Article

Schumann Resonance, Psychophysical Regulation & Psi (Part II)

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ABSTRACT

This article concurs with Hainsworth's pioneering research on the health correlates of Schumann Resonance ("SR") and postulates, along with Pitkanin and Sidorov, that SR may be the substrate for a radar-type extrasensory perception mechanism common to all organisms. SR forms a sort of global guidance system for life. Resonant absorption of an oscillating signal and reaction is presumed as most brainwaves fall within the first five SR modes (0-35 Hz). Frequency matching amplifies even weak signals, even in the presence of other strong static and oscillating fields. It is vital in brain-to-cell and cell-to-cell communication.

Part II of this two-part article contains: Brainwave Frequencies; Measuring Changes in Schumann's Resonances; SR and Global Temperature Changes; Discussion: Facilitating Our Potential; Conclusions & References.

Key Words: EMF, Schumann Resonance, psi, ionosphere, resonance, solar flares, ULF/ELF, diurnal cycles, endocrine hormones.

Brainwave Frequencies

The frequency bands and wave characteristics are described as follows:

Brain Waves (8 to 12 cycles per second) This brain wave indicates a relaxed state of mind.. State of relaxed alertness, good for inspiration and learning facts fast. A meditative mind. In this state tap into internal "antenna" like qualities. Visions, powerful ideas, mindless creation of the incredible. Internal feeling & sensations. Theta Brain Waves (4 to 8 cycles per second) Deep meditation. Deep inward thought. This is associated with life-like imagination. High state of mental concentration. A magical mind. Internal pictures / visualization. Intuition, inner guidance. Access to unconscious material. Dreaming. Studies have shown that learning in Alpha State enhances the performance of students. It also develops the interest of studies in students more than they have ever learned in tense environment. Frequent gaps of 2 to 3 minutes after every 30 minute study period relaxes their minds and the alpha state will prove its efficiency with great ease and fun. But learning is more than just absorbing information, so changing the state of mind to operate Beta, Alpha and Theta is most likely to produce the best learning, cognition and creativity, while also staying in a relaxed state.

Gamma waves (25-60 Hz) appear to relate to simultaneous processing of information from different brain areas, e.g., involving memory, learning abilities, integrated thoughts or

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information-rich task processing. Gamma rhythms modulate perception and consciousness, which disappear with anesthesia. Synchronous activity at about 40 Hz appears involved in binding sensory inputs into the single, unitary objects we perceive.

Beta waves (12-25 Hz) dominate our normal waking state of consciousness when attention is directed towards cognitive tasks and the outside world. Beta is a "fast" activity, present when we are alert or even anxious, or when engaged in problem solving, judgment, decision making, information processing, mental activity and focus. Nobel Prize winner Sir Francis Crick and other scientists believe the 40 Hz beta frequency may be key to the act of cognition.

Alpha waves (7-12 Hz) are present during dreaming and light meditation when the eyes are closed. As more and more neurons are recruited to this frequency, alpha waves cycle globally across the whole cortex. This induces deep relaxation, but not quite meditation. In alpha, we begin to access the wealth of creativity that lies just below our conscious awareness. It is the gateway, the entry point that leads into deeper states of consciousness. Alpha waves aid overall mental coordination, calmness, alertness, inner awareness, mind/body integration and learning.

Alpha is also the home of the window frequency known as the SR, which propagates with little attenuation around the planet. When we intentionally generate alpha waves and go into resonance with that Earth frequency, we naturally feel better, refreshed, in tune, in synch. It is, in fact, environmental synchronization.

Theta waves (4-7 Hz) occur most often in sleep but are also dominant in the deepest states of meditation (body asleep/mind awake) and thought (gateway to learning, memory). In theta, our senses are withdrawn from the external world and focused on the mindscape--internally originating signals. Theta waves are associated with mystery, an elusive and extraordinary realm we can explore. It is that twilight state which we normally only experience fleetingly as we rise from the depths of delta upon waking or drifting off to sleep. In theta, we are in a waking dream; vivid imagery flashes before the mind's eye and we are receptive to information beyond our normal conscious awareness. Theta meditation increases creativity, enhances learning, reduces stress and awakens intuition and other extrasensory perception skills.

