The Psychophysiology of Appreciation in the Workplace

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Abstract

This chapter reviews literature in support of a model that predicts the effects of Appreciative Inquiry on physical health in the workplace. Studies that demonstrate the physiological correlates associated with the experience of appreciation are examined. A model of emotion is proposed that suggests the heart, in concert with the brain, nervous, and hormonal systems, are fundamental components of a dynamic network from which the emotional experience emerges. The authors demonstrate how favorable affective experiences and appreciative processes go hand in hand—and suggest the need for further empirical investigations in the field of positive organizational change practices.

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Introduction

The heart has often been associated with wisdom and emotional experience, particularly with regard to other-centered, positive emotions such as love, care, compassion, gratitude, and appreciation. Current research provides evidence our heart plays a role in the generation of emotional experience, suggesting the associations are more than mere metaphor.

In this chapter, we review literature in support of a model, which predicts effects of Appreciative Inquiry on physical health (Cooperrider & Srivastva, 1999). Research that identifies physiological correlates associated with the experience of appreciation is examined. We propose a model of emotion that suggests the heart, in concert with the brain, nervous, and hormonal systems, are fundamental components of a dynamic network from which the emotional experience emerges. Research supporting our contention that favorable affective experiences and appreciative processes go hand in hand is described. The need for further empirical investigations examining the emotional impacts of positive organizational change practices such as Appreciative Inquiry is discussed. Finally, questions and propositions for future research to advance Appreciative Inquiry theory and positive organizational scholarship are offered—areas that we believe require further investigation.

Understanding Appreciative Inquiry from an Empirical Lens

Techniques that use positive experiences as organizational development frameworks to foster change are no longer missing from the palate of practitioner options.

A major shift in both research and practice has occurred. Recent emphasis has redirected the focus, toward the positive, in both organizational and psychological inquiry. Many scholars realized that we know a great deal about dysfunctional process. After decades of focusing on what is wrong, identifying the illnesses and aliments within our organizations through problem-solution based frameworks, we became experts at identifying what is wrong. Today, however, there is a tremendous shift toward the examination of what is right—what does it look like to thrive, achieve, and be well? As a result, recent efforts have altered the direction of research with inquiry shifting to examine what it looks like when we are at our best (Gillham, 2000).

Recognizing the influences that organizational change practices can have on participants' well-being is now considered essential. Toward that end, this chapter moves to explicate what happens physiologically as individuals embrace positive change approaches. We discuss how favorable emotional experiences from such techniques can lead to beneficial outcomes such as reduced stress and enhanced performance. Assumptions in the field, which suggest appreciative processes are conducive to generating favorable emotions, are now supported with empirical evidence. Given that psychophysiological consequences are associated with emotional experiences (Salovey, Rothman, Detweiler, & Steward, 2000), it is important to extend examination of organizational development processes such as Appreciative Inquiry, where one's state of appreciation may influence physical health positively.

Formed in the womb of social constructionism, Appreciative Inquiry came from theoretical bedrock where reality is not out there to be found, but continuously co-created. There are no hard and fast laws or axioms of social interaction within this

framework because from this stance we create truth by what we perceive, believe, and bring into our personal schema via the world around us. To understand the psychophysiological impacts of the process, however, a departure from Appreciative Inquiry's theoretical roots is required. While truths of social interaction are emergent, the science of human physiology is guided in large part by the laws of biological science. Hence, the traditions, language, and methods of normative science are also embraced and applied to create knowledge. By combining different ways of knowing and holding multiple assumptions, we hope to petition interest, debate and curiosity.

Coming from a modernist perspective, the world around us is reflected objectively by observing what is out there. Here, causal relations are described by researchers and observers as they communicate findings via the use of language systems. By adopting the use of conventional methods to convey one's ideas, researchers become a participant in the use of traditional "textual genre" or "linguistic forestructure" to interpret their observations (Gergen, 2001, p. 807). While empirical investigations into appreciation have adopted preexisting protocols to express the interpretation of data, there is equal respect for postmodern constructionism. The assumption is that scientific exploration will contribute to our understanding and provide evidence that mirrors reality—a reflection of our shared experience.

Our ambition is not to find an ultimate truth, but to seek cultural meaning in organizational contexts. By presenting a model of the psychophysiological underpinnings of appreciation as an emotional process, the intention is to exercise theory in a way that kindles our mutual construction of the world while also focusing on the individual's organizational experience. Perhaps our framing will seem paradoxical, as we choose to

use a logical positivist lens to advance our understanding of a postmodern technique. While it may be awkward to hold multiple assumptions, the overarching goal is to create a bridge for dialogue. We believe Appreciative Inquiry is a practice that seeks to enable dialogue in order to "traverse boundaries of difference" (Gergen, 2001, p. 807). Our intention is to extend knowledge of how positive emotions, such as appreciation, affect individuals in the workplace—and to spark conversation among people who make sense of the world holding different assumptions. We hope to stimulate dialogue among academics, practitioners, and organizational members and, as such, new knowledge will emerge. As Bohr suggests, it is our belief that truth is found not by breaking the world into either-ors, but by embracing both-and. Referring to this concept, Palmer writes: "…truth is a paradoxical joining of apparent opposites, and if we want to know that truth, we must learn to embrace those opposites as one" (p. 63).

