

Autonomic Activity is Associated with Behavior and Event-Related Potentials During Executive Function in Preschool-Aged Children

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Research Question

To what extent are Parasympathetic (rest-and-digest) & Sympathetic (fight-or-flight) activity linked to behavioral and neural measures of Go / No-Go performance?

•Neurovisceral models suggest a link between autonomic activity and neurocognitive function

- ♦Greater levels of parasympathetic nervous system (PNS) activity associated with better self-regulation across lifespan¹
- ♦High PNS tone associated with better cognitive performance due to more efficient PFC-subcortical function²

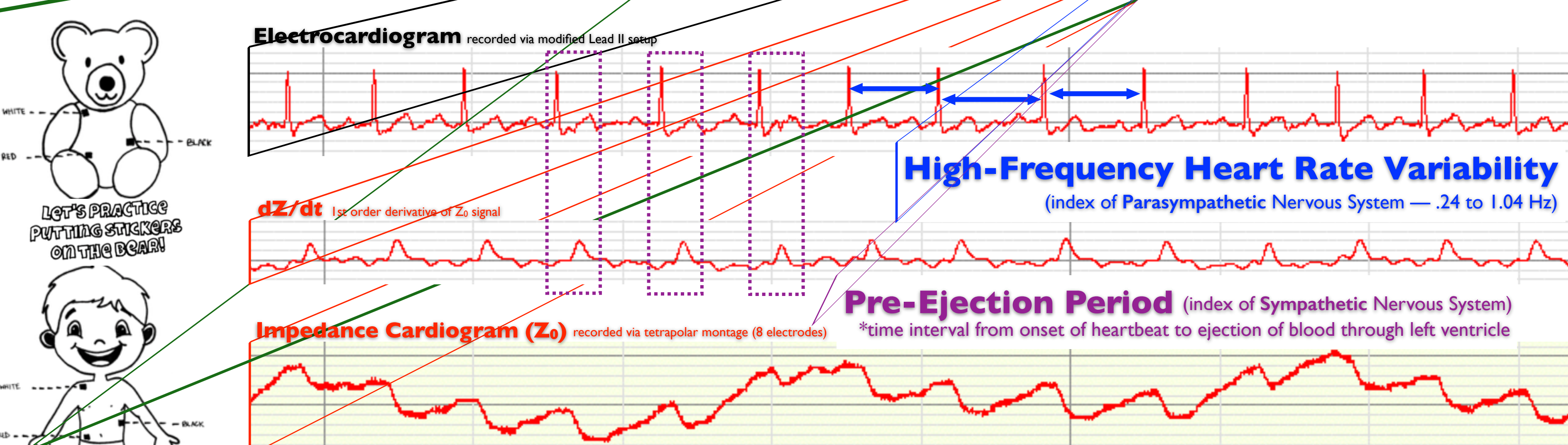
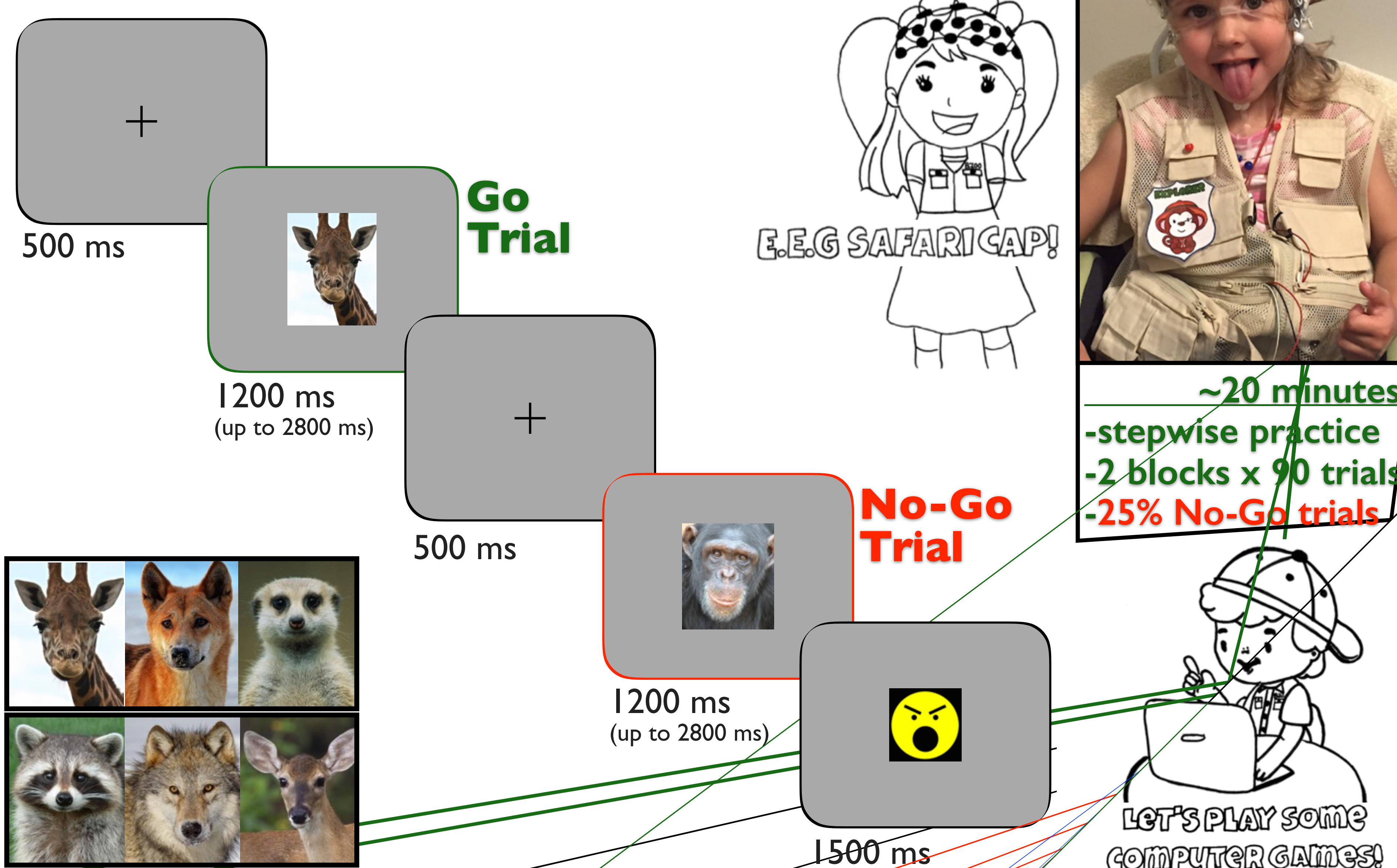
•Neurovisceral studies largely ignore the role of the SNS, emphasizing association between the PNS and neurocognitive processes

