

# *Simultaneous Brain and* *Heart Training:* *Elegantly Enhancing* *Experience and Learning.*

Presentation to the MSBMB 2015 Conference

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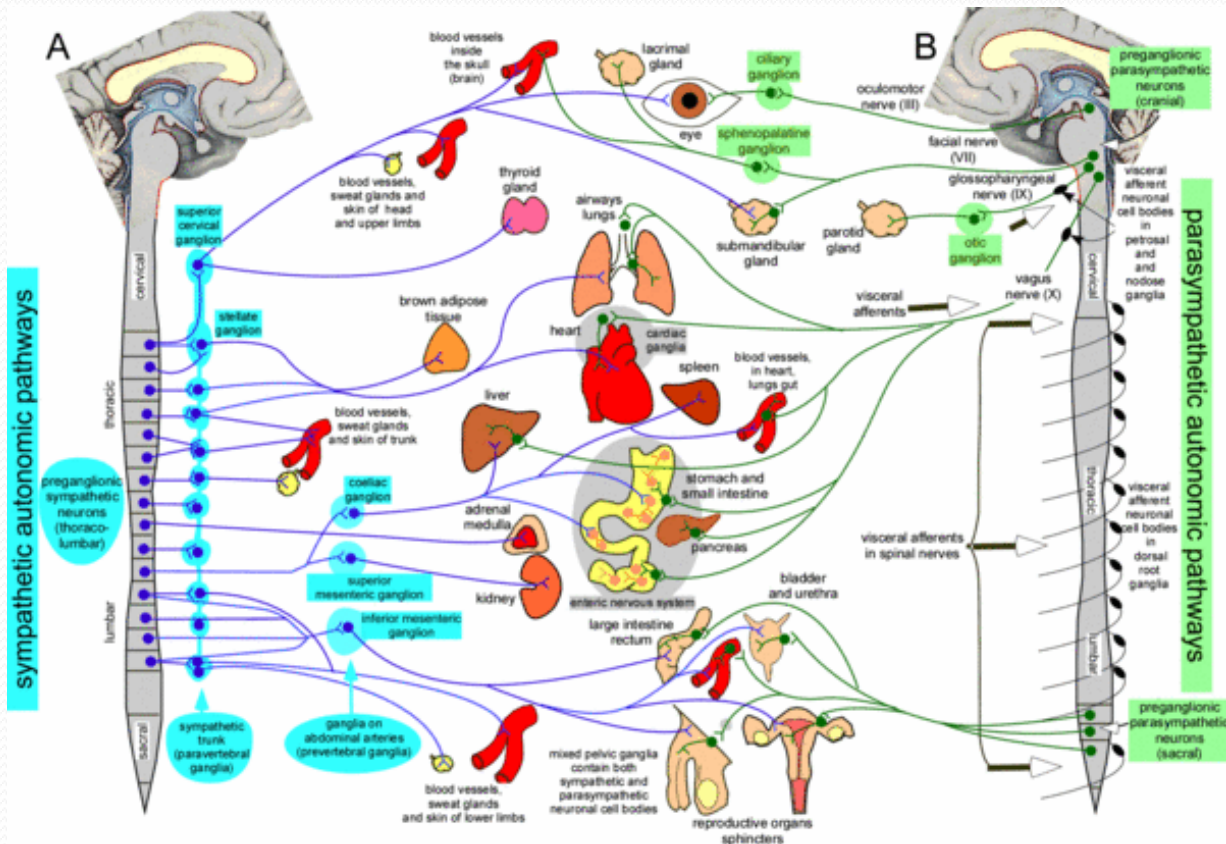
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# One System's Law in our Field

A change to any PART is effected upon the WHOLE.