Language and Emotions

To understand the relationship between Appreciative Inquiry and the emotional experience, researchers must address the role that language plays in this process. Knowledge, in the form of feelings, emotions, thoughts and perceptions, comes to us by way of language (Anderson, 1997). What we know—is formed, takes shape in, and is communicated via language. Meanings are assigned to events constructed from language. As an interpretative device, language is the nucleus for forming our reality. What we experience as real, is actually based upon metaphorical cognitions that, when believed, contribute to our perceptions of what is real (Madison, 1988).

Meaning, however, is not found in language per se—words themselves do not hold intention, emotion, or feeling—people do! In short, words are platforms used to

conjure up underlying recollections of understood intentionality. Language is an ongoing unfoldment of patterns of relationships, associations that contribute to our ability to stay connected—creating our world in concert with others (Gergen, 1988). As a result, the relationship between thoughts and words continues to be a living, evolving, and an emergent process (Vygotsky, 1986).

Advances in applied developmental psychology support that language is the basic condition for humans to become agentive and make active and productive sense of their world (Bamberg, 2000). Highly relevant to the emotional experience is one's schema for interpretation of events. In short, how we translate and make meaning of our experience has the propensity to influence the various components of our emotional response triad—feelings, expression, and physiology (Frijda, 1986; Johnstone & Scherer, 2000). For example, if one assesses a situation using an internal script based upon opportunity, an emotional response and expression of that encounter will be very different than if that same situation is translated and experienced as a problem, a concern to be overcome.

With language serving as a cognitive interpreter and conduit for emotional experience, how we create reality is determined by the language schemas we call upon internally and use in concert with others. Gergen takes the communal aspect of knowledge creation further, suggesting human reality is actually the product of social dialogue (1994). Our exchanges and interactions represent an agreement between people. Therefore, accounts (realities) hold up when we find them useful, not necessarily because they are true (Anderson, 1997). This implies that psychological knowledge is guided by our shared construction of the world and not by the objective validity of its truth. Holding the aforementioned assumptions, we contend that the reality of our emotional experience

can be favorably altered, depending upon the nature of the dialogue we choose to socially construct in concert with others. We suggest that if the dialogue within an organization shifts to one that focuses on its positive core through appreciation, this shared reality in the workplace can transform individual and organizational well-being.

In Maturana's, *Biology of Language: The Epistemology of Reality* this scholar provides insight on the association between the process of cognition (language formation and use) and emotion (1978). Much like Gergen, he considers language as a coupling activity, based upon the establishment of consensuality between recursive interactions among self and others. He views expression as being linked to "isomorphic physiological responses" that relate to "consensual domains" of relating and understanding (p. 50-53). In other words, we constitute the reality of our moments with the transaction of both cognitive and biological interactions that occur both within and between individuals. Further, participants in conversation undergo structural changes as a result of their shared interaction, which lead to feelings and behavior. While communication is not necessarily a result of physiology, the determination of the capacity for recursive structural coupling is *dependent upon the nervous system*. That is, internal structures on which linguistic interactions operate serve as triggers for "perturbations," which fuel recursive interactions (p. 52).

Implications of Maturana's thesis are that knowledge (i.e., assertion) implies interaction has transpired, which can lead to additional interactions. Further, the extent of what we can do is determined by our contained internal structure and its organization—actions from within this structure create our cognitions. While knowledge implies prior interaction, we cannot step out of our mind. Therefore, we live in a domain of subject-

dependent knowledge. As Maturana states, "We literally create the world we live in by living it" (p. 53). The reality of what we know and feel is created by our internal and external ongoing and recursive flow of interactions. In summary, language and subsequent new knowledge are formed between self and others. It is both a cognitive and biologically based activity and the context of dialogue is determined as organisms experience interactions at both the individual and interpersonal level. Taken together, these theoretical assumptions support the contention that there is potential to alter emotional experience favorably, depending upon what reality is constructed. If our internal and external dialogue focuses on appreciation, our emergent reality has the capacity to favorably transform both individual and organizational well being in the workplace.

Appreciation and Favorable Emotions

Noted by practitioners and participants alike in a variety of circumstances, individuals engaged in Appreciative Inquiry report that the stimulation of positive conversations between themselves and other organizational members serve as catalysts for creating positive change in their organization. In the initial phase of Appreciative Inquiry, interviews are conducted where members from all levels of the organization come together to converse with one another. During these dialogues, people have been observed to shift to a more positive, lively, and engaged stance. The process of asking people to think about and share the "best of" their organizational experiences with a fellow organizational member appears to energize participants (Sekerka & Cooperrider, 2001). As they reflect on positive encounters, exchange stories, and listen, they appear to become more hopeful, enthusiastic, and interested—cynicism gives way to idea

generation. The recognition of the best in something or someone seems to instill an energetic quality that is uplifting.

The optimism generated by participating in an appreciative dialogue has been observed in a broad milieu of situations. The Appreciative Inquiry *Discovery Phase*, as described above, brings people together and is an important step toward tapping the positive core of the organization (Sekerka, Cooperrider, & Wilken, 2001). We believe that this process moves organizational systems away from entrenched negative mental models (Senge, 1990) and single-loop learning (Argyris, Putnam, & McLain Smith, 1985) toward more flexible and broader thinking. Given consistent reports from practitioners about how participants experience positive emotions in Appreciative Inquiry (Magruder-Watkins & Mohr, 2001; Cooperrider & Whitney, 1999, 2000; Whitney & Shau, 1998), research that explores this technique at the psychophysiological level is warranted in order to understand the phenomena and its outcomes more fully.

