

Modulation of Electrocortical Responses To Emotional Pictures in Parkinson's Disease

Parkinson's Disease

P. Mangal^{1*}, J. Lafo¹, J. Renfro¹, B. Scott¹, M. Bradley², M.S. Okun^{3,4}, D. Bowers^{1,3,4}

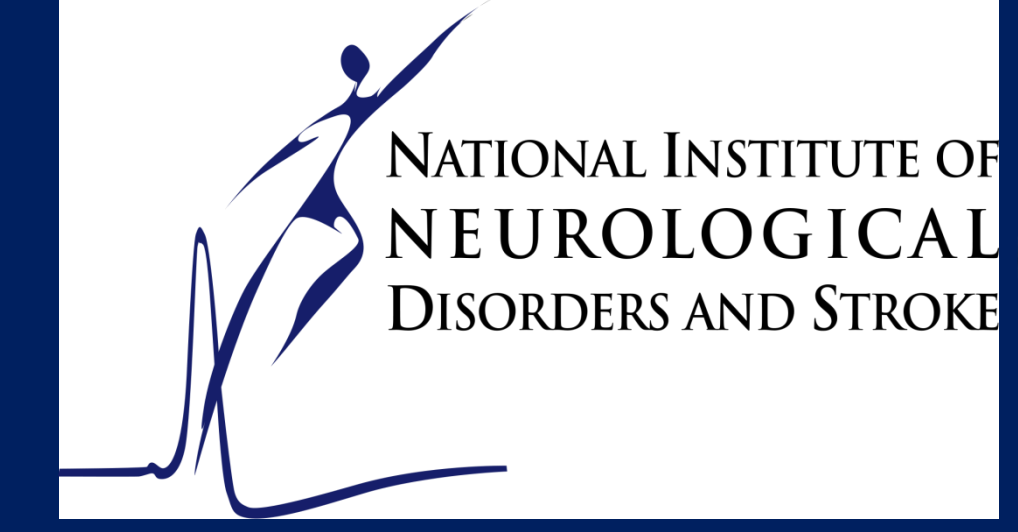
Dept. of Clinical & Health Psychology, University of Florida¹

Center for Study of Emotion and Attention, University of Florida²

Center for Movement Disorders and Neurorestoration, University of Florida³

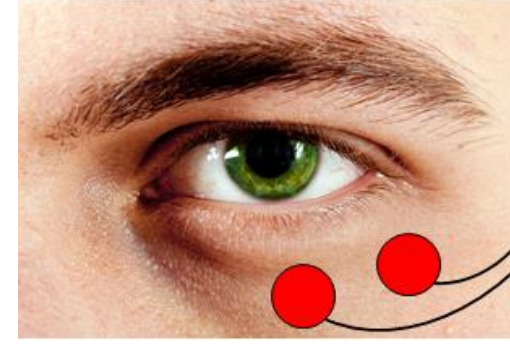
Department of Neurology, University of Florida⁴

*Contact: pmangal@ufl.edu



BACKGROUND

- Prior research has shown **emotion processing deficits** in **Parkinson disease (PD)**
 - Blunted startle eyeblink
 - Attenuated late positive potential
- The **late positive potential (LPP)** is an index of motivated attention and arousal
- Dietz et al., (2014) demonstrated attenuated LPP responses to negative pictures in PD compared to controls



