Report

THE INFLUENCE OF GROUP HEART RHYTHM ON TARGET SUBJECT PHYSIOLOGY: *Case report of a laboratory demonstration, and suggestions for further research*

by Eric Leskowitz, M.D., A.B.H.M.

ABSTRACT

An example of energetic interaction at a distance is described in which an unskilled subject's ability to increase his heart rate variability coherence (HRVC) by utilizing a standardized mind/body technique is facilitated when in close proximity to a group of skilled practitioners who are simultaneously eliciting a state of high HRVC. Several opportunities to improve research methodology in future studies are presented, and the implications of these results for understanding the nature of anomalous interpersonal interactions and group energy fields are discussed.

KEYWORDS: EMF, RNG, energy fields, heart coherence, entrainment

BACKGROUND

The standard psycho-behavioral model of interpersonal communication assumes that all information transfer between human beings is mediated by the five physical senses. However, a significant literature has emerged in recent years suggesting that nonphysical information transfer can occur over short and long distances. Two types of information transfer seem to be operative—short range transfers that may involve electromagnetic fields (EMFs) to encode information, and longer range nonlocal effects whose mechanisms are more difficult to understand.

Studies of shorter range information transfer (inches to feet) suggest that these effects may be mediated by conventional EMFs. For example, blinded subjects can use their palms to detect non-thermal signals from the nearby hand of the experimenter to a 65% degree of accuracy, even when the hands are separated at a distance sufficient to dissipate thermal information transfer (six inches).[1] This sort of information registration is presumed by some to involve the human perception of electromagnetic fields, and forms the basis for the diagnostic phase of such purported energy healing techniques as Therapeutic Touch.[2]

Another form of subtle interaction via magnetic fields has been described by researchers studying heart rate variability (HRV). The heart rate (HR) is not as regular as a metronome, and the variation in between-beat intervals conforms to meaningful patterns. In one striking demonstration done at the Institute of HeartMath (IHM) the subject entered a state of optimum HRV coherence (HRVC, a second order measure of HRV that involves a power spectrum analysis of HRV). This transition into high coherence triggered a measurable reaction in the heart rhythm of his adjacent pet dog, presumably via a mechanism involving interacting adjacent electromagnetic fields.[3] Similarly, heart-brain synchronization has been detected between people who are sitting five feet apart while practicing a technique to elevate HRVC.[4] The cardiac EMF as measured by magnetometers extends three feet in all directions, so two hearts that are 5 feet apart can be interacting magnetically. Several mechanisms have been proposed to explain these and other related anomalous findings, including the possibility that information is spectrally enfolded within the dynamics of EMF oscillation, that cortical mirror neurons are activated, and that adjacent EMFs may interact via resonance. The latter model might also explain emergent interpersonal phenomena in groups of people ranging from empathy, eg. the clinician/patient relationship, to emotional contagion in crowds.[5]

On the other hand, subjects paired several meters apart in separated rooms can still develop similar electro-encephalogram (EEG) rhythms and show phase-coordinated evoked cortical responses to stimuli presented to only one member of the pair.[6] Even more impressively, functional magnetic resonance images (fMRI) of paired subjects separated by thousands of miles also show synchronous changes in cortical activity in the unstimulated member of the pair.[7]

Other related anomalous findings include the positive clinical impact of intercessory prayer and the effect of distant mental influence on electrodermal responses.[8,9] Because of the physical distances and sensory isolation involved in these experimental protocols, the authors have proposed that these interactions are not mediated by physical forces like conventional electromagnetism. The forces are referred to as nonlocal or transpersonal in nature, and are not yet well-characterized.

Regardless of the actual mechanism(s) of action at work in these studies, the EMF resonance proposition is attractive because it invokes known physical forces, although it has not yet been tested rigorously in either laboratory or field settings. We report here a preliminary laboratory demonstration of apparent group resonant interaction using meditation protocols developed by the Institute of HeartMath, as a preliminary step towards assessing the validity of the group resonance hypothesis.

METHODS

This study was performed in May 2008 in the psychophysiology laboratory of the Institute of HeartMath in Boulder Creek, CA. The monitoring equipment consisted of an earlobe plethysmograph connected to a laptop computer, on which was installed the emWave PC™ software, which provides real-time feedback of HRV. The mathematically-derived second-order variable called heart coherence was also monitored.