•Few studies have examined how PNS & SNS interact with child cognitive performance, and fewer studies examining concurrent neural activity

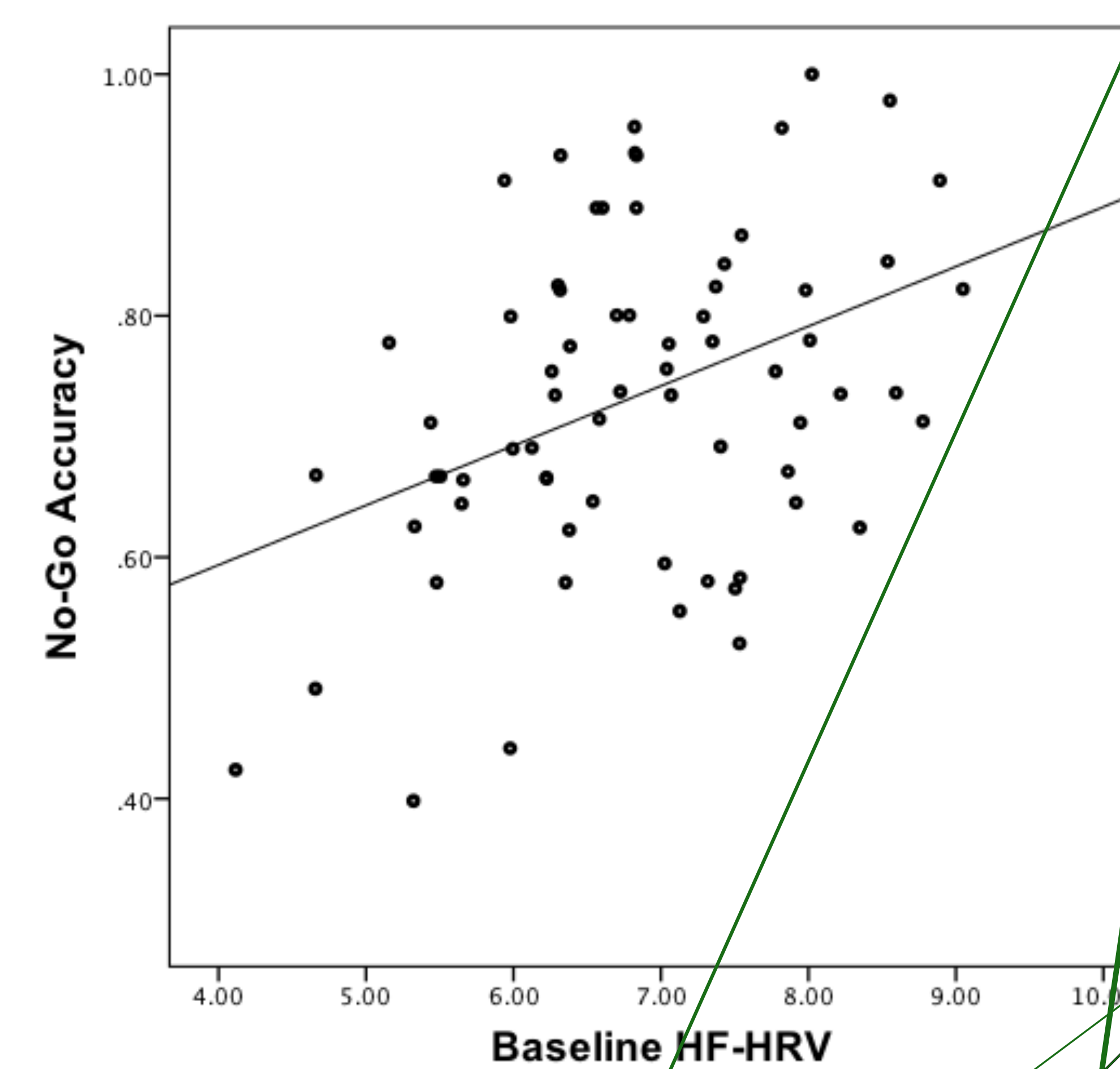
- ♦A number of findings implicate higher-order brain function in sympathetic nervous system (SNS) activity during cognitive tasks^{3,4}

Welcome to the Boogaloo Zoo!

Are you ready to help us catch some animals?

