

The HeartMath Resilience Advantage™ Program

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Introduction

This presents the fundamentals of the Institute of HeartMath's highly regarded Resilience Advantage™ program. This program, now presented in over 50 countries, is used by hospitals, corporations, police and fire departments, correctional institutions, professional athletes, military and Special Forces. It is proven to promote increased personal resilience and energy levels; diminish symptoms of stress; increase the ability to focus, solve problems and think more clearly under pressure; and to improve reaction times and coordination.

For over 20 years, HeartMath has researched the dynamic functioning of the heart and its relationship to optimal performance of mind and body. Its Research Center, along with independent researchers and universities, has published numerous studies validating the HeartMath System in numerous peer-reviewed journals such as The American Journal of Cardiology, Global Advances in Health and Medicine, Stress Medicine and the Journal of the American College of Cardiology and many more.

This paper provides an overview of the HeartMath research on the physiology of resilience. It is not intended as a substitute for the HeartMath Resilience Workshop which offers an in-depth presentation of the science behind the HeartMath technologies and instructs participants in the HeartMath techniques for achieving resilience-building physiological coherence and instruction on the practical day-to-day application of the techniques.

The following brief synopsis of the basics of the HeartMath research will provide conference attendees with a basic understanding of the relationship of the body's physiology to the HeartMath technologies.²

Resilience

Resilience is the capacity to prepare for, recover from and adapt in the face of stress, challenge or adversity. Although resilience is often assumed to be a personal trait, it is best understood as a *process* because it is descriptive of an individual's state of positive emotionality *over a period of time*. We all experience a wide range of emotions during a typical day, some of which lift our energy, such as gratitude or love, and others that wear our energy down, such as frustration or anxiety. How we react to a challenging or stressful event is a function of how much resilience we have, on balance, at any given point in time.

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² This paper is based on research and materials published by the Institute of HeartMath and made available on the HeartMath.com website under the title, "The Science Behind the emWave® and Inner Balance™ Technologies". The contents of this paper, including the graphs, are used with permission of the Institute of HeartMath.

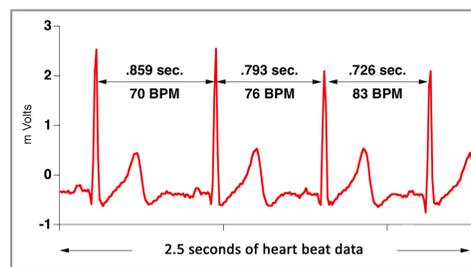
To illustrate, think of your resilience as the amount of energy you have stored in an inner battery—energy you have to use mentally, emotionally or physically. When you have a fully charged battery you have a greater capacity to remain calm, to think clearly, to be in control of your emotions and not overreact. You can more easily roll with the punches and flow through challenges rather than become stressed out, which further drains your energy reserves. But when your inner battery is depleted and there isn't energy to draw from when you need it, it's difficult to be at your best and respond well in difficult, yet very ordinary, situations.

It's a fact that most of us expend more energy during a typical day than we recover, thus the drain on our inner battery. It's the constant expenditure of energy that we endure *without adequate renewal* that leads to diminished resilience. A key in building and maintaining resilience is managing how we spend and how we renew it. The Institute of HeartMath has developed effective and powerful tools for supporting us in doing these very things.

Physiology of Resilience

A. Heart Rate Variability

The heart at rest was once thought to operate much like a metronome, faithfully beating at a regular, steady rhythm. But scientists and physicians now know that this is far from the case. The rhythm of a healthy heart – even under resting conditions – is surprisingly *irregular*, with the time interval between consecutive heartbeats constantly changing. This naturally occurring beat-to-beat variation is called heart rate variability (HRV). The below diagram shows three heartbeats recorded on an electrocardiogram (ECG) over a 2.5 second period of time. The variation in time intervals between consecutive heartbeats shows a different heart rate (in beats per minute) for each inter-beat interval.



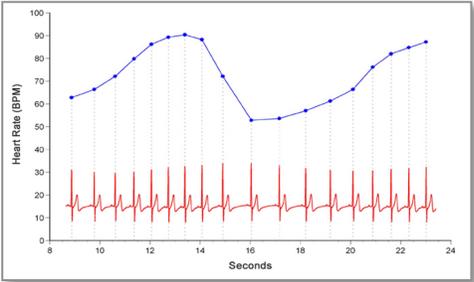
This normal variation in heart rate is due to the synergistic action of the two branches of the autonomic nervous system (ANS), the sympathetic and the parasympathetic, which are stimulated by our changing emotional state. The sympathetic branch acts to accelerate heart rate, while the parasympathetic nerves (primarily the vagus nerve) slows it down. These two branches of the ANS are continuously interacting one another to maintain cardiovascular activity within its optimal range in order to permit appropriate physiological responses to changing external and internal conditions. The analysis of HRV serves as a dynamic window into the function and balance of the autonomic nervous system.

Many factors affect the activity of the ANS and therefore influence HRV, such as our breathing patterns, physical exercise, and even our thoughts. Two of the most powerful factors that affect our heart's changing rhythm are our feelings and emotions.