For centuries, religious scholars, artists, scientists, medical practitioners, and lay authors have written about the transformative power of positive emotions. Presently, a growing body of research is beginning to provide objective evidence that positive emotions may indeed be key to well-being, enhancing nearly all spheres of human experience. Positive emotions have been demonstrated to improve health and increase longevity (Blakeslee, 1997; Danner, Snowdon, & Friesen, 2001; Goldman, Kraemer, & Salovey, 1996; Russek & Schwartz, 1997), increase cognitive flexibility and creativity (Ashby, Isen, & Turken, 1999; Isen, 1999), facilitate broad-minded coping and innovative problem solving (Aspinwall, 1998; Fredrickson, in press; Isen, Daubman, & Nowicki, 1987), and promote helpfulness, generosity, and effective cooperation (Isen,

1987). Fredrickson's work with the broaden-and-build theory suggests that positive emotions have reparative functions, which serve to bolster recovery from negative encounters (2001). Current research has also elucidated emotion-related changes in the body, including changes in the patterns of the heart's rhythmic activity. Researchers have recently moved to investigate this unique relationship between the heart and brain, finding that the interaction affects physiological, cognitive, and emotional processes.

The Heart's Role

Throughout the 1990s, increasing evidence has accrued to support the view that the brain and body work in conjunction in order for perceptions, thoughts, and emotions to emerge. This perspective has gained momentum and is now widely accepted. The brain is considered an analog processor that relates whole concepts to one another and looks for similarities, differences, or relationships between them. Longstanding assumptions, that emotions were purely mental expressions generated by the brain alone, have been set aside. Emotions have as much to do with the body as with the brain, and the heart plays a particularly important role in the emotional system. Emotions are thus a product of the brain, heart, and body acting in concert.

Recent work in the field of neurocardiology has firmly established that the heart is a sensory organ and a sophisticated information encoding and processing center, with an extensive intrinsic nervous system sufficiently sophisticated to qualify as a *heart brain*. Its circuitry enables it to learn, remember, and make functional decisions independent of the cranial brain (Armour & Ardell, 1994). Moreover, numerous experiments have demonstrated that patterns of cardiac afferent neurological input to the brain not only affect autonomic regulatory centers, but also influence higher brain centers involved in

perception and emotional processing (Frysinger & Harper, 1990; McCraty, in press; Sandman, Walker, & Berka, 1982).

One tool that has proven valuable in examining heart-brain interactions is heart rate variability analysis. Heart rate variability (HRV), derived from the electrocardiogram (ECG), is a measure of the naturally occurring beat-to-beat changes in heart rate. The analysis of HRV, or *heart rhythms*, provides a powerful, noninvasive measure of neurocardiac function that reflects heart-brain interactions and autonomic nervous system dynamics, which are particularly sensitive to changes in emotional states (McCraty & Singer, in press; Tiller, McCraty, & Atkinson, 1996). Research conducted by the Institute of HeartMath, along with that of others, suggests an important link between emotions and changes in the patterns of both efferent (descending) and afferent (ascending) autonomic activity (Collet, Vernet-Maury, Delhomme, & Dittmar, 1997; Ekman, Levenson, & Friesen, 1983; McCraty, in press; McCraty, Atkinson, Tiller, Rein, & Watkins, 1995; McCraty, Barrios-Choplin, Rozman, Atkinson, & Watkins, 1998; Tiller et al., 1996).

Changes in autonomic activity lead to dramatic changes in the *pattern* of the heart's rhythm, often without any change in the *amount* of heart rate variability. Specifically, researchers have found that during the experience of emotions such as anger, frustration, or anxiety, heart rhythms become more erratic and disordered, indicating less synchronization in the reciprocal action that ensues between the parasympathetic and sympathetic branches of the autonomic nervous system (ANS) (McCraty et al., 1995). In contrast, sustained positive emotions such as appreciation, love, or compassion, are associated with highly ordered or *coherent* patterns in the heart rhythms, reflecting greater synchronization between the two branches of the ANS, and a

shift in autonomic balance toward increased parasympathetic activity (Figure 1) (McCraty et al., 1995; McCraty, Atkinson, Tomasino, Goelitz, & Mayrovitz, 1999; McCraty et al., 1998; Tiller et al., 1996).

Insert Figure 1 about here

Research on conversations that flow from the heart and body to the brain, provided evidence that afferent input from the cardiovascular system could significantly affect *perception* and behavior (Lacey & Lacey, 1970; Rosenfeld, 1977). Behavioral and neurophysiological data suggested that sensory-motor integration could be modified by cardiovascular activity (Lacey & Lacey, 1974; Lacey & Lacey, 1970). The research also established relationships between the heart's afferent signals and reaction times, showing that decreasing heart rate in the anticipatory period of reaction time experiments quickens reaction times, while increasing heart rate slows reaction times (Lacey & Lacey, 1970).