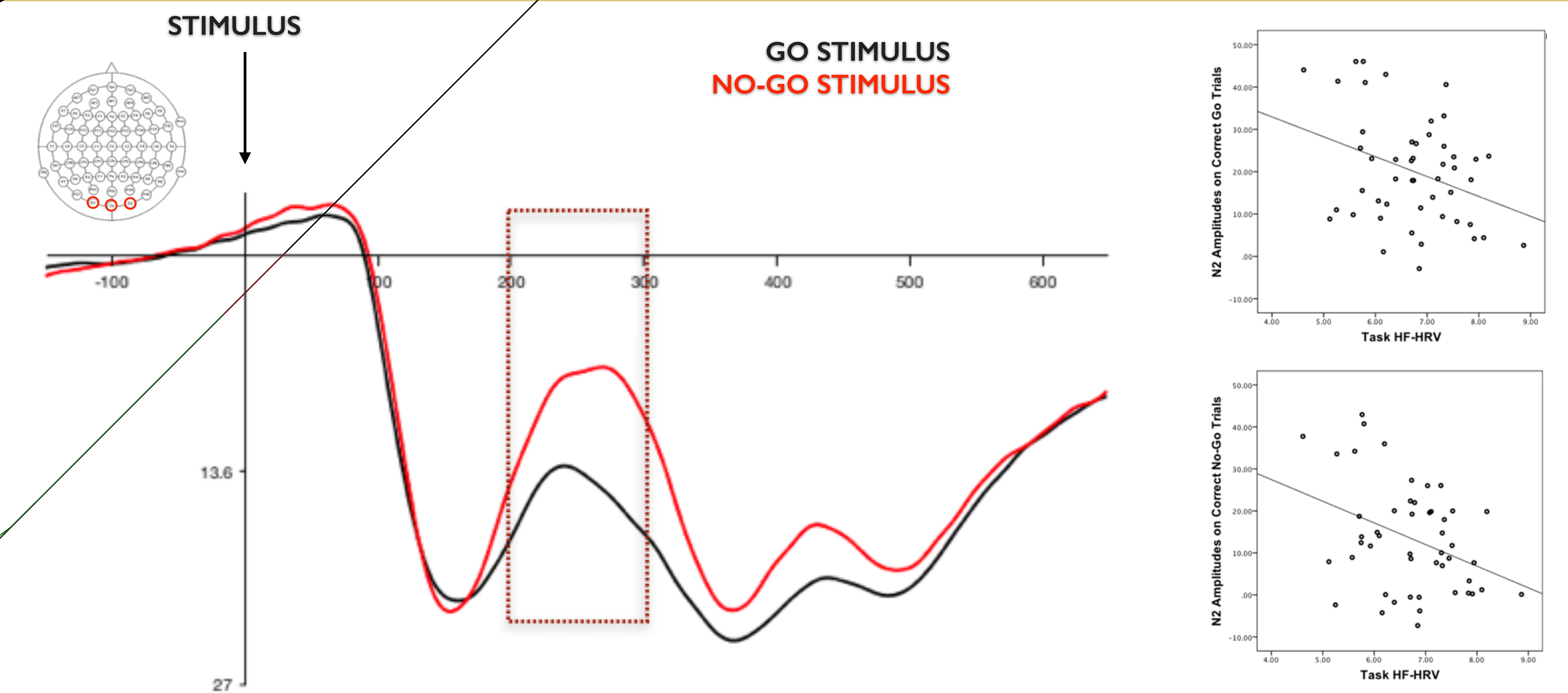


Greater PNS activity associated with better performance.