Delta waves (0-4 Hz) are the slowest but highest in amplitude. They are generated in deepest meditation and dreamless sleep. Delta waves confer a suspension of external existence and provide the most profound feelings of peace. In addition, certain frequencies within the delta range trigger the release of a growth hormone which is beneficial for healing and regeneration. This is why sleep, deep restorative sleep, is so essential to the healing process.

Rhythm & Harmonic Resonance There is a harmonic relationship between the Earth and our mind/body. Earth's low-frequency iso-electric field, the magnetic field of the Earth and the electrostatic field which emerges from our body are closely interwoven. Our internal rhythms interact with external rhythms, affecting our balance, REM patterns, health, and mental focus. SR waves probably help regulate our bodies' internal clocks, affecting sleep/dream patterns, arousal patterns and hormonal secretion (such as melatonin).

The rhythms and pulsations of the human brain mirror those of the resonant properties of the terrestrial cavity, which functions as a waveguide. This natural frequency pulsation is not a fixed

number, but an average of global readings, much like the EEG gives an average of brain-wave readings. SR actually fluctuates, like brain waves, due to geographical location, lightning, solar flares, atmospheric ionization and daily cycles.

The most important slow rhythm is the daily rhythm sensed directly as the change in light. Rhythms connected with the daily rhythm are called circadian (an example is pineal gland melatonin secretion). Some experiments in the absence of natural light have shown that the basic human "clock" is actually slightly longer than one day (24 hours), and closer to one lunar day (24 hours 50 minutes).

On a slower scale, a strong influence on the Earth is its geomagnetic field, which is influenced by the following periods: the Moon's rotation (29.5 days); the Earth's rotation (365.25 days); sunspot cycles (11 or 22 years); the nutation cycle (18.6 years); the rotation of the planets (88 days to 247.7 years); and the galaxy's rotation cycle (250 million years). Very important rhythms, like hormone secretion and dominant nostril exchange, are in the order of 1-2 hours. In the range of human EEG, we have the Sun's electromagnetic oscillation of 10 Hz, while the Earth/ionosphere system is resonant at frequencies in the theta, alpha, beta-1 (low or slow) and beta-2 (high or fast) bands.

Different species often have internal generators of environmental rhythms, which can be extremely precise, up to 10-4. The frequency of these oscillators is then phase-locked-loop (PLL) synchronized with the natural rhythms. Environmental synchronization sources are often called zeitgebers. The mechanism of optical synchronization can be shown. The presented rhythms should inspire a better understanding of the interaction of internal and external rhythms during specific states of consciousness.

The bioelectrical domain is geared to thalamocortical generation of rhythmic activity. In neurofeedback, what is being trained is the degree of rhythmicity of the thalamocortical regulatory circuitry. Rhythmicity manages the entire range of activation and arousal in the bio-electrical domain. One role advocated for rhythmic activity is that of time binding: the need for harnessing brain electrical activity, which is spatially distributed, while maintaining it as a single entity.

Brain waves indicate the arousal dimension, and arousal mediates a number of conditions. Changes in sympathetic and parasympathetic arousal "tune" the nervous system. Underarousal leads towards unipolar or reactive depression, attention deficit disorder, chronic pain and insomnia. Overarousal is linked with anxiety disorders, sleep onset problems, nightmares, hypervigilance, impulsive behavior, anger/aggression, agitated depression, chronic nerve pain and spasticity. A combination of underarousal and overarousal causes anxiety and depression as well as ADHD.

Instabilities in certain rhythms can be correlated with tics, obsessive-compulsive disorder, aggressive behavior, rage, bruxism, panic attacks, bipolar disorder, migraines, narcolepsy, epilepsy, sleep apnea, vertigo, tinnitus, anorexia/bulimia, suicidal ideation and behavior, PMS, multiple chemical sensitivities, diabetes, hypoglycemia and explosive behavior.

The brain responds to inputs at a certain frequency or frequencies. The computer can create wave-form patterns or certain frequencies that compare with the mind's neural signals in terms of mind patterns. If people can control their mind patterns, they can enter different states of being (mental relaxation, study, etc.).

So what happens when the mind is entrained with a sound or vibration that reflects the thought patterns? When the mind responds to certain frequencies and behaves as a resonator, is there a harmonic frequency that the mind vibrates to or can attune to? What does the study of harmonic resonance, sound or vibration have to do with the brain's frequency waves?