To date, extensive experimental data have been gathered documenting the role played by afferent input from the heart in modulating such varied processes as pain perception (Randich & Gebhart, 1992), hormone production (Drinkhill & Mary, 1989), electrocortical activity, and cognitive functions (Rau, Pauli, Brody & Elbert, 1993; Rosenfeld, 1977; Sandman et al., 1982; van der Molen, Somsen & Orlebeke, 1985). In addition, scientists now have a framework for how patterns of afferent input and emotional processes go hand in hand, which provides support for a systems-oriented model of emotion. This model includes the heart, brain, and the nervous and hormonal systems as fundamental components of a dynamic, interactive network that underlies the emergence of emotional experience (McCraty, in press; McCraty et al., 1998).

The model builds on the theory of emotion proposed by Pribram (Pribram & Melges, 1969) where the brain serves as a pattern identification and matching system. From this view, past experiences build an internal set of familiar patterns, which are maintained in the neural architecture. Inputs to the brain from both the external and internal environments contribute to the maintenance of these patterns. Throughout the body, many processes provide constant rhythmic inputs with which the brain becomes familiar. This includes the heart's rhythmic activity; digestive, respiratory and hormonal rhythms; and patterns of muscular tension, particularly facial expressions (McCraty, in press). Such inputs are continuously monitored by the brain to organize perception, feelings, and behavior. When an input pattern is sufficiently different from the familiar reference pattern, this *mismatch* or departure from the familiar underlies the generation of feelings and emotions.

When inputs do not match the existing program, an adjustment must be made in an attempt to achieve control and return to stability. One way to reestablish control is by taking an outward action. We run away or fight if threatened or do something to draw attention if feeling ignored. We can also reestablish stability by making an internal adjustment (without any overt action). For example, a confrontation at work may lead to feelings of anger, which can prompt inappropriate behavior (e.g., shouting). However, through internal adjustments, we can *self-manage* our feelings in order to inhibit these responses, reestablish stability, and maintain our composure.

We observe two sets of emotions; those that reflect current order and those that reflect expectation of future order. Emotions, signals of perturbation and its cessation, and the initiation of processes necessary to reestablish control, can thus be divided into

concurrent and *prospective* encounters. The concurrent reflects the degree of match or mismatch between the current inputs and the reference pattern in the here-and-now (Pribram & Melges, 1969). A mismatch is arousal, with an achievement of regaining a match or control characterized by gratification. The prospective affect can be divided into optimistic or pessimistic. Inputs to the neural system are appraised and compared to memories of past outcomes associated with similar inputs or situations. If the historical outcomes of similar situations are positive, an optimistic affect results (e.g., interest, confidence, or hope). If, however, the memory of past outcomes has led to the expectation of failure to achieve control, the current inputs are accompanied by pessimistic feelings regarding the future (e.g., annoyance, apprehension, hopelessness or depression).

It is through practice and experience that inputs become appraised as relevant or irrelevant, hopeful or hopeless, appreciated or unappreciated. As we encounter new situations, experience new inputs, and learn how to gain or maintain control, we expand our repertoire of successful outcomes. The more repertoires available, the more likely a new input will be assessed as optimistic with a high probability of success in maintaining control. Organization of sequences and behaviors into hierarchically arranged programs give a person flexibility and adaptability.

Once a stable baseline pattern or program is established, the neural systems attempt to maintain a match between this along with current inputs and future behaviors. If the baseline pattern becomes maladapted, the system will still strive to maintain a match to that pattern, even though it is not in our best interest. There are many examples of maladaptation. For example, one may adapt to a convenience to the point of it

becoming an *expectancy*. Something is then taken for granted—rather than truly appreciated. Therefore, if an individual does not get what he/she wants or expects, a mismatch occurs and there is emotional discord.

The Heart's Role in Appreciation

Monitoring the alterations in the rates, rhythms, and patterns of afferent traffic is a key function of the cortical and emotional systems in the brain. Thus, input originating from many different bodily organs and systems is ultimately involved in determining our emotional experience. The heart, however, as a primary and consistent generator of rhythmic information patterns in the human body, possessing extensive afferent communication with the brain than other organs, plays a particularly important role (McCraty, in press). With each beat, dynamic patterns of neurological, hormonal, pressure, and electromagnetic information are sent to the brain. Cardiovascular afferent signals play a major part in establishing the dynamics of the baseline pattern or *set point* against which our current experience is compared. At lower brain levels, the heart's input is compared to references or set points that control blood pressure, affect respiration rate, and gate the flow of activity in the descending branches of the autonomic system (Langhorst, Schulz & Lambertz, 1983). From there, these signals cascade up to a number of subcortical or limbic areas that are involved in the processing of emotion (Oppenheimer & Hopkins, 1994; Rau et al., 1993).

Several lines of research support the perspective that changes in bodily states, particularly those mediated by the ANS, are crucial to emotional experience. One area of research has found that an absence of afferent feedback concerning autonomically generated bodily states is associated with impairments in emotional response (Critchley,

Mathias, & Dolan, 2001). Validation also comes from studies that examine effects of afferent input on the amygdaloid complex—the amygdala and associated nuclei, which play a pivotal role in storing and processing emotional memory and in attaching emotional significance to sensory stimuli (LeDoux, 1993). For example, neural activity in the central nucleus of the amygdala is synchronized to the cardiac cycle and is modulated by cardiovascular afferent input (Frysinger & Harper, 1990; Zhang, Harper & Frysinger, 1986).