The subject (the author, EL) was seated in the lab, connected to the emWave and given a brief 5 minute instruction in a basic IHM psychophysiologic training process called Heart Lock-In, with which he was not familiar. This technique entails imagining the breath flowing in and out of the heart area in mid-sternum, and then activating the internal felt sensations that accompany positive emotions like appreciation and happiness. This feeling is then radiated outwards to a specific person or place. This technique was chosen because studies have shown that this technique can enhance cognitive function and psychophysiological coordination.[10] After his brief introduction to Heart Lock-In, the subject (an experienced meditator who was otherwise naïve to Heart Lock-In) was then blindfolded with leather-covered airline eyeshades, and was sound restricted with foam earplugs and overlying audio headphones, and instructed to continue his Heart Lock-In practice, while his ongoing levels of HRVC were being recorded. At a point in time unknown to him, one of the IHM research staff members signaled for a group of experienced Heart Lock-In practitioners to enter the room. As shown in Figure 1, they were stationed several feet behind the subject.

After allowing a brief period of time (less than 30 seconds) for the group to get comfortable in the laboratory setting, they were given a silent signal to begin the Heart Lock-In technique. The subject was not aware when this silent hand signal was given, and simply continued his own internal practice of the technique. At a point about 3.5 minutes into the group's heart coherence practice, the test was terminated by the IHM research staff.

Figure 1. Laboratory arrangement

RESULTS

Three variables were measured: heart rate (HR), Coherence Ratio, and Accumulated Coherence. HR is simply the beats per minute (bpm) detected by the plethysmographic sensor attached to the subject's earlobe. HRV refers to beat-to-beat variations in the heart rate. A measure derived from HRV, called heart coherence, is computed by a patented algorithm which assesses the patterns in the heart rhythm. Heart rhythm coherence is a distinct mode of synchronized psycho-physical functioning that is associated with sustained positive emotion.[11] HeartMath suggests that this state naturally emerges when the heart, mind and emotions are in energetic alignment. The Coherence Ratio is the percent of time in a session that is spent in either low, medium, or high coherence states. "Accumulated coherence" is a weighted average of coherence scoring over a series of 5 second intervals, with one point given for each interval in medium coherence, +2 points for intervals in high coherence, and -2 points for intervals in low coherence.

Figure 2 shows the actual computer monitor screen at the end of the test run. Heart Rate is presented in the graph shown in the upper half of the image, Coherence Ratio is shown in the graph in the lower left corner, and Accumulated Coherence is shown in the bar chart in the lower right corner of the image. The timeline in both graphs is divided into 2-minute interval bars, but the scale differs between the two graphs, so the two graphs cannot be compared directly by simply superimposing one over the other; actual points in time must be located separately on each horizontal axis before any moment-to-moment comparisons are made between the two graphs.

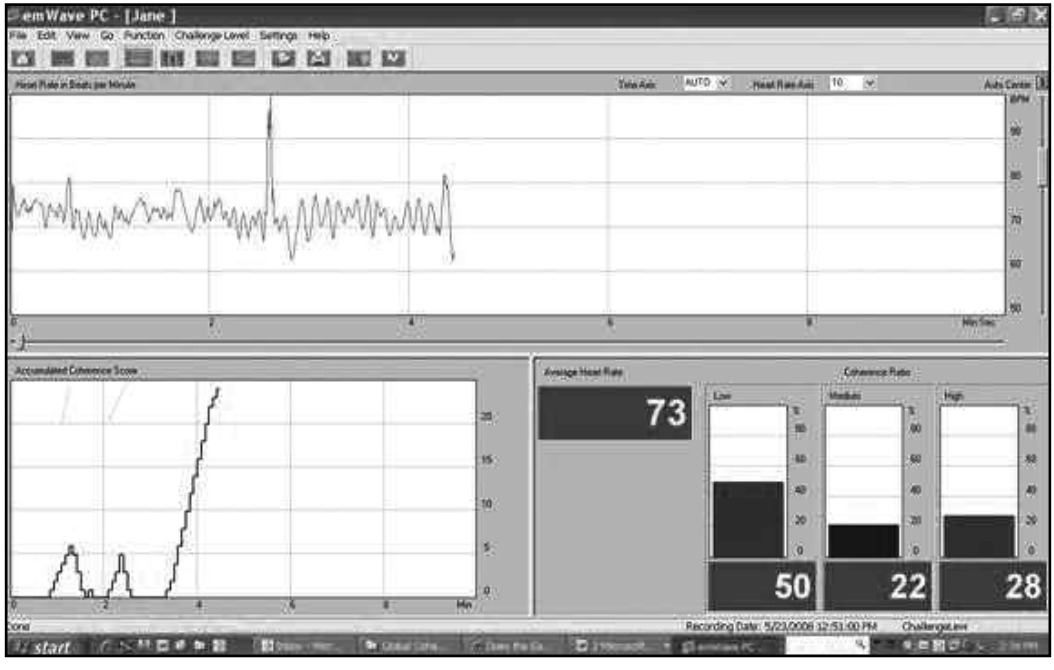

Figure 2 – Computer monitor showing final results
(Note– events in the upper graph cannot be compared to events directly below them in the lower graph, because different scales are used in the horizontal axis time lines of each graph)

