

Coherent "Rational" Heart Rate Responding To Coherent Breathing (HRV 20+ Beats)

Welcome to the February 2011 *COHERENCE Newsletter*. I hope you enjoyed last month's topic, *Coherent Breathing – State Of The Art*. In honor of *American Heart Month*, February's topic is "The Rational Heart" where we'll examine the behavior of the heart when we *are breathing* and when we're not, as well as consider the implications.

Heart rate variability is the degree to which the heart rate changes over time. *Variability of the heart rate (HRV) is a critical indicator of cardiovascular health where low HRV correlates highly with elevated risk of sudden cardiac death, heart disease, and mortality resulting from all causes.* While we don't hear much about the importance of HRV in mainstream medicine, it is a standard measure of contemporary electrocardiography. If we've had an EKG for life insurance purposes, we can rest assured that our HRV was measured. And if it was relatively lower, the rate we were quoted was relatively higher. *Per previous newsletters, in our research we find no instances where HRV is above 13 beats and average blood pressure is above normal.*

We can divide heart rate variability into two principal types: a) breathing induced heart rate variability, otherwise known as respiratory sinus arrhythmia or "RSA" – sinusoidal variation of the heart rate due to respiration, and b) variation for all other reasons, including the real time going on of the nervous system as it goes about the business of regulating the myriad biological functions of the body. When we are *not breathing* coherently, the mind is also reflected, where *provocative* thoughts and emotions may be reflected as spurious and incoherent variation of the heart rate. We find that thoughts that affect the heart rate also manifest in our physiology in other ways, i.e. brainwaves, muscle tension, etc., but heart rate, because it is a relatively rapid phenomenon is particularly responsive, where a "thought" may relate to an ectopic beat. Figure 2 is a baseline view of this type of *irrational* mind body status – it presents the heart rate of a young adult female who is beset by stress and anxiety – *and is not breathing*. Her HRV is relatively low (~5 beats) and her heart rate is largely incoherent. Ectopic beats are also present. (You may know that **HearthMath**'s essential protocol involves cultivation of positive thoughts and emotions so as to tame this kind of spurious variation in heart rate in lieu of breathing.)

But why would HRV be a key indicator of cardiac risk and mortality risk from all causes? Here there are a couple of related hypotheses: 1) Low HRV tends to indicate that breathing is insufficient and insufficient breathing places increased burden on the heart and vascular system, and 2) If one is breathing slowly, deeply, and rhythmically and HRV is still low, it is indicative of arterial inflexibility, a key symptom of diminished vascular function. (Please note that these are hypotheses.)



Figure 2: Chaotic Irrational Heart Rate Reflecting Rapid Shallow Irregular Breathing

To better appreciate the importance of heart rate variability to health, let's add the simultaneous blood volume that accompanies this heart rate, the red curve of Figure 3, which is oriented around the same X-axis as the heart rate. We see that it is similarly chaotic, its relationship with the heart rate being virtually indiscernible.

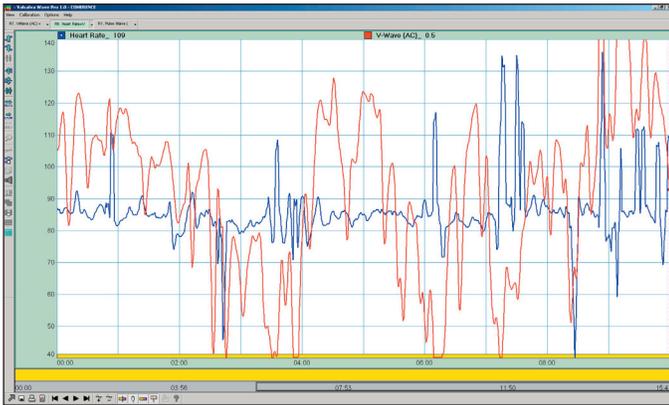


Figure 3: Simultaneous View Of Blood Volume And Heart Rate (Same Heart Rate As Figure 2)

It's important to note that both heart rate and blood flow and pressure in the body are governed by the autonomic nervous system in real time, the point being that this is what the autonomic outcome of stress and angst coupled with non-working breathing may look like internally – *complete chaos* – and the entire body experiences this chaos. The question could be reframed as this: *Is chronic internal chaos healthful?*

As the subject of Figures 2 and 3 begins the practice of Coherent Breathing, both her heart rate and her Valsalva Wave (blood volume wave due to respiration) begin to become rational and coherent. Figure 4 is the blood volume wave demonstrated during her 3rd session. Fundamentally, this is an outcome of breathing becoming coherent -> which produces a coherent Valsalva Wave -> which elicits coherent heart rate “rhythmia”, heart rate tending to rise as blood volume falls and fall as blood volume rises, this synchrony tending to grow stronger with practice.

As the heart rate – a window into autonomic status becomes more rational, the client's objective and subjective condition also tend to improve. Objectively, this can be seen in other biometrics including blood pressure, EEG, muscle tension, hand temperature, and electrodermal response. Subjectively, it manifests as internal calm, increased comfort, increased flexibility, presence of mind, focus, etc. In the longer run, I am certain that it manifests as enhanced health, well-being, performance, and very probably longevity, although it will take some time for the jury to determine the latter. In the case of our subject, she experienced diminished anxiety, improved self confidence, and was able to go on to achieve her singing goals, where performance anxiety had previously limited her aspirations. I submit that conscious “coherent breathing, and its result, “coherent blood flow”, underlie her improved status – of which heartbeat is a key indicator.

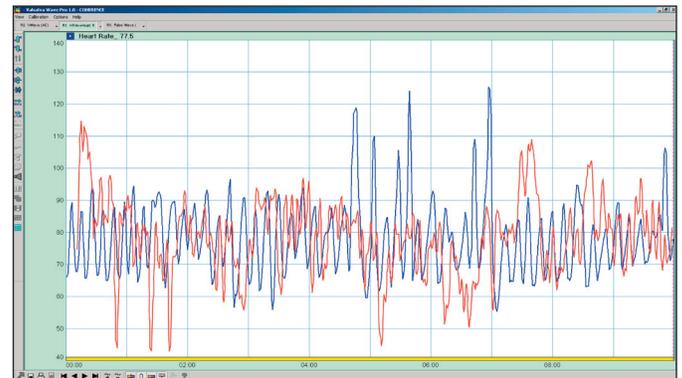


Figure 4: Simultaneous View Of Blood Volume And Heart Rate During Session 3.

Thank you all for your interest and consideration.

Stephen Elliott - COHERENCE

Stephen's research colleague is [Dee Edmonson, RN, BCIAC-EEG](#)

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