- The beating of a butterfly's wings in one place do effect the weather patterns around the world(?)
- The field of Genetic Engineering is based upon this. Small chain proteins have influence on the protein based organism.
- Increase in HRV can be correlated to gastrointestinal measures. **GENERAL AUTONOMIC TONE.**

# We know this:

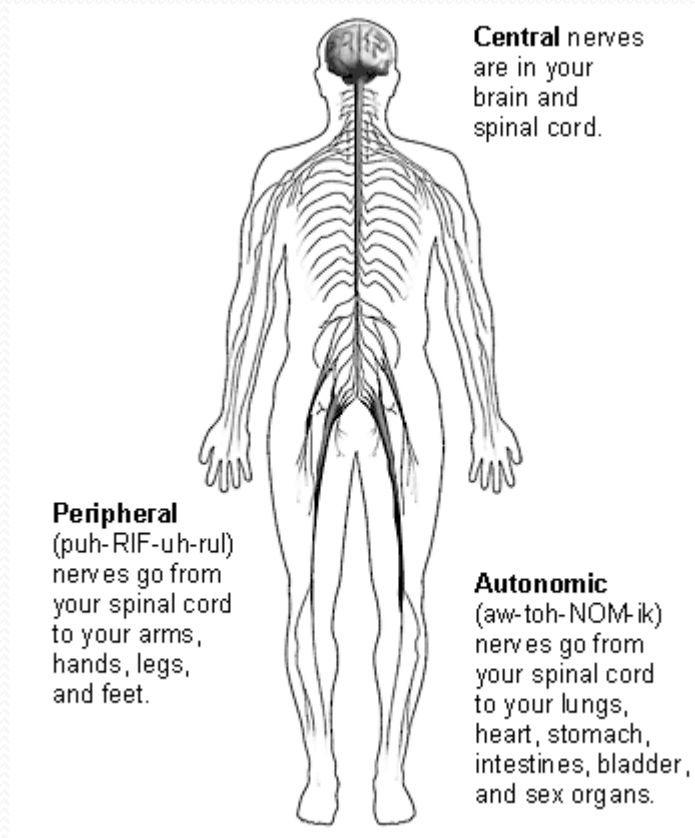


ANS has two enervations with two-way communication.

# Our Bodies Confirm This:

## AFFERENT

ANS PNS tell  
the CNS about  
“The World”



## EFFERENT

CNS tells ANS  
PNS how to act  
in “The World”

CNS receives/controls ANS and PNS, whereas CNS is regent.

*Found on [diabetes.gov](http://diabetes.gov)*

# To this we respond:

- **Biofeedback:**

- *A person becomes aware of one's ANS or PNS organs and consciously can control these organs for greater health and calming.*

- **Neurofeedback:**

- *A person becomes aware of one's encephalon and can consciously control its function; to the same end.*

- **AND ALSO-**

- *A person controlling ANS function can have a measurable effect upon CNS function, and vice versa.*

# A change to any PART is effected upon the WHOLE.

- [Appl Psychophysiol Biofeedback](#). 2013 Mar;38(1):45-56. doi: 10.1007/s10484-012-9207-0.

**The effect of a single session of short duration heart rate variability biofeedback on EEG: a pilot study.**

[Prinsloo GE](#)<sup>1</sup>, [Rauch HG](#), [Karpul D](#), [Derman WE](#).

The findings of this study suggest that a single session of HRV biofeedback after a single training session was **Brain Res Cogn Brain Res. 11: 281-287** both during and after the intervention.

## **And Vice Versa:**

- Brain Res Cogn Brain Res. 2014 Mar;11: 281-287

**Frontal midline theta rhythm is correlated with cardiac autonomic activities during the performance of an attention demanding meditation procedure.**

Kubota Y, Sato W, Toichi M, et al..

# Weigh the Strength to Weakness:

- **HRV- BIOFEEDBACK:**

*This technique is easily self-witnessed, managed and learned using the more overt Observe-Adjust-Automate paradigm.*

*The signal is slow enough to “GROK”.*

- **EEG- NEUROFEEDBACK:**

*This technique is difficult to self-observe (?), however the nature of brain frequency/mind state relationship and the fNA framework allows unbeatable specificity.*



# A Synergistic Pairing of Strengths:

- Proposing Technique that simultaneously trains increase in HRV while also training Attention.
- 

The Rationale is clearly explored in a number of applications:

- **Performance** - Gruzelier, J [Int J Psychophysiol.](#) 2014 Jul;93(1):105-11.  
doi: 10.1016/j.ijpsycho.2013.05.004
- **ASD**- Friedrich&Suttie Front Neuroeng. 2014; 7: 21.2014 Jul; 3. doi:  
[10.3389/fneng.2014.00021](#)
- **TBI**- Moss, D Biofeedback: Spring 2015, Vol. 43, No. 1, pp. 1-3.