The top graph shows that the subject's HR generally varied between 60 and 80 beats per minute (bpm). For the first 2.5 minutes of the run, the rhythm fluctuated irregularly; at 2' 40" there is a spike in HR to 100 bpm, and then the rhythm shifts to a pattern of more regularly fluctuating HR for the remainder of the run, with HR ranging from 68 to 76 bpm in a nearly sinusoidal pattern. The recording is stopped when the test is terminated at the 4'30" mark.

The graph in the lower left hand corner of Figure 2 shows Coherence Ratings for the first 2'40" that range between zero and 5%, indicating a low level of success in attaining coherence. The 2' 40" point marks the start of a period of sustained increase in coherence that rises steadily and continuously to a level of 25 units, at which point the test is halted.

The bar graph in the lower right portion of Figure 2 reflects changes in the Coherence Ratio, and shows that by the end of the test, the subject had spent 50% of the total time in a state of low coherence, 22% in a state of medium coherence, and 28% in a state of high coherence. This is a cumulative score, and began with initial readings of zero at the start of the study. Moment-by-moment readings of coherence were not recorded. The subject's average HR for the duration of the test was 73 bpm.

The internal experiences of the subject were also noted. Despite the sensory blinding measures, he reported that he was able to detect air movements when the practitioner group passed by him as they took their seats. This awareness that the test period was about to begin led to a brief surge of "performance anxiety" which occurred at the same time as the HR spike evident in the top graph of Figure 2. The subject was able to refocus on his meditation practice, which was now accompanied by a newly arising subjective feeling of lightness and openness in the chest area. He later remarked that this internal shift resembled subtle energy sensations he had often experienced during group energy balancing workshops attended in previous years, conducted by Rev. Rosalyn Bruyere.[12]

The full extent of the subject's sensory isolation was not formally tested, although he reported complete visual isolation for all events. Auditory isolation was complete for all sounds except for occasional muffled tones emitted by the laptop. These sounds were part of an HRV feedback training program, but the meaning of the various sound frequencies was not known to the subject, and did not prove distracting. Ambient air movement was detected, as previously mentioned.

In summary, the subject was unable to achieve a significant degree of HRV coherence during the initial phase of the test, when he was practicing the technique while alone in the lab. When the experienced practitioner group entered the lab, the subject's HR (but not HRV) briefly spiked and then returned to baseline. When the practitioner group elicited their own state of high HRVC, the subject also entered a state of sustained HRV coherence which persisted until the study session was terminated at the 4'30" mark.

DISCUSSION

This report has three major implications which merit discussion. Most importantly, it raises the possibility that resonant physiologic interactions do in fact occur in the laboratory and perhaps in other group settings, and may have significant benefits for human health and well-being. Next, it suggests a possible mechanism of action by which such interpersonal physiologic resonance may occur. Finally, it can serve as a call for future research under more rigorously-controlled conditions, to explore the nature and extent of the physiological coherence facilitated by interpersonal bioresonance that seems to have been demonstrated in this study.

Methodological Issues

Several crucial methodological issues must be addressed by future studies in order to further validate this phenomenon of interpersonal physiological bioresonance. They include:

Subject blinding: The subject's perception of periodic tones from the monitor can be easily blocked by either silencing the monitor, or by using noise cancellation headphones. The possibility that the subject will feel air movements caused by entry and

exit of the IHM staff can be eliminated by ensuring that a greater distance exists between the subject and the meditators. Alternatively, the following signaling system can enhance subject blinding.

Signaling: The meditating group could begin the session already seated in the lab, near the subject. They could start and end their heart coherence practice at the PI's silent hand signal, without leaving and entering the room. This arrangement would eliminate the possibility that the subject could detect the start and end of the session, information which might bias his physiological status and performance.

