







# Evaluation of cognitive subtypes in Parkinson's Disease, Correlations with qEEG power spectra

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## Introduction.

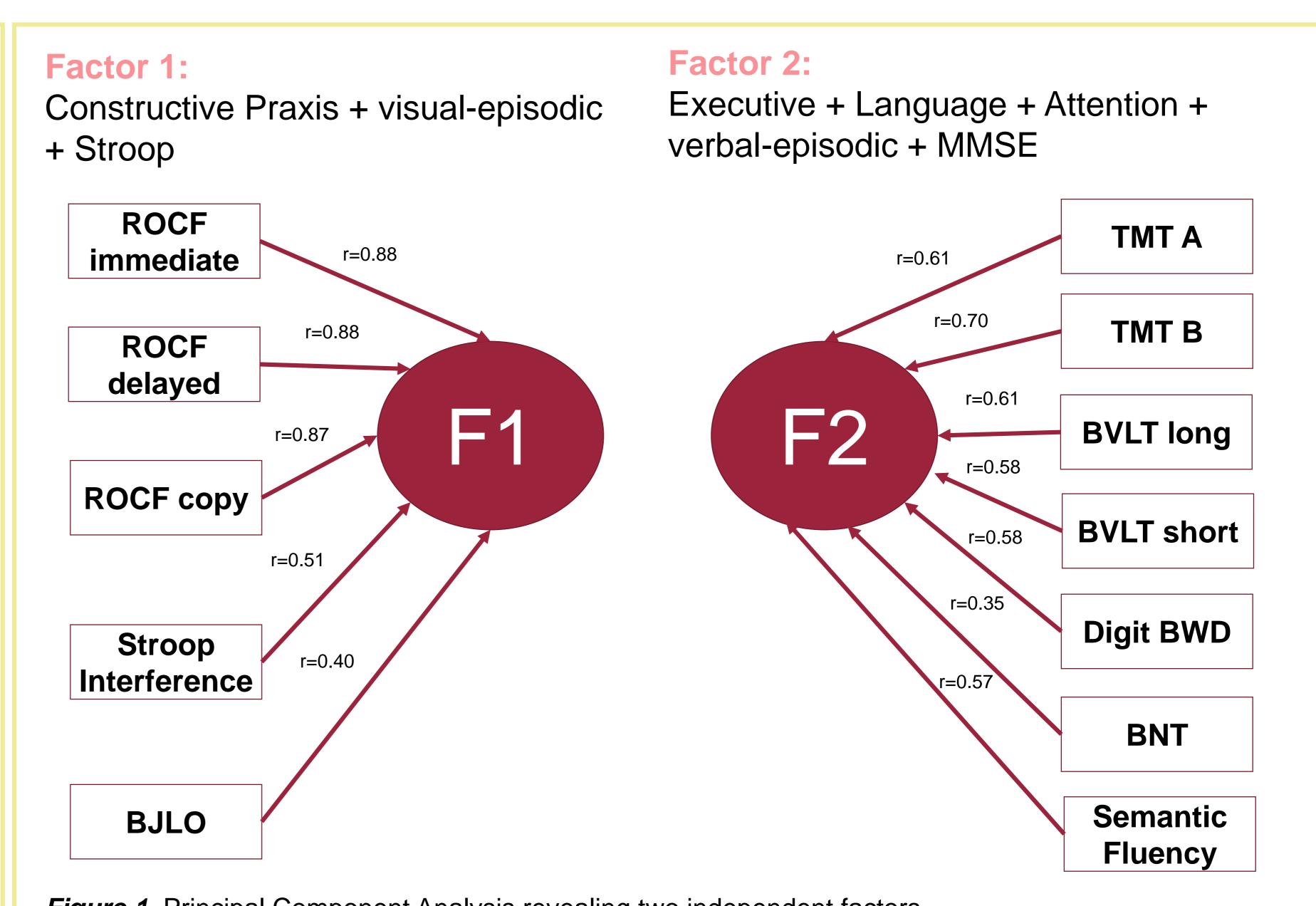
According to the *Dual Syndrome Hypothesis* cognitive impairment in Parkinson's disease (PD) patients can be divided into two subtypes: The frontal type versus the posterior type. The risk of progression to PD dementia was described to be higher in patients initially presenting with posterior deficits (Williams-Gray et al. 2009). Additionally, cognitive impairment in PD is related to slowing of electroencephalography (EEG) background activity. The aim of the present study was to investigate the correlation between different cognitive subtypes and quantitative EEG measures in PD-patients.

## Patients and Methods.

Fifty-nine PD-patients completed a comprehensive neuropsychological test battery covering five cognitive domains (Executive Function, Episodic Memory, Attention, Visuo-Spatial Ability, Language). Additionally, a 256-resting-state EEG was recorded. For statistics, Principal Component Analysis was calculated to group the neuropsychological measures into independent factors. Factor scores were further correlated with qEEG power spectra through Pearson's correlation.

Variables	Raw values (Median, Range)
N	59
Sex (female / male)	21 / 38
Age (years)	67 (45 - 82)
Education (years)	14 (9 - 20)
Disease Duration (years)	3.3 (0.3 - 22.5)
LED (mg / day)	590 (60 - 2129.5)
UPDRS subscale-III	15 (0 - 41)

**Table 1.** Demographic, clinical characteristics and descriptive data for all variables of interest of the total sample. LED: Levodopa Equivalent Dose; UPDRS: United Parkinson's Disease Rating Scale



**Figure 1.** Principal Component Analysis revealing two independent factors. ROCF: Rey Osterrieth Complex Figure; BJLO: Benton Judgement of Line Orientation; TMT: Trail Making Test; BVLT: Basel Verbal Learning Test. MMSE: Mini Mental State Examination; r: Correlation coefficent

#### Results.

From screeplot two factors could be derived. Factor 1 consisted of tests measuring constructional praxis, visuo-episodic memory as well as Stroop interference. Factor 2 consisted of tests assessing executive functions, attention, verbal-episodic memory and language. Pearson's correlation with qEEG measures and Factor 2 showed significant **positive** correlations with *Global Alpha2 Power* (10-13 Hz; r=0.35, p <0.01) and *Global Beta Power* (13-30 Hz; r=0.28; p <0.05). There was a **negative** correlation between Factor 2 and *Global Theta Power* (4-8 Hz; r=-0.31, p <0.05). No correlation with Factor 1 was found.

### Discussion/Conclusion.

In line with the Dual Syndrome Hypothesis two factors were derived through Principal Compontent analysis of our comprehensive neuropsychological test battery. In our sample, fronto-temporal associated neuropsychological measures were meaningfully correlated with qEEG power spectra. In a further step, correlation with connectivity measures of the qEEG power spectra could allow a closer insight into underlying network dynamics.