Re-EXAMIN-ing Executive Function in Parkinson Disease:

Comparison of the NIH EXAMINER to Traditional Neuropsychological Measures

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FIXEL CENTER

BACKGROUND

- The **NIH EXAMINER** was developed by UCSF and funded by NINDS to provide a reliable and valid test of executive functioning that could be applied across many populations (e.g., age groups, disorders) (see Kramer, 2012).
- Parkinson disease (PD) is a disease often characterized by executive functioning deficits.
- In 2014, Bott et al. found superior sensitivity of NIH EXAMINER composite scores to executive deficits in PD patients than traditional neuropsychological measures.

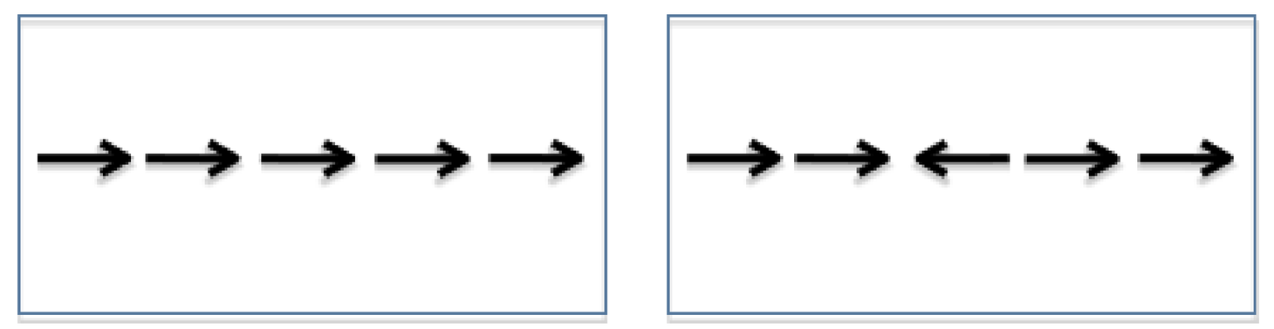


Figure 4. Example of Flanker stimuli

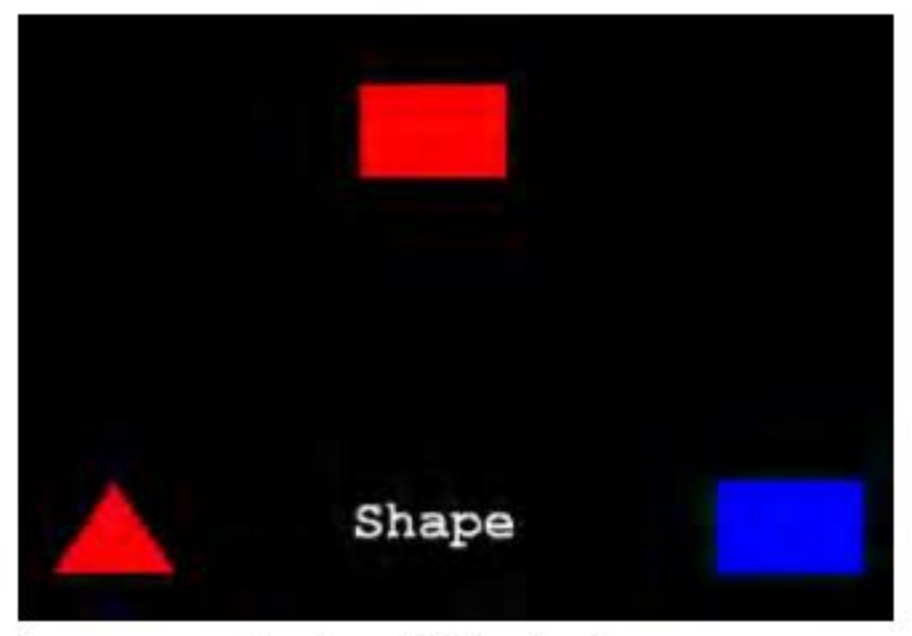


Figure 7. Example of Set Shifting stimulus

Letter 'F'
Fly
Farm
Free
First
Flame

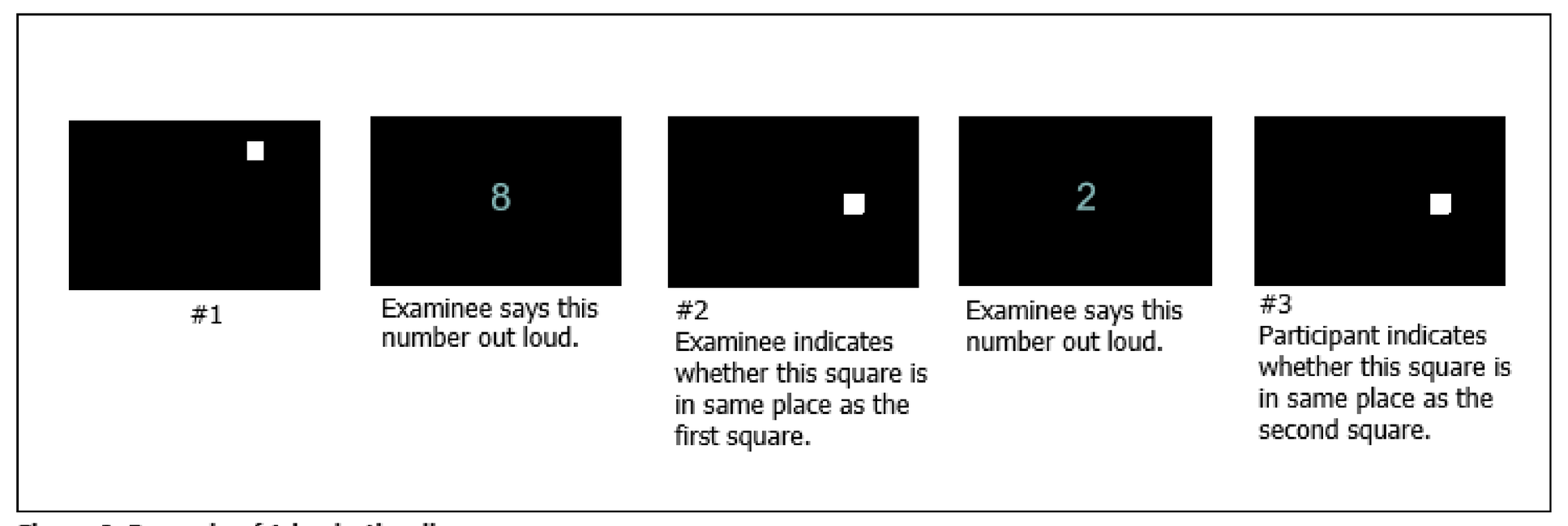


Figure 2. Example of 1-back stimuli

Category 'Animals'
Bird
Dog
Cow
Lion
Cat

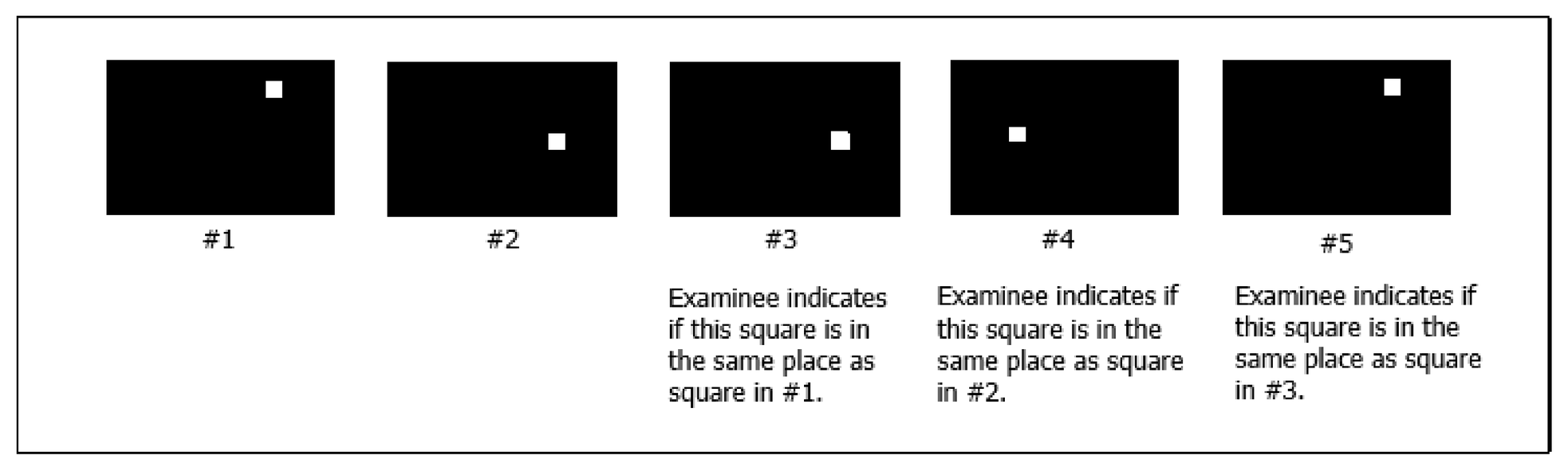
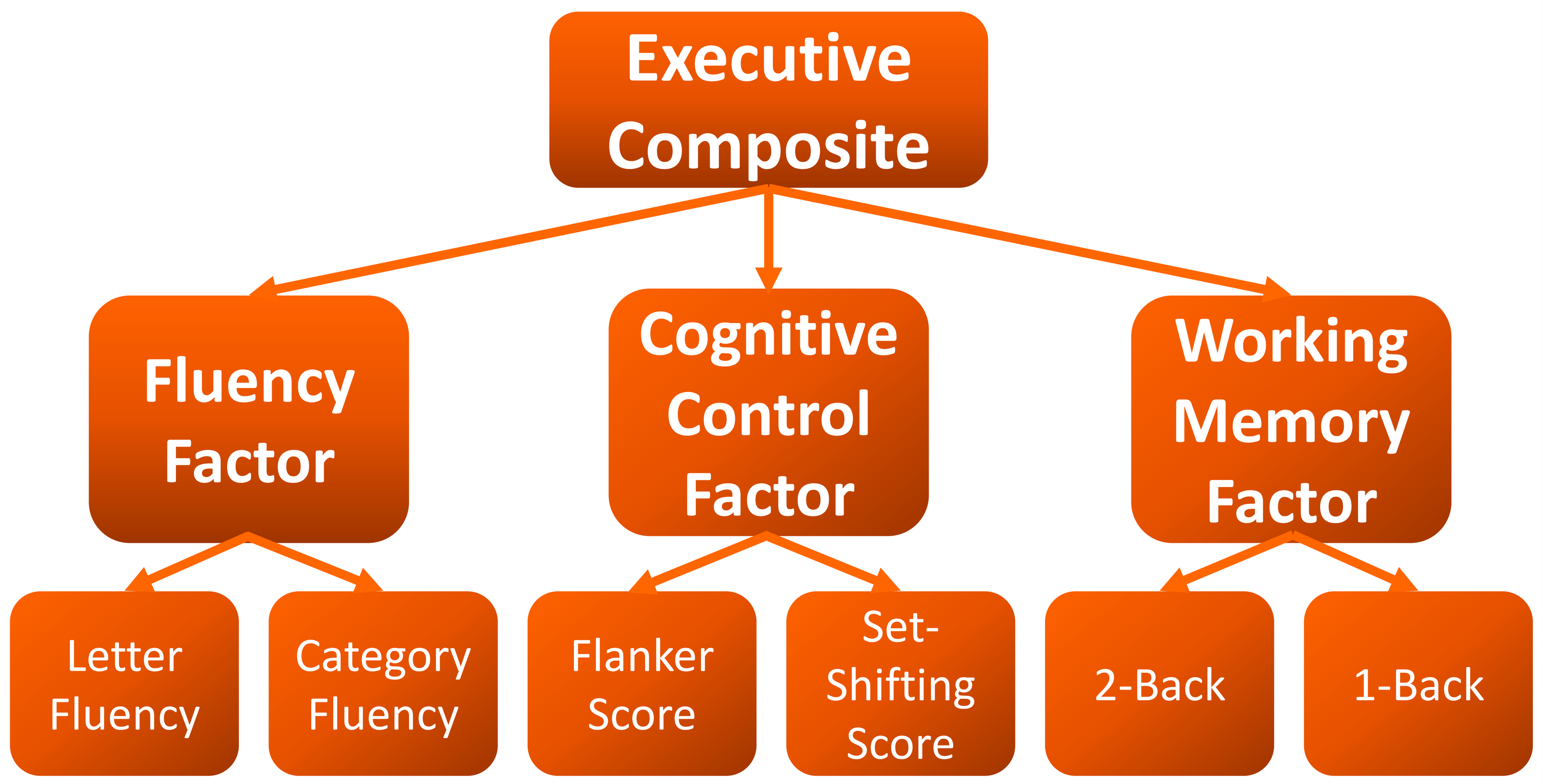


Figure 3. Example of 2-back stimuli

NIH EXAMINER



AIMS

<u>Aims:</u> To replicate findings from Bott et al. (2014) in a larger sample of Parkinson patients

1. Quantify the relationship between EXAMINER composites and traditional neuropsychological measures .
2. Compare performance on EXAMINER and traditional neuropsychological measures in subset of PD and Controls

<u>Prediction:</u>

1. EXAMINER composites will correlate with other measures of executive functioning
2. EXAMINER <u>Executive Composite</u> and <u>Cognitive Control</u> scores will show greater sensitivity to executive functioning in a PD sample than traditional neuropsychological measures.