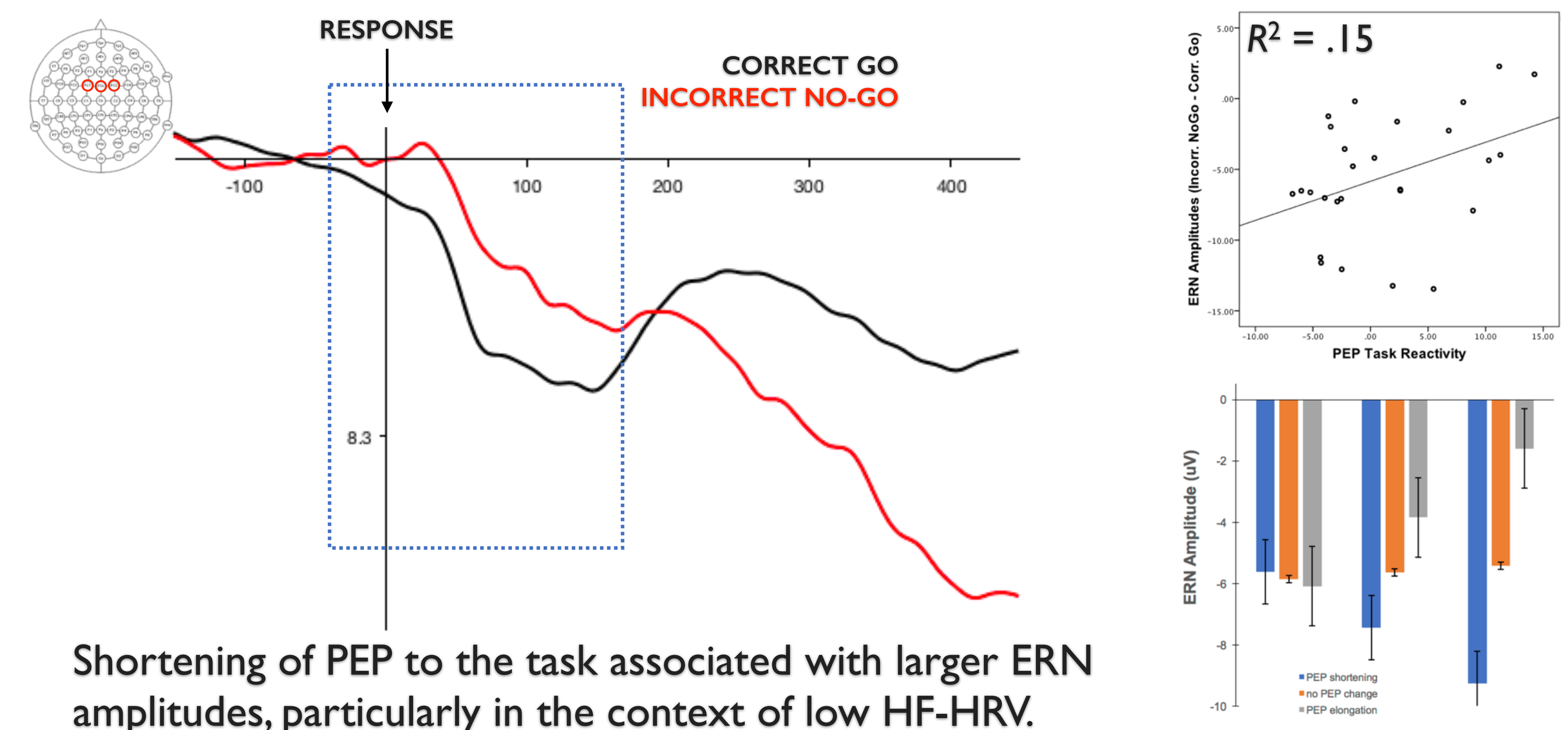
Higher HF-HRV associated with greater accuracy on No-Go trials.

Greater PNS activity associated with larger stimulus-locked ERPs.