Sound waves are examples of periodicity, of rhythm. Sound is measured in cycles per second (hertz or Hz). Each cycle of a wave is, in reality, a single pulse of sound. The average range of hearing for the human ear is somewhere between 16 Hz and 20,000 Hz. We cannot hear extremely low frequencies, but we can perceive them as rhythmic.

Entrainment is the process of synchronization, where vibrations of one object will cause the vibrations of another object to oscillate at the same rate. External rhythms can have a direct effect on the psychology and physiology of the listener. Slower tempos from 48 to 70 BPMs have been proven to decrease heart and respiratory rates, thereby altering the predominant brain-wave patterns.

Binaural beats are continuous tones of subtly different frequencies, delivered to each ear independently in stereo via headphones. If the left channel's pitch is 100 cycles per second and the right channel's pitch is 108 cycles per second, the difference between the two equals 8 cycles per second. When these sounds are combined, they produce a pulsing tone that waxes and wanes in a "wah wah" rhythm.

Binaural beats are not an external sound; rather, they are subsonic frequencies heard within the brain itself. These frequencies are created as both hemispheres work simultaneously to hear sounds that are pitch-differed by key mathematical intervals (window frequencies). The brain waves respond to these oscillating tones by following them (entrainment), and both hemispheres begin to work together. Communication between the two sides of the brain is associated with flashes of creativity, insight and wisdom.

Alpha-wave biofeedback is considered a consciousness self-regulation technique, while alpha-frequency binaural beat stimulation (frequency-following response) is a passive management technique where cortical potentials entrain to or resonate at the frequency of an external stimulus. Through the self-regulation of specific cortical rhythms, we begin to control those aspects of consciousness associated with that rhythm. When the goal is alpha, either in meditation or in biofeedback, it means entraining with the primary SR.

Measuring Changes in Schumann's Resonances

Earth's background base frequency, or "heartbeat" (Schumann's resonances), fluctuates BUT IS NOT RISING dramatically, despite a New Age meme that alleges it. The authors have been

unable to substantiate a rising SR in the literature and Ben Lonetree's readings directly contradict it. SR is stable; it is NOT rising. Though it varies between geographical regions, for decades the overall measurement has remained 7.8 cycles per second. This was once thought to be a constant. Global military communications were developed using this frequency.

As previously stated, the Earth behaves like an enormous electrical circuit. The atmosphere is actually a weak conductor; and if there were no sources of charge, its existing electrical charge would diffuse away in about 10 minutes. There is a "cavity" defined by the surface of the Earth and the inner edge of the ionosphere, whose height fluctuates somewhat. It's been calculated that at any moment, the total charge residing in this cavity is 500,000 coulombs.

There is a vertical current flow between the ground and the ionosphere of 1 - 3 x 10-12 amperes per square meter. The resistance of the atmosphere is 200 ohms. The voltage potential is 200,000 volts. There are about 2,000 lightning storms at any given moment worldwide. Each produces 0.5 to 1 ampere, and these collectively account for the measured current flow in the Earth's "electromagnetic" cavity.

Schumann's resonances are quasi standing-wave electromagnetic waves that exist in this cavity. Like waves on a string, they must be potentiated or "excited" in order to be observed. They are not caused by internal terrestrial factors or Earth's crustal movements or the core, which does produce magnetic fields. They seem to be related to electrical activity in the atmosphere, particularly during times of intense lightning activity. So long as the properties of Earth's electromagnetic cavity remain about the same, these frequencies remain the same. Presumably there is some change due to the solar sunspot cycle, as the Earth's ionosphere changes in response to flares and mass ejections during the 11-year cycle of solar activity. High-energy charges coming off the Sun brush across the upper atmosphere, ionizing there.

Since the Earth's atmosphere carries a charge, a current and a voltage, it is not surprising to find such electromagnetic waves. The resonant properties of this terrestrial cavity were first predicted by W. O. Schumann in 1952 and 1957, and first detected by Schumann and Konig in 1954.

Much of the research in the last 20 years has been conducted by the US Department of the Navy, which uses ELF signals for communication with submarines. However, little attention is given by the military and defense contractors to issues of psychobiological health and well-being.