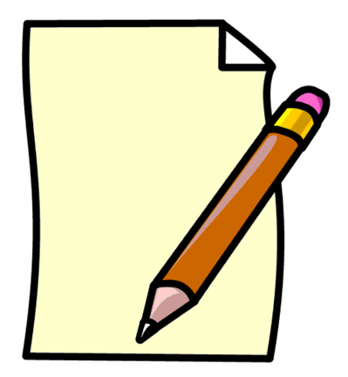
PARTICIPANTS

- Recruited from the UF Fixel Center and Gainesville FL community
- PD and HC comparison analysis used age-, gender-, and education-matched subsample of PD participants (n=15)

	PD (N=60)	Healthy Controls (N=15)
Age (yrs)	65.5 (7.4)	73.7 (5.8)
Education (yrs)	15.3 (2.5)	17.0 (2.5)
Sex (% Male)	67.8	46.7
Race (% Caucasian)	98.3	100.0
BDI-II	7.9 (6.4)	5.5 (4.4)
STAI-Trait	34.5 (9.6)	30.7 (8.7)
MMSE Total	-	29.3 (0.9)
DRS-2 Total	136.5 (4.9)	-
UPDRS III-ON	23.9 (8.6)	-
Hoehn & Yahr	2.3 (0.6)	-
PD Duration (yrs)	9.7 (5.0)	-

METHODS

- All participants completed the following:



NIH EXAMINER
Letter Fluency
Category Fluency
Flanker
Set-Shifting
1-Back
2-Back

Traditional Neuropsychological Measures
Trails B
Stroop
Digits Backward
Letter Fluency
Cognitive Screener
Dementia Rating Scale 2 OR Mini Mental Status Exam
Mood Measures
BDI-II
STAI-Trait

For PD vs. HC comparison:
- All cognitive scores were z-transformed using mean and SD of controls
- Compared using t-tests
- Impairment defined by ≥1.5 SD below mean

RESULTS

- Significant correlations between composites and traditional neuropsychological measures ranged from .740 to .373 , spearman rho

Executive Composite → <u>Stroop</u> CW (ρ=.740), <u>LN Seq</u> (ρ=.626), <u>Trails B</u> (ρ=-.620), <u>Digits Back</u> (ρ=.505), <u>Letter Fluency</u> (ρ=.392)

Cognitive Control → <u>Stroop CW</u> (ρ=.666), <u>Trails B</u> (ρ=-.656), <u>LN Seq</u> (ρ=.554), <u>Digits Back</u> (ρ=.463)

Fluency Factor → <u>Letter Fluency</u> (ρ=.668), <u>LN Seq</u> (ρ=.374), <u>Stroop CW</u> (ρ=.373)

Working Memory → <u>Stroop CW</u> (ρ=.657), <u>Trails B</u> (ρ=-.635), <u>Digits Back</u> (ρ=.474), LN Seq (ρ=.447)

*All spearman's rho correlations significant at p ≤ .001

- <u>No significant differences</u> (p = .05) between PD and HC groups on either EXAMINER composites or traditional measures
- Effect sizes greatest for <u>Trails B, Digits Back, and Cognitive Control composite</u>

	PD (N=15) Mean (SD)	HC (N=15) Mean (SD)	Cohen's d	p-value	Impaired Range
Executive Composite	0.03 (0.41)	0.22 (0.48)	0.40	0.251	PD = 2 HC = 2
Cognitive Control Score	-0.22 (0.80)	-0.02 (0.40)	0.51	0.391	PD = 4 HC = 1
Working Memory Score	-0.25 (0.61)	-0.05 (0.62)	0.31	0.400	PD = 1 HC = 1
Verbal Fluency Score	0.30 (0.42)	0.53 (0.64)	0.36	0.252	PD = 0 HC = 2
Trails B	154.86 (91.42)	101.52 (61.21)	1.03	0.074	PD = 5 HC = 2
Stroop CW	28 (9.02)	30.79 (11.51)	0.43	0.482	PD = 1 HC = 0
Digits Backward	4.60 (1.24)	5.36 (1.01)	0.75	0.084	PD = 2 HC = 0

CONCLUSIONS

- NIH EXAMINER composites ***were not found*** to be more sensitive to executive deficits in a sample of 15 PD and 15 HC than traditional neuropsychological measures
- Correlations of EXAMINER composites with other neuropsychological measures were ***moderate to strong***
- Our sample had worse cognitive scores in general than those from Bott et al.
- **<u>Future studies should</u>:**
  - Include a greater number of healthy controls
  - Examine relationship between EXAMINER subtest scores and traditional neuropsychological tests
  - Examine relationship between EXAMINER composites and other ecologically valid executive functioning measures (e.g., Observed Tasks of Daily Living)