



# Syntactic impairment in Parkinson's Disease: Cross-task differences and relationship to cognitive impairment

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Presenting at 9.00 & 15.00

## Background

- People with PD (PwPD) known to have early cognitive, including language impairment
- Literature to date unclear about exact relationship between language and other cognitive skills
- Wide variety of methodologies used to investigate language impairment
  - Little guidance on clinical assessment and management of language problems

## Aims and Objectives

- Further investigate the relationship between language and other disease indicators for PD:
- investigate language performance across a number of task complexities;
  - correlate this performance with cognitive skills.

## Methods

### Participants:

22 German speaking non-demented PwPD  
22 matched healthy control participants  
Matched for gender, age and cognitive profile

### Cognitive assessments:

- Set-shifting (Trail Making Test Contrast (TMC))
- Working memory (digit span)
- Attention (Brief Test of Attention, BTA)
- Letter/category fluency

### Language tasks:

- Complex grammar (embedded and right-branching subject and object relative clauses, e.g. The dog that jumps over the rabbit chases the cat, The dog jumps over the rabbit that the cat chases)
- Sentence generation (noun-verb stimuli, e.g. unpack – holiday)
- Narrative production (Cookie Theft picture description)

### Language Evaluation:

- Quantity (mean length of utterance)
- Complexity (no. of subordinate clauses)
- Accuracy (no. of grammar errors)
- Fluency (no. of false starts) & Pausing
- CIUs (and Concepts) for sentence generation and narrative

## Results

### 1. Group Comparison (significant differences & trends)

Variable name	HC (Mean, SD)	PwPD (Mean, SD)	Test-statistics
Cognition: Significance level with Bonferroni-correction: .008			
TMC	41.09 (28.10)	98.67 (71.30)	U = 88.00, p < .001
Letter Fluency	15.86 (3.63)	12.09 (6.45)	t(42) = 2.39, p < .021
Complex Grammar: Significance level with Bonferroni-correction: .008			
Grammar Errors	89.91 (16.05)	76.09 (19.53)	U = 98.00, p < .001
Sentence Generation (Significance level with Bonferroni-correction: .010)			
S_errors	0.43 (0.90)	2.08 (2.09)	U = 109.50, p < .001
S_false starts	1.58 (2.01)	3.59 (3.30)	U = 75.00, p < .001
S_CIUs	99.8 (0.61)	94.66 (10.05)	U = 170.00, p < .037
S_pause	84.73 (9.76)	76.16 (16.65)	U = 128.50, p < .021
Narrative Production: Significance level with Bonferroni-correction: .007			
N_errors	0.83 (0.91)	2.85 (2.60)	U = 105.00, p < .003
N_CIUs	86.80 (9.23)	76.71 (14.72)	t(40) = 2.66, p < .011
N_concepts	5.85 (0.85)	5.14 (1.15)	U = 143.50, p < .043
N_pauses	72.62 (10.49)	62.52 (15.16)	U = 128.50, p < .021

- Poorer performance for set-shifting in PwPD despite cognitive matching
- Consistently higher error rate across all three language tasks

### 2. Relationship between language and cognition

- Performance in complex grammar task dependent on set-shifting performance
- Error rate in other tasks independent of cognitive skill

### 3. Performance across language tasks

- No relationship between grammatical performance across the three language tasks despite consistently higher errors rates compared to healthy controls

## Discussion & Clinical Implications

- Findings on cognitive and language performance align with rest of the literature
- Language and cognitive performance are linked, **BUT**
- Only apparent in highly complex tasks at the early stages of the disease
- No correlation between performance across language tasks



- Need to test a range of cognitive functions instead of screening assessment to detect problems at early stage of PD;
- Need to assess language across several tasks,
- Greater importance should be given to more naturalistic language production outcomes;
- Assessment results for language impairment need to be validated by patient to establish presence and especially impact of problems.

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