The importance of changes in the pattern of cardiac information is also evidenced in psychological aspects of panic disorder—a sudden-onset cardiac arrhythmia. One study found that DSM-IV criteria for panic disorder were fulfilled in more than two-thirds of patients with these sudden-onset arrhythmias. Arrhythmias generate a sudden change in the pattern of afferent information sent to the brain, which is detected as a mismatch, which results in anxiety and panic. When heart rhythms from this type of arrhythmia are compared to incoherent heart rhythm patterns produced by strong feelings of anxiety in an otherwise healthy individual the plots are similar. By contrast, coherent heart rhythm patterns associated with sincere positive emotions are recognized as familiar and evoke feelings of security and well-being.

Our contention is that techniques capable of shifting the pattern of the heart's rhythmic activity actually modify one's emotional state. In fact, people commonly use just such an intervention—simply altering their breathing rhythm by taking several slow, deep breaths. Most people do not realize, however, that the reason breathing techniques are effective in helping to shift one's emotional state is because changing one's breathing rhythm modulates the heart's rhythmic activity (Hirsch & Bishop, 1981).

Physiological coherence

Our research on emotion has identified distinct physiological correlates of heartfelt positive affective states. We have introduced the term *physiological coherence* to describe a functional mode encompassing a number of related physiological phenomena that are frequently associated with feelings of appreciation. The term *coherence*, found in physics, is used to describe the ordered or constructive distribution of power within a waveform. The more stable the frequency and shape of the waveform, the higher the coherence.

An example of a coherent wave is the sine wave. The term *autocoherence* denotes this kind of coherence. In physiological systems this type of coherence describes the degree of order and stability in the rhythmic activity generated by a single oscillatory system. Coherence also describes two or more waves that are either phase or frequency-locked. A common example is the laser, in which multiple waves phase-lock together, producing a coherent energy wave. In physiology, coherence is used to describe a functional mode in which two or more of the body's oscillatory systems, such as respiration and heart rhythms, become *entrained* and oscillate at the same frequency. The term *cross-coherence* is used to specify this type of coherence.

Interestingly, all the above apply to the study of emotional physiology. We have found that sincere positive emotions such as appreciation are associated with a higher degree of coherence *within* the heart's rhythmic activity (autocoherence). During such states there tends to be increased coherence *between* different physiological oscillatory systems (cross-coherence/entrainment) (Tiller et al., 1996). Typically, entrainment is observed between heart rhythms, respiratory rhythms, and blood pressure oscillations.

That stated, other biological oscillators including very low frequency brain rhythms, craniosacral rhythms, electrical potentials measured across the skin, and rhythms in the digestive system, can also become entrained (McCraty & Atkinson, in press).

A related phenomenon that can also occur during physiological coherence is *resonance*. In physics, resonance refers to a phenomenon whereby an abnormally large vibration is produced in a system in response to a stimulus whose frequency is the same as, or nearly the same as, the natural vibratory frequency of the system. The frequency of the vibration produced in such a state is said to be the *resonant frequency* of the system. When the human system is operating in the coherent mode, increased synchronization occurs between the sympathetic and parasympathetic branches of the ANS, and entrainment between the heart rhythms, respiration, and blood pressure oscillations is observed. This occurs because these oscillatory subsystems are all vibrating at the resonant frequency of the system (~0.1 Hertz). Thus, in the coherent mode, the power spectrum of the heart rhythm displays an abnormally large peak around 0.1 Hertz (see Figure 2).

Most models show resonant frequency of the human cardiovascular system is determined by the feedback loops between the heart and brain (Baselli et al., 1994; deBoer, Karemaker & Strackee, 1987). The system especially vibrates at its resonant frequency when an individual is actively feeling appreciation or some other positive emotion (McCraty et al., 1995). In terms of physiological functioning, resonance confers a number of benefits to the system, which result in system-wide energy efficiency and metabolic energy savings (Langhorst, Schulz & Lambertz, 1984; Siegel et al., 1984). This provides a link between positive emotions and increased physiological efficiency, which

may explain the growing number of correlations documented between positive emotions, improved health, and increased longevity. In addition, data suggest this functional mode also improves the cognitive processing of sensory information (McCraty & Atkinson, in press).

Insert Figure 2 about here

Appreciation: Heart and Cognition in Harmony

Physiological coherence is also associated with increased *synchronization* between the heartbeat and alpha rhythms in the electroencephalogram (EEG). In experiments measuring heartbeat-evoked potentials, it was found that the brain's alpha wave activity (8-12 Hertz frequency range) is naturally synchronized to the cardiac cycle. However, when subjects used a positive emotion-focused technique to self-induce a feeling of appreciation, their heart rhythm coherence significantly increased, as did the ratio of the alpha rhythm that was synchronized to the heart (McCraty & Atkinson, 1999; McCraty & Atkinson, in press). Further research demonstrated that increased heart rhythm coherence correlates with significant improvements in cognitive performance in auditory discrimination tasks, which require subjects to focus and pay attention, discriminate subtle tone differences, and react quickly and accurately.