Time markers: Accurate recording of the exact moment at which the signals are given to start and end the meditation phase of the experiment is crucial, and simple to do via pre-arranged hand signals. The blinded subject would not be able to detect the signaling, and any correlations between onset and termination of HRV practice with HRV changes could then be more accurately assessed.

Baseline stabilization: To ensure that the subject has entered a stable baseline level of heart coherence before the group practice is begun, the subject should spend an initial period (20 minutes) establishing his own baseline parameters.

Practitioners' coherence state: The actual degree of heart coherence attained by the IHM practitioners was not recorded, and so their subjective sense of being in coherence could not be independently and objectively validated. This can be remedied in future testing by recording this data from each group member's hand-held HRV recording unit.

Additional measures: The subject's coherence state could be assessed after the group has been silently instructed to end their IHM practice, while he continues his own independent practice. It would be instructive to see whether his success at maintaining heart coherence is now independently stable, or still requires facilitation by the group. Also, his state of coherence should be recorded moment-to-moment, in addition to the cumulative measures used here.

Expectancy issues: Any innate ability which the subject may have possessed to attain states of psycho-physiological balance may have been inadvertently activated by a combination of non-specific factors, including his high level of motivation and hopeful expectation, his prior training in other self-regulation strategies, and a hypnotic-type benefit from unconscious positive suggestions that were self-generated during the weeks of preparation prior to this demonstration. These non-specific factors could be controlled by using multiple subjects who had less psychological investment in the study's outcome than did this study's subject.

Mechanism(s) of Action

Two possible mechanisms of action will be described, one involving local EMFs and the other involving nonlocal subtle energy processes. Because the electrical activity of

the heart generates the largest rhythmic magnetic field of any organ in the human body, it is plausible to assume that any interactions between two adjacent human EMFs would be mediated, or at least influenced, by the rhythmic oscillations of the beating heart's EMF. Sympathetic resonance between two adjacent tuned oscillators occurs in electronics and acoustics (e.g. between tuning forks), and could analogously occur in these human EMF interactions. Mechanical resonance effects are subject to attenuation with increasing physical separation between oscillators, an effect which can be overcome to some extent by more forceful (loud) oscillations. This distance effect limits acoustic resonance between tuning forks because the sound waves are dissipated by the conducting medium (air). Magnetic fields also dissipate, in inverse proportion to the square of the distance from the source. Given that a significant measurable human cardiac EMF extends at least three feet before dissipating, it is likely that group facilitation effects such as described here require the participants to be in fairly close physical proximity to one another.

It is possible that heart-mediated EMF oscillations can be transmitted via direct resonance between nearby vibrating EMFs, analogous to the interaction between tuning forks. However, according to the HeartMath model, true entrainment-synchronized heart beats, with the subject and the meditating group all pulsing in unison- is unlikely to occur.[13] They speculate that it is more likely to involve a facilitation effect whereby the subject finds it easier to use an internal heart-focused awareness process like Heart Lock-In to enter into a state of physiological coherence. In other words, entry into the state of coherence does not arise from true entrainment, but from a process of facilitation that is mediated by the subject's immersion in a more harmonious larger group energy field. It is not clear at present how this facilitation might occur.

Other nonlocal, non-EMF mechanisms could explain the interaction effects described here. Several strands of research describe intentional impacts on target subjects that occur over distances ranging from several meters to several thousand miles, clearly beyond the range of EMFs, even powerful ones. For example, remote attention studies of the sense of being stared at show that visual gaze was detectable by receiver subjects (and impacted their autonomic nervous systems) when transmitted through glass one-way mirrors; however, an EMF mechanism was eliminated when similar gaze sensitivity occurred even when the gaze was transmitted to the subject via closed circuit TV, without any direct physical presence or visual contact.[14] Similarly, because of the large distances involved, the previously mentioned intercessory prayer literature and the studies showing electrodermal response to mental intention cannot be explained by an EMF mechanism.

In this vein, to eliminate a potential role for EMF transmission in future heart coherence studies, it would be possible to screen out EMF radiation by having the subject placed

inside a Faraday cage to electromagnetically isolate him from the group of facilitators meditating outside the cage. If physiological resonance still occurred despite this EMF screening, then the non-EMF mode of transmission proposed earlier would have to be considered, even though possible mechanisms for such nonlocal phenomena are highly speculative. For example, telepathic, quantum entanglement and gauge-invariant scalar wave mechanisms of nonlocal interaction have been proposed by other researchers.[15,16,17]

Possible dosage effects could also be studied by utilizing different size groups of IHM practitioners to affect the subject. Presumably a larger group of coherent EMFs would more readily entrain the subject's HRV by virtue of the larger size and strength of the group magnetic field that is created during group HRV practice. Detection of dose/response effects would give further credence to the findings and explanations proposed in this study. The presence of one or more particularly gifted "influencers" in the group would also have to be considered. Distance effects and a possible inverse square relationship could be tested by varying the distance between the subject and the group.