M&L Thompson are in this discussion, overarching application.



# Present Day Implementation:

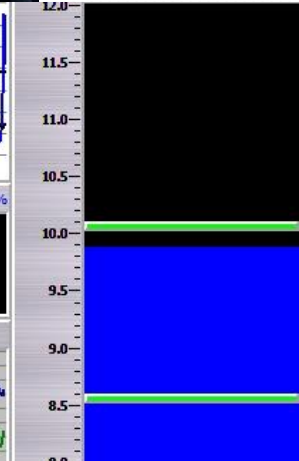
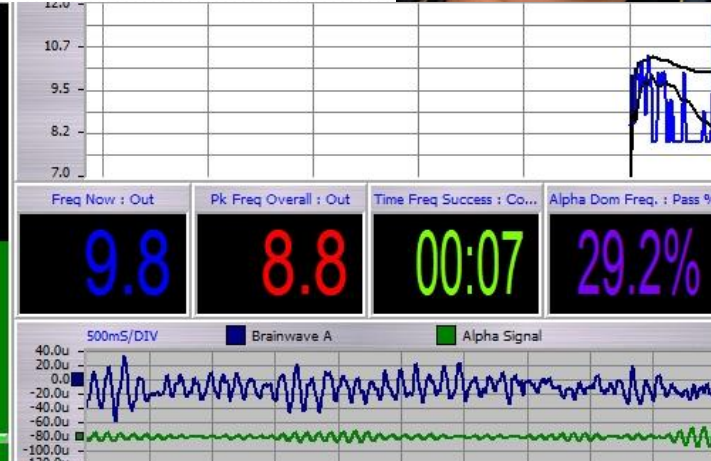
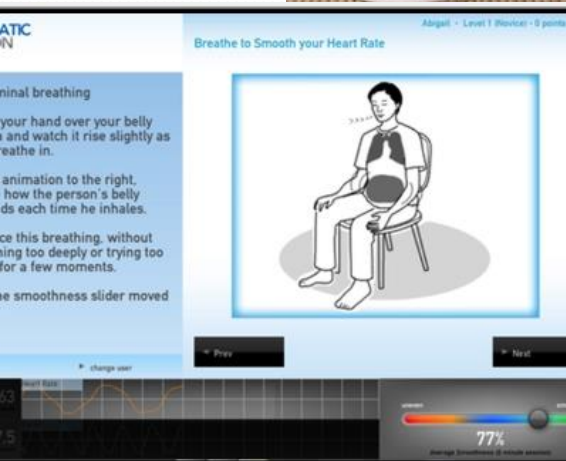
- **1 hour sequential training session 2x weekly.**
  - Start the session with HRV for 5 to 10 minutes (while applying EEG sensors).
  - Train remainder of session with EEG protocol (perhaps reminding the trainee to “remember your breath”).
  - Offer home breath training routine for learning transfer.
- **Critique:** *The sequential aspect separates the two clearly integrated systems, so that HRV is merely a “primer”. Op.Conditioning is not realized in 5min bursts 2x weekly.*

# Proposed Implementation:

- **1 hour simultaneous training session 2x weekly.**
  - Start the session with discussion 5 to 10 minutes (while applying EEG sensors for multimodal training).
  - Train session with EECG protocol (with HRV prerequisite performance goal to the EEG conditions).
  - Offer home breath training routine for learning transfer and brain state “induction”.
- **Consideration:** *This concurrent aspect can enhance brain “priming” while integrating precognitive brain learning with the very learnable attention to breath.*

# Practical Consideration:

- Multiple modes make for many wires and boxes and concurrent software demands, right?