Not only do increases in heart rhythm coherence accompany increased cognitive performance, but also the degree of coherence correlated with task performance across all subjects during all tasks (McCraty & Atkinson, 1999; McCraty & Atkinson, in press). Such research provides support for the concept that the *pattern* of cardiac afferent input reaching the brain can inhibit or facilitate cortical function significantly beyond the micro-rhythm of inhibition/facilitation associated with simple changes in heart rate that

was first documented by the Laceys. Thus, findings continue to point to a potential physiological link between appreciation and improvements in faculties such as motor skills, focused attention, and discrimination.

In summary, we use the term *coherence* to describe a physiological mode that encompasses entrainment, resonance and synchronization—distinct but related phenomena, all of which emerge from the harmonious interactions of the body's subsystems. Correlates of physiological coherence include: increased synchronization between the two branches of the ANS, a shift in autonomic balance toward increased parasympathetic activity, increased heart-brain synchronization, increased vascular resonance, and entrainment between diverse physiological oscillatory systems. A coherent mode is reflected by a smooth, sine wave-like pattern in the heart rhythms, and a narrow-band, high-amplitude peak in the low frequency range of the HRV power spectrum, at a frequency of about 0.1 Hertz.

Research with Appreciation in Organizations

To explore how participants experience an Appreciative Inquiry process on a psychophysiological level, a research study was conducted at the Department of Veterans Affairs Medical Center in Washington, D.C. (Sekerka, 2002). Two-hundred and twenty-four employees took part in a study examining their emotional experience as a result of their engagement in different organizational change processes. Participants reflected on their work situation, with either an appreciative or problem-based focus. As in the *Discovery Phase* of an Appreciative Inquiry process, those in appreciative conditions were asked to either recall a time when things were at their best on the job, or with their

organization. Conversely, those in a problem-based approach were asked to recall a time when things were not at their best on the job, or with their organization.

While participants in the problem-based approach showed no change, employees in the appreciative conditions experienced a reduction in negative affect and lowered heart rate. Further, a significant increase in HRV was specifically attributable to those who reflected on appreciative thoughts about their organization. This finding was of particular interest because it suggests that outward-focused appreciation may have more pronounced links to positive psychophysiological effects than inward-focused appreciation. The results of this study suggest that individuals engaged in Appreciative Inquiry—focusing appreciatively on their organization—became less negative, more relaxed, and less stressed (Sekerka, 2002).

Interestingly, the indicators reflecting increases in HRV occurred during the act of reflection as opposed to after the Appreciative Inquiry experimental encounter. Given these results, it appears that the act or process of positive reflection outside of self is where beneficial impacts may be the most prominent. That is, it is the actual process of thinking appreciatively about the organization that may be the entry point for inducing favorable shifts in one's psychophysiological health and well-being. We see that when individuals' cognitive focus is centered on appreciation beyond the self, this leads to a shift in feeling, whereupon beneficial physiological changes can occur. With a lowered heart rate reflecting a change in autonomic balance towards decreased sympathetic and increased parasympathetic activity, the use of Appreciative Inquiry can now be predicted to be associated with other competencies such as improved cognitive task performance

and increased accuracy of perception and reaction time (Lacey & Lacey, 1970; Sandman, Walker, & Berka, 1982).

In summary, research has documented that participating in the *Discovery Phase* of Appreciative Inquiry, focusing on the best of one's organization, leads to a favorable change in psychophysiological well-being. Unlike individuals focusing on what is wrong, the deficits or problems in their organization or with their jobs, those who look to the best of their organization experience decreased negative affect and favorable shifts in ANS activity (Sekerka, 2002). Short-term increases in HRV, present in the appreciative approach, indicate less mental workload during that period (Jorna, 1992). While these benefits were short-term, we see engagement in the initial phase of an Appreciative Inquiry reduces negative emotions and helps employees relax. These findings demonstrate the potential for health benefits for those engaging in Appreciative Inquiry in workplace settings and corroborate the beneficial health outcomes associated with the use of the positive emotion-focused techniques (McCraty, Atkinson, & Tomasino, 2001).

Further Inquiry

While documenting the favorable outcomes of Appreciative Inquiry, a plethora of unanswered questions remain. One issue, the sustainability of positive emotions, is of particular importance. How can organizational members create a state of psychophysiological coherence and positive emotion after an Appreciative Inquiry encounter? How can the Appreciative Inquiry dialogue be prolonged in an organization long after the practitioner leaves and members need to move forward with the next steps? How can we help individuals to respond positively to change on a daily basis, specifically

helping them to reframe negative mindsets and create long-term health and well-being over time?

One efficient and effective avenue of intervention may be to provide training for organizational members in the use of positive emotion-focused techniques designed to help individuals reduce stress, increase positive affect, and improve performance in real time. A number of heart-based refocusing and emotional restructuring tools and techniques developed by the Institute of HeartMath have been demonstrated to yield measurable improvements in heath, emotional well-being, and performance at both the individual and organizational levels (Childre & Cryer, 2000; McCraty et al., 2001). Organization-relevant outcomes associated with the practice of these techniques include increases in productivity, goal clarity, job satisfaction, communication effectiveness, and reductions in employee turnover (Barrios-Choplin, Atkinson, Sundram, & McCraty, in preparation; Barrios-Choplin, McCraty, & Atkinson, 1999; Barrios-Choplin, McCraty, & Cryer, 1997; McCraty et al., 2001).