RESULTS

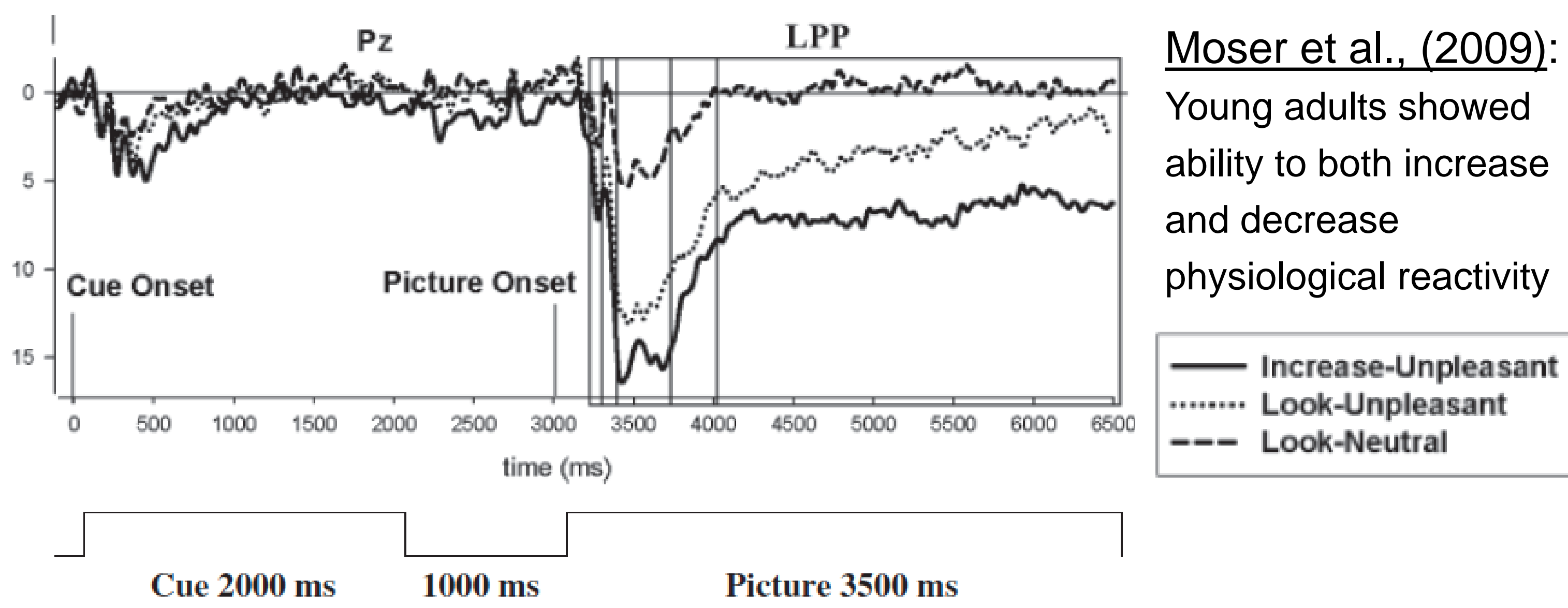
	Parkinson	Control	T-Test Value	p-Value	Cognitive Measure (SD)	Parkinson	Control	T-Test Value	p-Value
Gender (M/F)	19/7	12/6	.210	.647	DRS-2 Total Score	136.4(6.0)	137.7(4.6)	-.724	.473
Race (Caucasian/African American)	26/0	17/1	-.2	.409	Digit Span	16.8(4.1)	16.7(3.8)	.130	.898
Antidepressant (Y/N)	8/18	3/15	-.2	.309	Letter Number Sequencing	9.7(1.9)	9.6(3.5)	.217	.823
Age	64.9(5.39)	63.1(7.3)	.908	.369	Logical Memory Immediate	40.4(10.4)	42.5(10.5)	-.645	.523
Education (Years)	15.9(2.2)	15.9(2.4)	-.030	.976	Logical Memory Delayed	23.5(7.5)	27.4(7.3)	-1.63	.110
BDI Total Score	9.75(5.9)	2.65(2.8)	5.16	$p < .001^{**4}$	HVLT Immediate	23.2(5.5)	26.4(3.9)	-2.05	.047
Apathy Scale Score	10.4(6.3)	9.3(5.5)	.728	.471	HVLT Delayed	7.4(3.4)	9.2(2.5)	-1.91	.064
STAI State Anxiety Score	26.3(10.1)	24.2(4.4)	1.14	.261	Category Fluency (Animals)	19.8(7.2)	21.1(5.3)	-.614	.543
STAI Trait Anxiety Score	31.5(7.2)	27.7(7.8)	1.76	.074	BNT Total Score	56.1(2.6)	57.5(2.8)	-1.60	.118
Disease Duration (Years)	7.4(6.5)	-	-	-	Trails B Time	39.1(14.0)	30.2(7.5)	2.37	.022
HY On Score	2.07(0.36)	-	-	-	Trails B Error	106.2(59.2)	70.5(22.3)	3.03	.005
UPDRS Motor On Score	24.9(10.6)	-	-	-	Stroop Color-Word	33.0(11.8)	39.1(9.3)	-1.78	.083
PDQ-39 Total Score	24.3(13.4)	-	-	-	Stroop Interference	2.9(9.5)	3.9(8.0)	-.352	.727
					WCST Categories	3.7(2.5)	5.3(1.9)	-3.06	.004
					Executive Composite Score	49.1(5.9)	53.4(6.0)	-2.16	.037