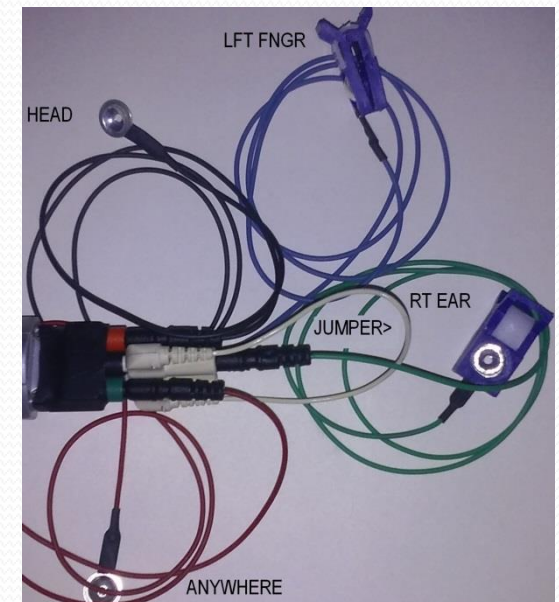
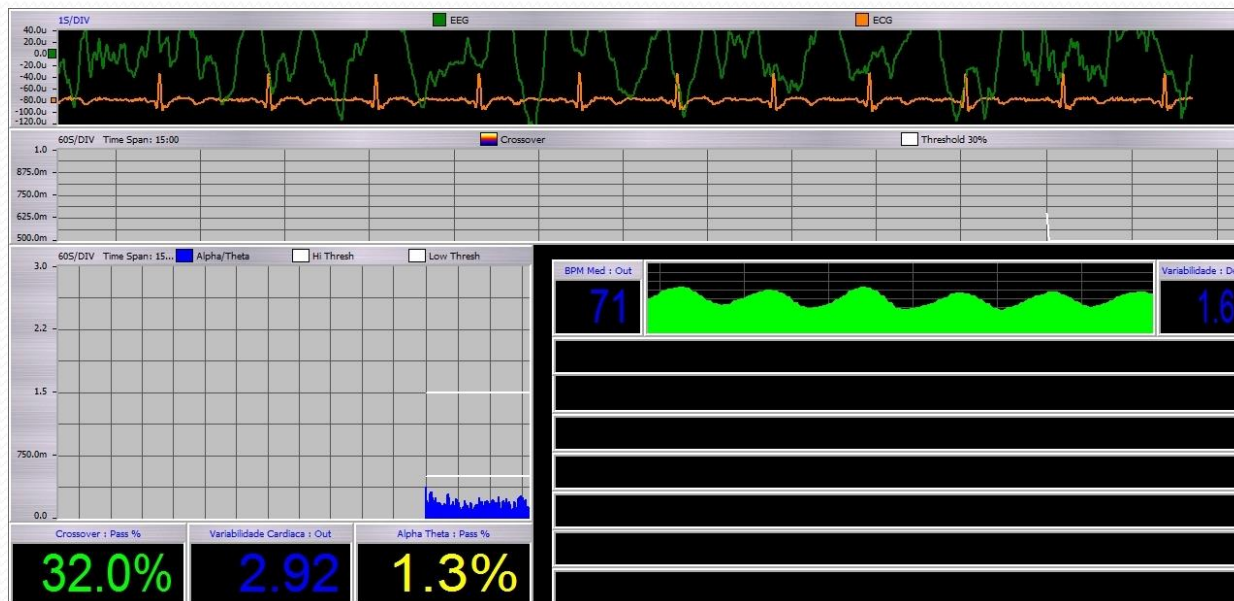


# Practical Consideration:

- Elegance in EECG montage can clean up the workspace, while still providing simultaneous training.

One Design for Both Streams

One Device to Read them All



# EECG Montage with EEG Amp:

- **Physiological Consideration**

EKG wave is the largest electrical wave in the body, replicating out across tissue to every corner.

- **Technical Consideration**

To capture the EKG wave, one need only have active on one side of the spine and reference on the other.

- **Bibrachial EKG montage.**

- Ears, Clavicle, Ribs, Wrist Condiles, Fingertips, etc...



# Example of Training:



# Expected Outcome:

- Frontal Midline Theta (6-8 Hz) production has been correlated closely with HRV phenomenon and with meditative attention exercises.
- HRV increase has been correlated to Theta and to Alpha increases.
- Calming, internalizing effects are noted in both HRV training as well as Alpha and Theta increase training.



# Potential Applications:

- Training Calm Focus and Attention.
- Training External focus while triggering Internal awareness.
- Training hypnagogic states anchored in Breathing.
- Use of ECG in any paradigm to add the conscious element and catalyze the subteknowledge transfer.

# Potential Applications:

- SO FAR THAT WE CAN GO WITH WHAT WE HAVE.

THANK YOU MSBMB and Bio-Medical for allowing me the opportunity to explore these concepts with you!

Sincerely, Adrian Van Deusen  
October 3, 2015