Moreover, HRV is an important indicator of physiological resilience and behavioral flexibility because it reflects our ability to adapt effectively to stress and challenging environmental demands. Just as a tennis player’s crouched and shifting stance preparing to receive a serve facilitates his or her swing response, the heart in healthy individuals remains primed with resiliency, ready to respond to changing inner and outer environment conditions.

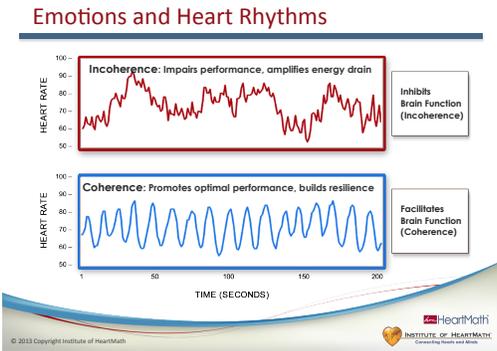
B. Heart Rhythm Patterns and Emotions

As the heart rate varies from beat-to-beat, it creates a rhythmic pattern. The below graph shows a varying heart rate (at the bottom) plotted over 24 seconds of time and producing shape of the waveform (at the top) called the heart rhythm pattern.



The emotions we experience directly affect our heart rhythm pattern, which in turn reveals a important information about how well (or not) our body is functioning.

In general, stress brought on by emotions such as anger, frustration, and anxiety stimulate the sympathetic branch of the ANS and give rise to heart rhythm patterns that appear irregular and erratic – the HRV waveform looks like a series of uneven, jagged peaks called an incoherent heart rhythm pattern. (See upper graph of the below chart) Physiologically, this pattern indicates that the signals produced by the two branches of the ANS are out of sync with each other and can cause our body to operate inefficiently, deplete our energy, and produce extra wear and tear on our whole system. This is especially true if stress and negative emotions are prolonged or are experienced often.



In contrast, positive emotions send a very different signal throughout our body. When we experience uplifting emotions such as appreciation, joy, care, and love; our heart rhythm pattern

becomes highly ordered, looking like a smooth, harmonious wave (See bottom graph of above chart). This is called a coherent heart rhythm pattern. When we are generating a coherent heart rhythm, the activity in the two branches of the ANS is synchronized and the body's systems operate with increased efficiency and harmony.

Heart rhythm patterns are continuously transmitted to the brain. Coherent heart rhythm patterns promote creativity, focus, decision-making and other executive functions of the neocortex. Incoherent heart rhythm patterns do just the opposite – they impair optimal brain function and compromise the executive activity of the neocortex.

Coherence: A State of Optimal Function

By generating sustained positive emotions we facilitate a body-wide shift to a specific, scientifically measurable state. This state is termed psychophysiological coherence, because it is characterized by increased order and harmony in both our psychological (mental and emotional) and physiological (bodily) processes.

Psychophysiological coherence is the state of optimal function. It is marked by the synchronization of the two branches of the ANS and with an overall shift in autonomic balance toward increased parasympathetic activity. When we activate this state, our physiological systems function more efficiently we experience greater emotional stability, increased mental clarity, improved cognitive function, and we feel and perform better. Most importantly, there is increased synchronization between the activity of the heart and brain. It is in this state that we are renewing and increasing our resilience.

A. The Role of Breathing

To create the state of psychophysiological coherence the HeartMath system incorporates specific breathing techniques. Because breathing patterns modulate the heart's rhythm, a coherent heart rhythm can be generated by simply breathing slowly and regularly at a 10-second rhythm (5 seconds on the in-breath and 5 seconds on the out-breath). Breathing rhythmically in this fashion is a useful intervention to bring about a shift out of stressful emotional states and into increased coherence.

Paced breathing is not, however, the primary focus of the HeartMath system and HeartMath tools should therefore not be thought of simply as breathing exercises. HeartMath breathing techniques incorporate and focus upon an *intentional generation of a heartfelt positive emotional state*, and it is this emotional shift that is a key element of the techniques' effectiveness. Positive emotions stimulate the body system to move into its natural resonant frequency and enable coherence to emerge and to be maintained naturally without the necessity for continuing, conscious mental focus on one's breathing rhythm. Input generated by the heart's rhythmic activity is a major factor affecting our breathing rate and patterns. When the heart's rhythm shifts into coherence as a result of a positive emotional shift, our breathing rhythm automatically synchronizes with the heart, thereby reinforcing and stabilizing the shift to system-wide coherence.

The positive emotional focus of the HeartMath techniques confers a much wider array of benefits than those typically achieved through breathing alone. These include deeper perceptual

and emotional changes, increased access to intuition and creativity, cognitive and performance improvements, and favorable changes in hormonal balance.

The critical element of achieving success in activating coherence and renewing and maintaining resilience is to learn how to *self-activate and eventually sustain a positive emotion*. For many people this may take some time. Nonetheless, once one has grown accustomed to generating coherence through rhythmic breathing and has become familiar with how this state *feels*, they can then practice breathing a positive feeling or attitude *through their heart area* in order to enhance their experience of the benefits of the HeartMath tools. Eventually, with the continuity of practice, most people become able to shift directly into coherence by activating a positive emotion.