OBSERVATION

Reduced physiological reactivity in Parkinson's disease

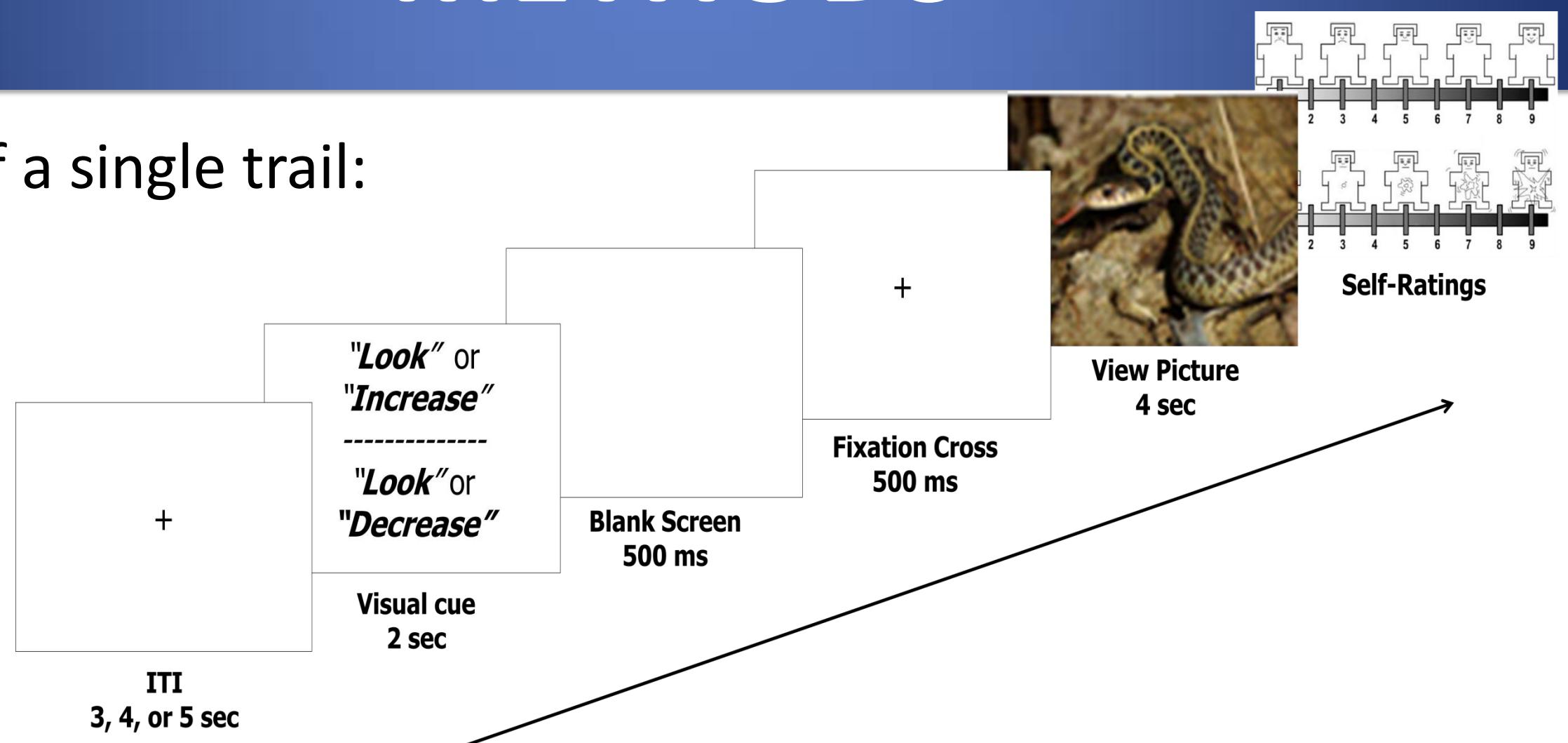
KEY AIMS:

- Determine whether those with PD can modulate (increase or decrease) physiological reactivity using emotion regulation strategies such as **reappraisal**.
- Examine the relationship between physiological reactivity (LPP) and **executive functions**.