Significance of Coherence and Group Effects

The most important questions raised by this study concern the significance of so-called heart coherence, and its possible relevance to a wider range of human behaviors. IHM's work suggests that heart coherence confers optimal physiological functioning in a way that is not achieved by other mind/body interventions like muscle relaxation or mindfulness meditation. They have shown that coherence increases stress resistance, psychological resilience and physical coordination in its practitioners; for example, golfers were able to increase clubhead and ball speed in one IHM study.[18] Heart coherence may facilitate entry into the so-called "Zone" of exceptional athletic performance because it is the sort of altered state of consciousness that marks sports' potential to elicit profound spiritual experiences.[19,20]

Field studies could also be performed to assess the impact of group coherence on a wide range of behavioral measures outside of the laboratory. Would similar physiological benefits accrue to athletes whose entry into a state of coherence was facilitated by exposure to multiple coherent EMFs nearby? This sort of group field effect has been proposed as one factor that may contribute to the positive impact that friendly audiences have on the performance of their favorite sporting teams (the so-called home field advantage).[21] A large group of supportive fans may unknowingly create a mutually reinforcing state of heart coherence when their emotions are predominantly those of gratitude and appreciation towards their team. Their resultant coherent EMFs might be strong enough to facilitate coherent heart rhythms in the players on their home team, much as occurred in this demonstration, thereby enhancing the athletes' mind/body coordination and increasing their chances of achieving exceptional performance in the "zone" and gaining eventual victory.

Though no sports teams to date have reported using such a group strategy to enhance their home field advantage, evidence from random number generator (RNG) field tests shows that emotional activation in the crowd watching a professional baseball game produces a simultaneous increase in non-randomness of on-site RNG output, a change of the sort felt by the Princeton Engineering Anomalies Research lab to indicate a state of sustained attention on a common focus point.[22] However, the RNG research is complicated by the fact that readings are made by devices which are electromagnetically shielded, and will often detect fluctuations during events that occur at significant physical distances from the equipment. In fact, the Global Consciousness Project (GCP) monitors world events via a series of RNG setups which are often hundreds of miles from the events being followed.[23] Hence, EMF mechanisms are not likely to be the sole, or primary, mediator of these RNG effects. When this data stream is combined with other evidence for nonlocal effects described earlier, it becomes quite possible that non-EMF mechanisms are also crucial in mediating the physiologic facilitation effects described in this paper, either in tandem with, or separate from, any EMF mechanisms that may be operating.

Regardless of the mechanism of action, large gatherings of people sharing strong positive emotions have long been known to have a transformative effect on participants, and have been organized for the purpose of altering political and cultural behaviors.[24] The euphoria felt at large scale musical events like rock concerts can be literally habit-forming (viz. Deadheads, whose lifestyle revolved around regular attendance at Grateful Dead concerts), while the positive feelings engendered at political rallies can have a global influence (for example, the global reactions to the recent election night crowd of Obama supporters celebrating at Chicago's Grant Park). The phenomenon of group emotions, and the intangible forces they evoke, has been well-studied by sociologists; perhaps it is now time for additional scientists to join them in this line of inquiry.

SUMMARY

This demonstration provides further evidence that certain anomalous human physiologic interactions may not be mediated by the five physical senses. Despite the numerous methodological shortcomings described, it appears that HRV performance, in particular the Heart Lock-In technique, may be particularly sensitive to the influence of adjacent rhythmically oscillating cardiac EMFs. Nonlocal forces may be at work along with the EMF resonance/entrainment model to create the example of psycho-physiologic facilitation described here. These factors may also be involved in larger scale synergistic group phenomena that occur in audiences at musical performances and athletic contests. Further studies along the lines indicated are suggested to help differentiate among several possible mechanisms of action and to highlight potential areas of clinical and behavioral benefit.