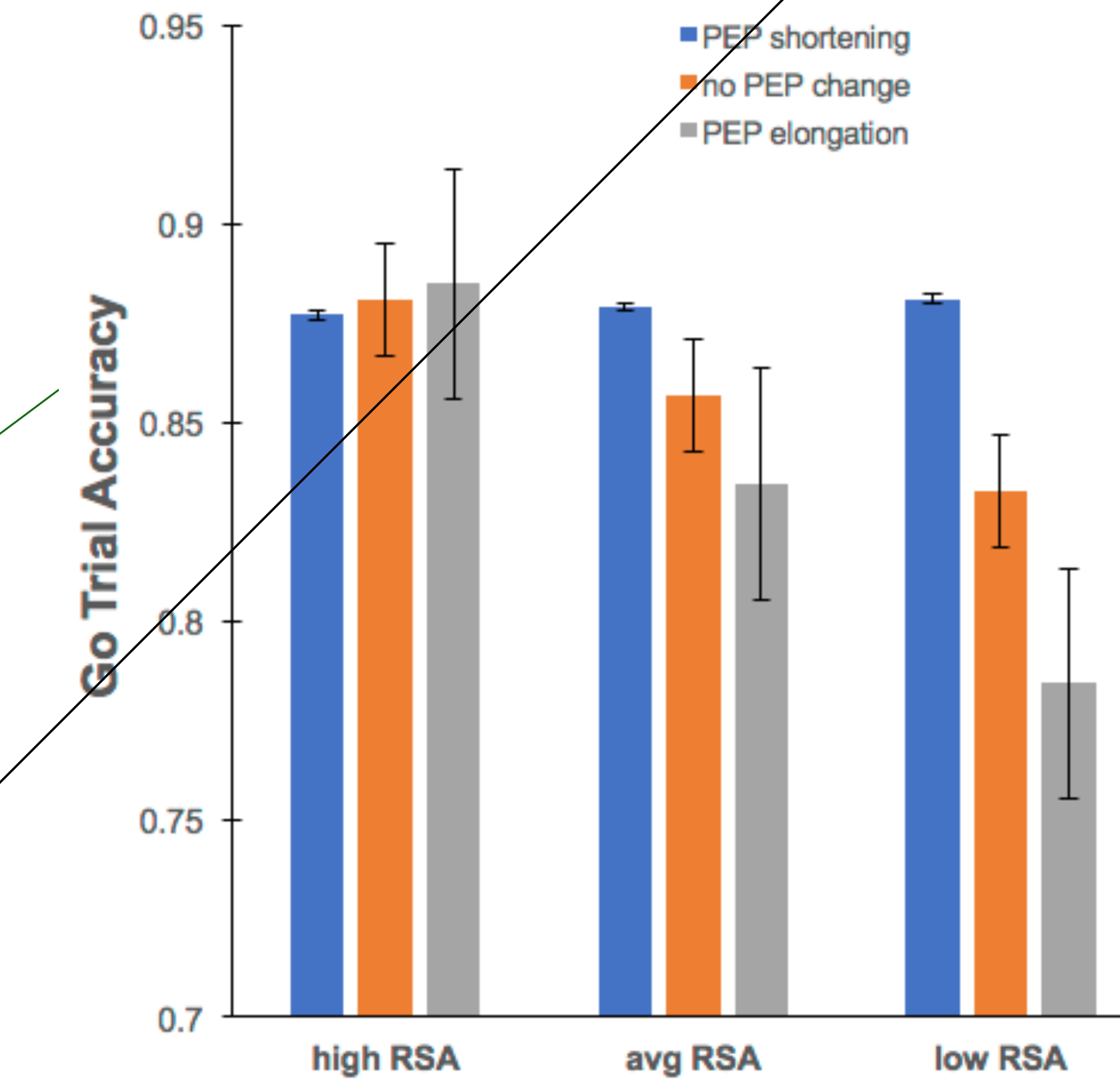


Higher task HF-HRV associated with larger N2 to No-Go and Go stimuli.

Greater SNS reactivity associated with larger Error-Related Negativity.



Shortening of PEP to the task associated with larger ERN amplitudes, particularly in the context of low HF-HRV.



Higher HF-HRV, better Go performance. With lower HF-HRV, PEP reactivity predicts behavior.

Summary & Future Directions

- Higher HF-HRV, a marker of parasympathetic activation, associated with better performance and more robust stimulus-locked ERPs — consistent with view of regulated arousal being optimal for cognition
- Interactions between HF-HRV and PEP reactivity associated with behavior and response-locked ERPs
 - PEP shortening in the context of low HF-HRV optimal for Go performance and ERN amplitudes
- Future analyses examining the effects of acute social stressor on behavior, ERPs, and physio measures

References

- 1, Beauchaine & Thayer (2015). *Int J of Psychophys.*
- 2, Thayer et al. (2012). *Neuro Bio Beh Reviews.*
- 3, Beissner et al. (2013). *Neuroscience.*
- 4, Hugdahl (1996) *Curr Op Neurobio.*

A digital copy of this poster is available at: [RJG2.github.io](https://github.com/RJG2)