METHODS

Schematic of a single trial:



Methods adapted from Moser et al., (2009)

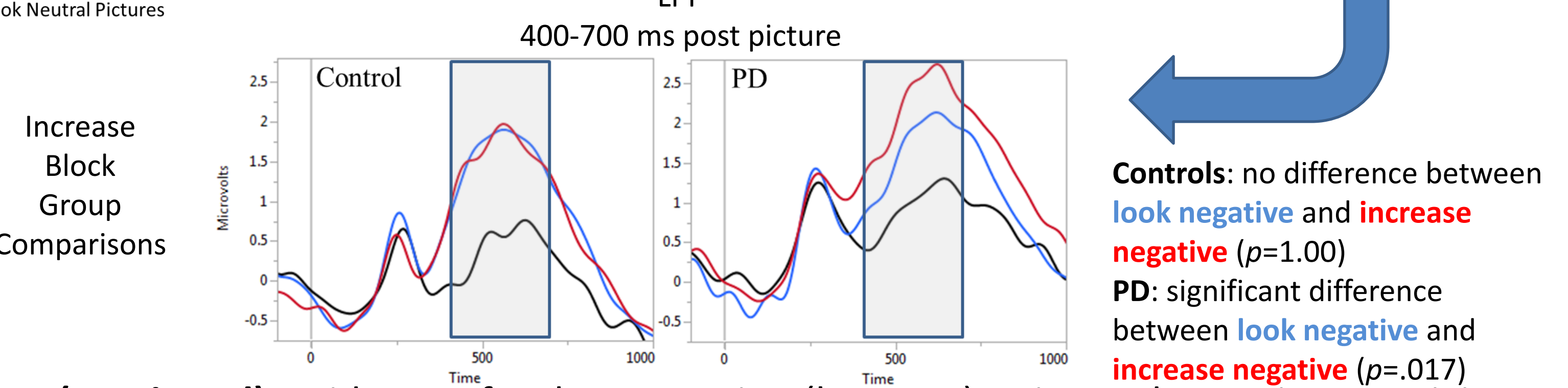
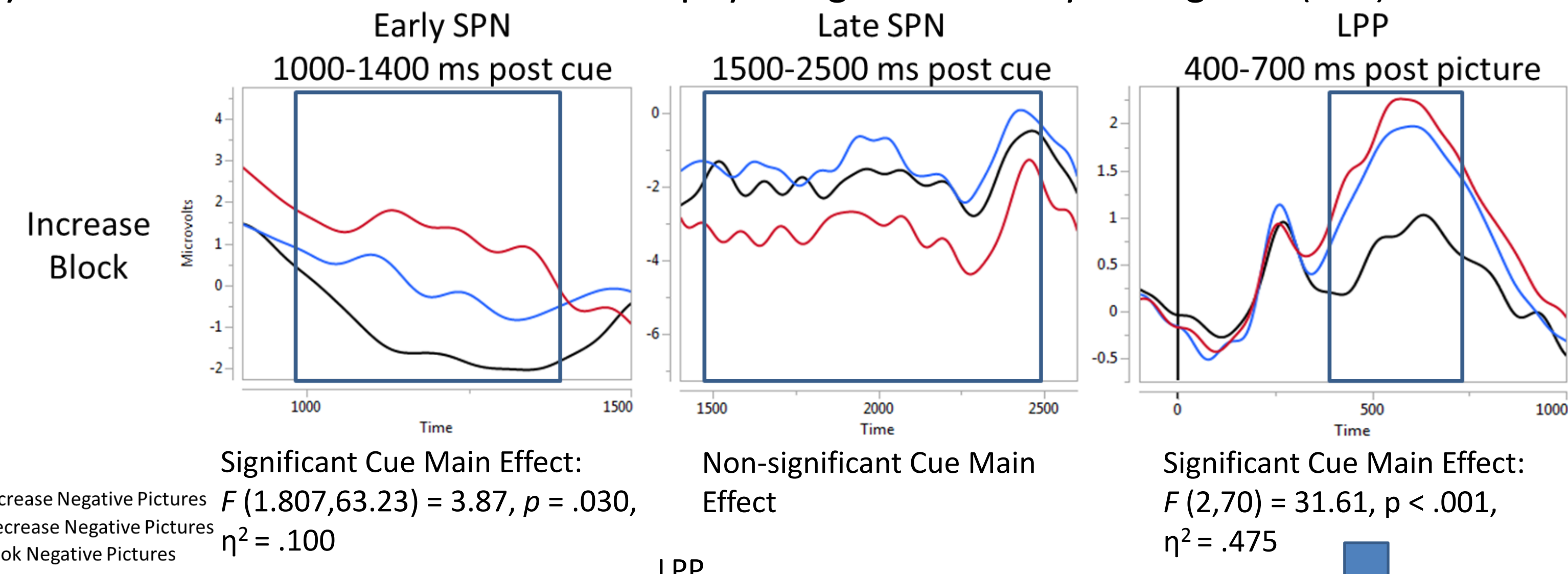
Screening and Baseline Measures: screening, cognitive testing, mood questionnaires
Simultaneous EEG Recording and IAPS Picture Viewing (30 neutral, 30 "look negative", 30 "increase negative", 30 "decrease negative")