• • •

CORRESPONDENCE:
Eric Leskowitz, MD, ABHM, 23 Tolman St., Needham MA 02492, 781-449-3819, Rleskowitz@pol.net, www.TheJoyOfSoxMovie.com

ACKNOWLEDGMENTS:
Rollin McCraty, Director of Research at IHM, for assistance in designing and implementing this demonstration, and in editing this manuscript; Gaby Boehmer and the staff of the IHM, for providing logistical support and heart coherence; two anonymous reviewers for their constructive feedback; and David Leskowitz for his editorial assistance. This paper is dedicated to the memory of Susan Schulman, from whom I learned much about the power of the human heart.

REFERENCES & NOTES

1. G. Schwartz, L. Russek & J. Beltran, Interpersonal hand-energy registration: evidence for implicit performance and perception, *Subtle Energies* **6**,3 (1995), pp. 183-201.
2. S. Mulloney & C. Wells-Federman, Therapeutic Touch: A healing modality, *Journal of Cardiovascular Nursing* **10**,3 (1996), pp. 27-49.
3. R. McCraty, The energetic heart: Bioelectromagnetic communication within and between people, In *Bioelectromagnetic Medicine,* (P. J. Rosch & M. S. Markov, Marcel Dekker, NY, 2004), pp. 541-562.
4 R. McCraty, M. Atkinson & R. Bradley, Electrophysiological evidence of intuition: the surprising role of the heart. *Journal of Alternative and Complementary Medicine* **10**,1 (2004), pp. 133-143.
5. J. Tatum, Clinical intuition and energy field resonance, in, *Transpersonal Hypnosis: Gateway to Body, Mind and Spirit,* (E. Leskowitz, CRC Press, Boca Raton FL, 1999).
6. J. Grinberg-Zylberbaum, Human communication and the electrophysiologic activity of the brain. *Subtle Energies* **13**,3 (1992), pp. 25-44.
7. J. Achterberg, K. Cooke, T. Richards et al., Evidence for correlations between distant intentionality and brain function in recipients: a functional magnetic resonance imaging analysis. *Journal of Alternative and Complementary Medicine* **11**,6 (2005), pp. 965-971.
8. R. Byrd, Positive therapeutic effects of intercessory prayer in a coronary care unit population, *Southern Medical Journal* **81** (1998), pp. 826-829.
9. D. Radin, R. D. Taylor & W. Braud, Remote mental influence on human electrodermal activity: A pilot replication. *European Journal of Parapsychology* **11** (1995), pp. 19-34.
10. R. McCraty, B. Barrior-Shoplin, D. Rozman, et al., The impact of a new emotional self-management program on stress, emotions, heart rate variability, DHE and cortisol. *Integrative Physiology and Behavioral Science* **33** (1998), pp. 151-170.
11 W. Tiller, R. McCraty & M. Atkinson, Cardiac coherence: a new, noninvasive measure of autonomic nervous system order. *Alternative Therapies in Health and Medicine* **2**,1 (1996), pp. 52-65.
12. R. Bruyere, *Wheels of Light: Chakras, Auras, and the Healing Energy of the Body* (Fireside Books, NY, 1998).
13. R. McCraty, personal communication, 5/27/08.
14. W. Braud & M. Schlitz, Consciousness interactions with remote biological systems: Anomalous intentionality effects. *Subtle Energies* **2** (1991), pp. 1-46.
15. L. Dossey, Nonlocal knowing: The emerging view of who we are. *Explore* **4**,1 (1998), pp. 1-9.
16. D. Radin, *Entangled Minds: Extrasensory Experience in a Quantum Reality* (Simon and Schuster, NY, 2006).
17. W. Tiller, *Science and Human Transformation: Subtle Energies, Intentionality and Consciousness* (Pavior Publishing, Walnut Creek CA, 1997).
18. M. Thiel. *Play golf "In the zone" all the time.* www.heartmath.com/company/proom/articles/golf_tips_tech_awards.pdf
19. M. Murphy & R. White, *In the Zone: Transcendent Experience in Sports* (Penguin Books, NY, 1978, 1995).
20. A. Cooper, *Playing in the Zone: Exploring the Spiritual Dimensions of Sports* (Shambhala Publications, Boston, MA, 1998).
21. E. Leskowitz, www.TheJoyOfSoxMovie.com/blog/finally_some_data.htm (posted 12/15/07)
22. E. Leskowitz, *Random number generators at the ballpark: a graphic representation of group intention* (submitted for publication).

23. L. Dossey, PEAR Lab and Nonlocal Mind: Why They Matter, *Explore* **3** (2007), p. 3, pp. 191-196.
24. B. Ehrenreich, *Dancing in the Streets: A History of Collective Joy* (Henry Holt and Company, NY, 2007).

∞ ∞ ∞