We believe positive emotion-focused techniques are effective in helping to *build back energy* that has been depleted by persistent mental processing or negative emotional arousal, thereby enhancing health favorably impacting numerous domains of performance. Further research is needed to investigate both short-term and long-term health, organizational, and quality of life benefits associated with the use of positive emotion-focused techniques in conjunction with Appreciative Inquiry. Refocusing and emotional restructuring techniques such as *Freeze-Frame* and *Heart Lock-In* (Childre, 1998; Childre & Martin, 1999), which help individuals self-generate and sustain feelings

of appreciation, can be used in association with Appreciative Inquiry to complement one another. [1]

To advance this sustainability inquiry, researchers can compare workplace settings, those with and without established daily appreciative practices, to determine differences in health and well-being over time. Only by employing techniques on a regular basis will we be able to examine the long-term *quality of life* repercussions. Designing longitudinal studies will be an important next step in Appreciative Inquiry's practice and theoretical development. In addition, we recommend that current deficit-based assessment programs, tools, and techniques be augmented with strength-based appreciative approaches. It is important to create learning and development programs that focus on the positive, in order to harvest both short and long-term benefits.

By moving Appreciative Inquiry beyond its current scope, coupling the best of this process with positive emotion refocusing and emotional restructuring tools, organizations have the potential to enhance health and well-being, performance, and *quality of life* in the workplace on an ongoing basis. Studies that validate these propositions will help expand the capabilities of Appreciative Inquiry and promote interventions that foster appreciation on a sustained basis in the workplace. Equally important are investigations that link positive emotion-based approaches with favorable modifications of key organization-relevant outcomes such as productivity, creativity and innovation, sales, key performance indicators, absenteeism, turnover, and customer satisfaction. Additional questions must examine organizational climate: does Appreciative Inquiry influence communication, social support, relationships between employees, and between employees and customers?

[1] HeartMath, Heart Lock-In, and Freeze Frame are registered trademarks of the Institute of HeartMath.

Conclusion

Research is beginning to substantiate what many have intuitively known—positive emotions not only feel good at the subjective level, but also bolster one's ability to meet life's challenges, optimize one's cognitive capacities, sustain constructive and meaningful relationships with others, and foster good health. We have identified and characterized a distinct mode of physiological functioning associated with the emotion of appreciation. Physiological coherence encompasses a number of related phenomena including entrainment, synchronization, and resonance. These favorable processes result from efficient and harmonious interactions of the body's subsystems. We suggest a coherent mode provides a potential physiological link between positive emotions and a range of favorable health-related, cognitive, and psychosocial outcomes that have been associated with positive emotional experience.

We have outlined how the brain functions as a pattern identification and matching system, and highlighted the role of afferent bodily input in establishing the familiar references critical in determining emotional experience. As a principal source of rhythmic information patterns that influence the physiological, cognitive, and emotional systems, the heart plays an important role in the generation and perception of emotion. Because emotions are reflected in heart rhythms, shifts may bring about significant changes in perception and emotional experience.

Appreciative Inquiry and positive emotion-focused techniques serve to help shift the heart's rhythmic patterns with self-induced feelings of appreciation. Independently, these processes have been shown to be an effective means to reduce stress and negative emotions in the moment. With sustained appreciative practices, such efforts will instill

more positive perceptions, expression, emotions, and behaviors. As a result, a positive transformation of our shared and emergent realities can be created on both the individual and organizational level. Appreciative approaches not only significantly reduce stress, but also lead to enduring positive changes in attitude, relationships, and worldview.

How we choose to experience the world contributes to our reality. We see that our emotional experience can be altered and, in so doing, can generate favorable outcomes. With interactions focused on what we appreciative, the workplace can be an environment for positive transformation, serving to contribute to both individual and collective well-being.

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Figure Legends

Figure 1. Emotions are reflected in our heart rhythm patterns. Real-time heart rate variability (heart rhythm) pattern of an individual making an intentional shift from a self-induced state of frustration to genuine feeling of appreciation by using a HeartMath positive emotion refocusing technique (Freeze Frame). It is of note that when the recording is analyzed statistically, the *amount* of heart rate variability is found to remain virtually the same during the two different emotional states; however, the *pattern* of the heart rhythm changes distinctly. Note the immediate shift from an erratic, disordered heart rhythm pattern associated with frustration to a smooth, harmonious, sine wave-like (coherent) pattern as the individual uses the positive emotion refocusing technique and self-generates heartfelt feelings of appreciation.

Figure 2. Heart rhythm patterns during different psychophysiological states. Heart rate tachograms, showing beat-to beat changes in heart rate (left) and heart rate variability power spectra (right) typical of different emotional/psychophysiological states. Anger (top) is characterized by a lower frequency, disordered heart rhythm pattern and increasing mean heart rate. As can be seen in the power spectrum, the rhythm is primarily in the very low frequency band, which is associated with sympathetic nervous system activity. Relaxation (center) results in a higher frequency, lower-amplitude rhythm, indicating reduced autonomic outflow. In this case, increased power in the high frequency band of the power spectrum is observed, reflecting increased parasympathetic activity (the relaxation response). In contrast, sustained positive emotions such as appreciation (bottom) are associated with a highly ordered, smooth, sine wave-like heart rhythm pattern (coherence). As can be seen in the power spectrum, this physiological

mode is associated with a large, narrow peak in the low frequency band centered around 0.1 Hz. This indicates system-wide resonance, increased synchronization between the sympathetic and parasympathetic branches of the nervous system, and entrainment between the heart rhythm pattern, respiration, and blood pressure rhythms. The coherent mode is also associated with increased parasympathetic activity, thus encompassing a key element of the relaxation response, yet it is physiologically distinct from relaxation because the system is oscillating at its resonant frequency and there is increased harmony and synchronization in nervous system and heart-brain dynamics. In addition, the coherent mode does not necessarily involve a lowering of heart *rate* per se, or a change in the *amount* of variability, but rather, a change in heart rhythm *pattern*. Also, note the scale difference in the amplitude of the spectral peak during the coherent mode.