- Cue "Look": "Look at the image and respond naturally"
- Cue "Increase": "Look at the picture so that you feel negative emotions more strongly. Imagine that you or a loved one are this sick individual. Do not think of something unrelated that is negative."
- Cue "Decrease": "Look at the picture so that you feel negative emotions less strongly. For instance you could adopt a detached, clinical perspective, or imaging that this picture is from a movie. Do not think of something unrelated that is positive."

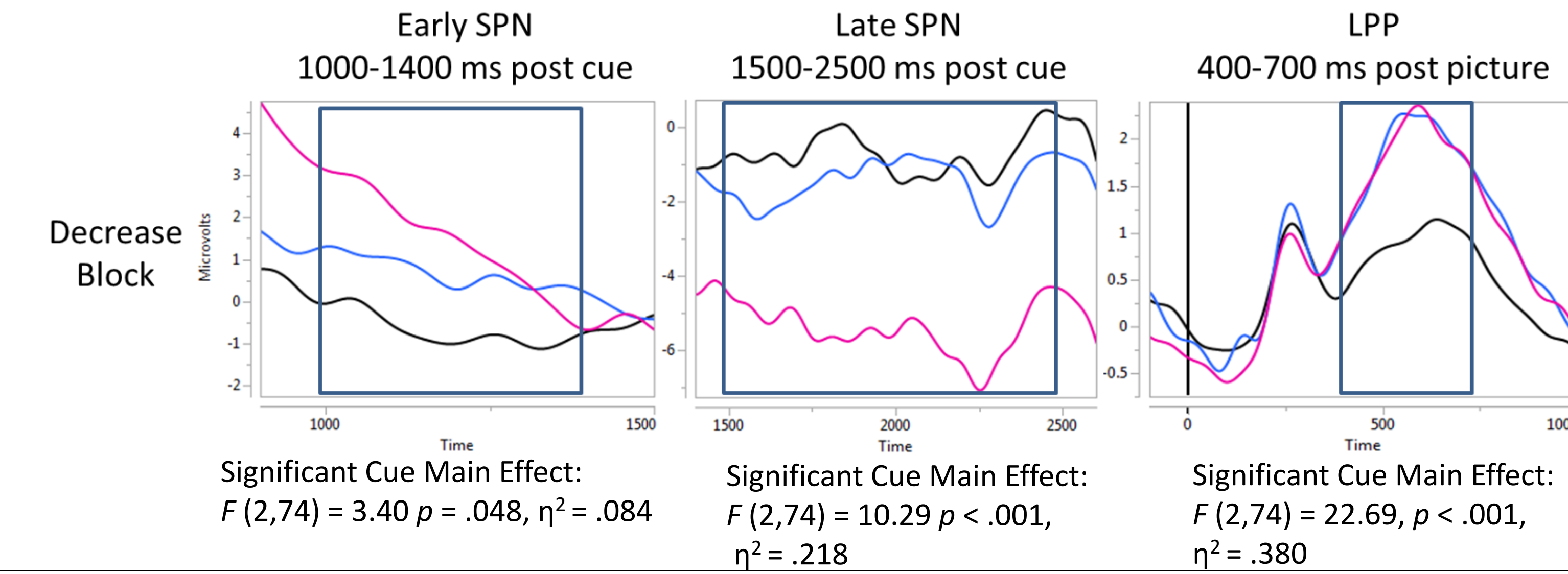
Ratings: Participants were asked to rate the valence and arousal of every picture

