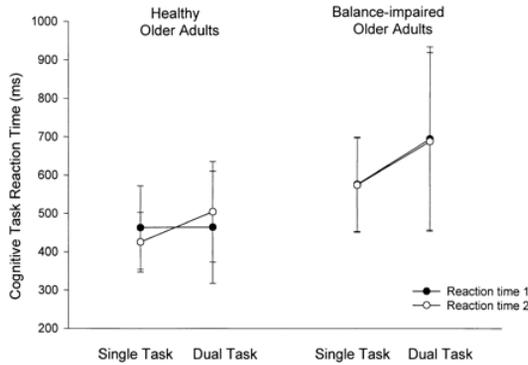
Formal Neuropsychological Testing

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

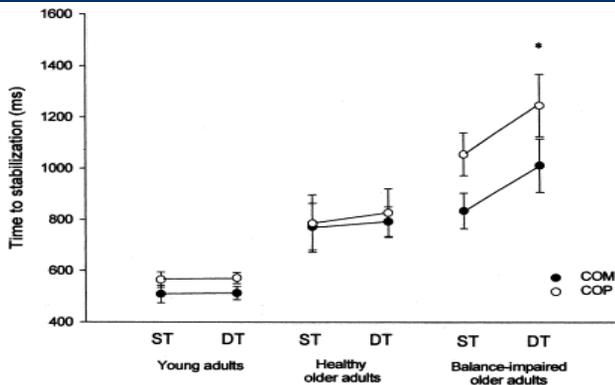
Attention

- “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

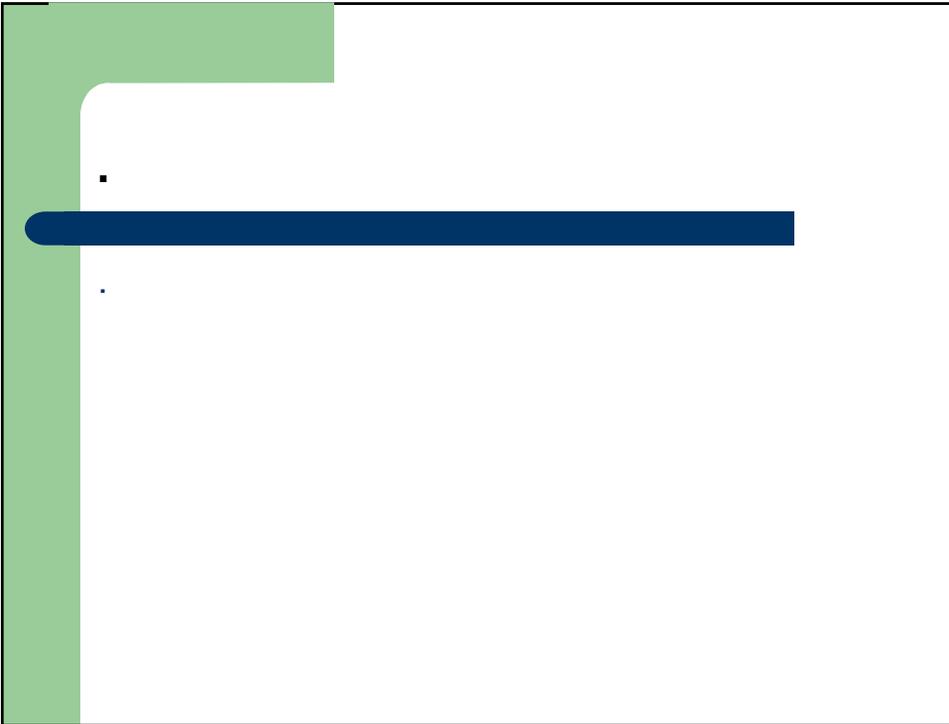
Banana

Train

Manager

Tangerine

Dentist



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

Manager Painter Dentist
Grapes Tangerine Banana
Airplane Train Boat

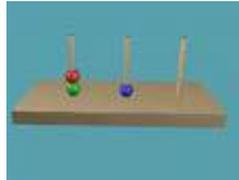
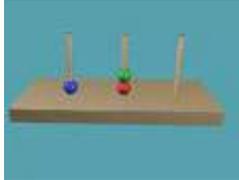
Executive Functioning

- 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 levodopa 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

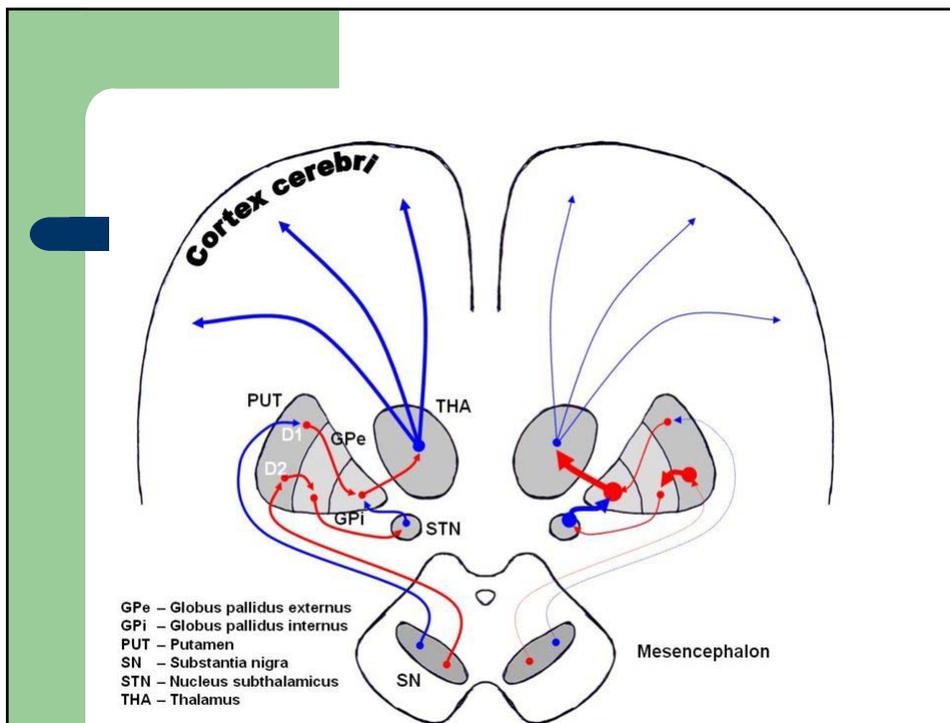
- Increases with age and disease severity:

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.

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