Figure 1.

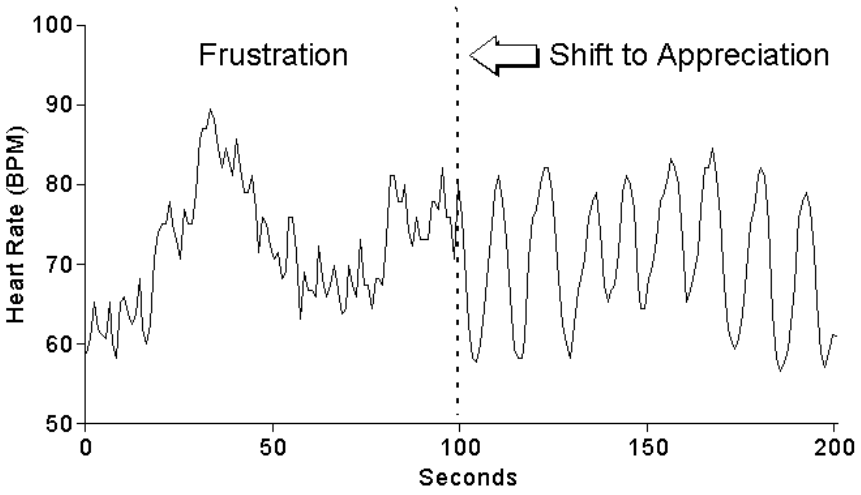
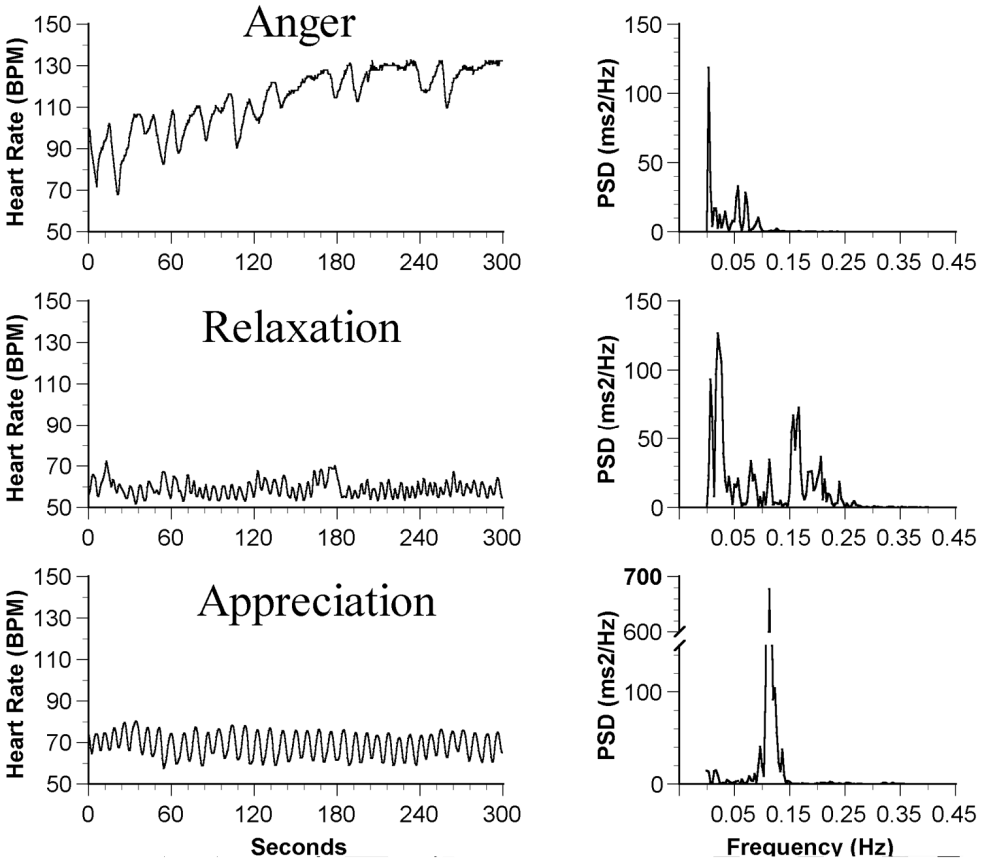

Frustration
Shift to Appreciation
Heart Rate (BPM)
100
90
80
70
60
50
0
50
100
150
200
Seconds

Figure 2.


Anger
Relaxation
Appreciation
Heart Rate (BPM)
PSD (ms2/Hz)
Seconds
Frequency (Hz)
150
130
110
90
70
50
0
60
120
180
240
300
100
0
0.05 0.15 0.25 0.35 0.45
700
600