Cognitive Domains	Neuropsychological Tests
General Cognition	Dementia Rating Scale – II (DRS-2): Total Score
Working Memory	Digit Span (WMS-III): Total Score
Processing Speed	Trails A: Total time and total errors
Executive Function	Stroop Color-Word (Golden Version): # of Items in 45 Seconds Stroop Color-Word Interference: difference between actual and predicted scores
	Trails B: Total time and total errors Wisconsin Card Sorting Task (WCST): # of categories, Total Errors
Verbal Memory	Logical Memory Stories II (WMS-III): Immediate and Delayed Recall
Language	Boston Naming Test (BNT): # of Correct Items
Mood	Beck Depression Inventory II (BDI-II): Total Score Apathy Scale (AS): Total Score State-Trait Anxiety Inventory (STAI): State and Trait Anxiety Scores

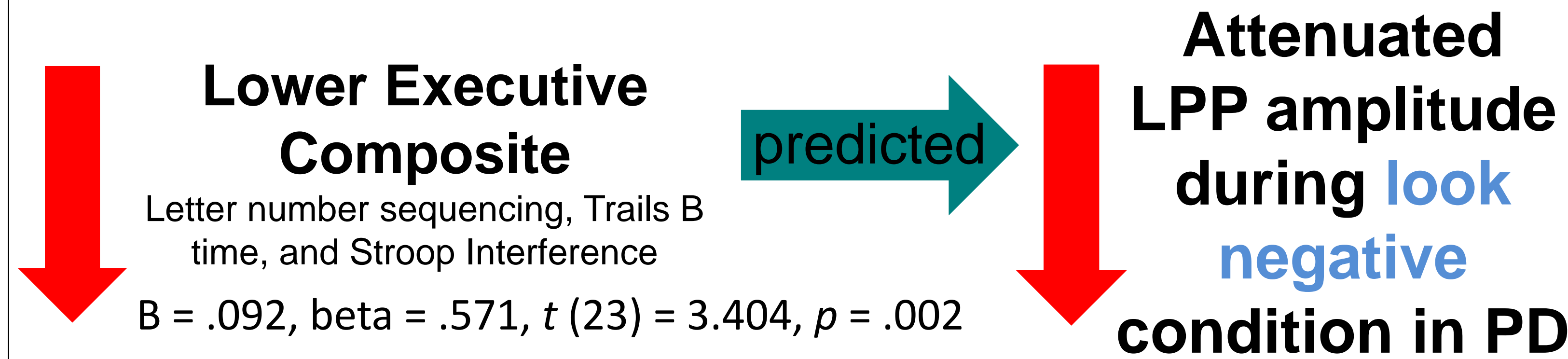
Aim 1: Evidence of early cue processing (early SPN) when preparing increasing reactivity; Only those with PD were able to **increase** physiological reactivity during task (LPP)



Aim 1 (continued): Evidence of task preparation (late SPN) prior to decreasing reactivity but no group was able to **decrease** physiological reactivity during task (LPP)



Aim 2: In those with PD, lower scores on an executive composite predicted reduced physiological reactivity (LPP) to negative pictures



CONCLUSIONS

- Individuals with Parkinson disease showed the ability to intentionally increase their physiological reactions to emotional stimuli when cued, but not decrease reactivity
- Those with PD and lower performance on an executive composite showed reduced physiological reactivity when viewing aversive stimuli
- Future Studies:
 - To what degree do those with PD spontaneously engage in these strategies?
 - Will patients with PD and apathy demonstrate a similar pattern of reactivity?