Between the nearly perfectly conducting terrestrial surface and ionosphere, a resonating cavity is formed. Broadband electromagnetic impulses, like those from lightning flashes, fill this cavity and create globally the so-called Schumann's resonances at frequencies in the range of 5-50 Hz (Schumann, 1952; Bliokh et al., 1980; Sentman, 1987). The nominal average frequencies observed are 7.8, 14, 20, 26, 33, 39 and 45 Hz, with slight diurnal variation (Sentman and Fraser, 1991).

Standard magnetometers are not able to measure Schumann's resonances, and even the search coil (i.e., pulsation) magnetometers, which most often sample at about 0.1 Hz, do not allow such studies. Special equipment is thus needed (see, for example, Sentman and Fraser, 1991).

Current findings suggest:

1. Schumann's resonances are actually observed by experiment to emerge at several frequencies related to brain waves. They range between 6 and 50 cycles per second, specifically 7.8 (alpha), 14 (low beta), 20 (mid beta), 26 (high beta), 33 (low gamma), 39 (gamma) and 45 Hz (gamma), with daily variation of about ±0.5 Hz.

2. The strongest of the seven resonances is 7.83 Hz, in the alpha brain-wave range. If the rise in resonance continues, this primary resonance, the Earth pulse, changes from sub-band low alpha (7-10 Hz) to sub-band high alpha (10-12 Hz), perhaps influencing our ability to relax deeply, balance and integrate our mind/body connection. It could influence REM sleep and dreaming. If it continues to rise, it will breach the threshold into "fast" beta activity. Low beta (12-15 Hz) is associated with lack of focused attention, and can even indicate attention deficit disorder.

3. The amplitude (i.e., intensity) of the Schumann's resonances is not constant, and appears to be extremely dependent upon tropical (and hence global) temperature. Indeed, preliminary results seem to indicate that a mere one-degree increase in temperature correlates with a doubling of the SR. This could not be more significant, as it is unknown what psychobiological effect these fluctuations could have on humans.

SR and Global Temperature Changes

One of the most crucial questions in science today centers on whether or not the planetary temperature is rising, falling or remaining unchanged. Recently global warming has been acknowledged by most in the field, and human interference (technology) is implicated. Yet, there is evidence the whole solar system is heating with the solar cycle.

On one hand, analyses of thermometer measurements of near-surface global (land and sea) air temperatures suggest the planet has been warming in recent decades. But satellite measurements of the planet's lower atmospheric temperature show no warming from 1979 to 1998.

Temperature data from weather balloons launched throughout the world reveal variations and trends in global temperatures that correspond to those found in the satellite-based measurements. Analysis of pressure thickness measurements from these same balloons also shows no warming in recent decades. It's no wonder we have such an ongoing "heated debate" about the recent temperature history of the Earth! Yet most people recognize that their local weather is markedly different than in past decades.

Scientists have suggested lately that another method may exist to monitor planetary temperature accurately. The idea is simple, though the underlying physics of the processes is complex. The method is based on the well-known fact that thunderstorms and lightning strikes in many parts of the world are directly related to lower-atmospheric air temperatures. Higher temperatures produce more lightning strikes, while lower temperatures tend to depress lightning activity.

Lightning discharges occurring anywhere in the world produce electromagnetic pulses that spread away from the source. Much of the energy is quickly degraded, but some of the energy the lightning produces falls in the extremely low frequency/long-wavelength domain of the electromagnetic spectrum. At these long wavelengths, the energy from a lightning strike is able

to circumnavigate the Earth without serious degradation. This low-frequency/long-wavelength energy creates SR signals which can be detected throughout the world.

Understanding SR waves requires a basic appreciation of the vertical structure of the atmosphere. In the upper reaches of the ionosphere, incoming ultraviolet radiation and soft X-rays affect atoms or bonded groups of atoms, causing gains or losses of negatively charged electrons. This interaction creates an environment of positively and negatively charged particles of the high atmosphere that, among other interesting qualities, can readily conduct electricity.

The bulk of our insulating atmosphere lies between two conducting layers of the Earth's surface and the lower boundary of the ionosphere. This spherically concentric cavity, the Earth/ionosphere cavity, is bounded by those electrically conducting walls. Again, lightning discharges within the cavity produce electromagnetic pulses that spread away from the source in the extremely low frequency domain, and the conductive walls of the cavity produce some interesting effects for the low-frequency energy.

For example, energy with a frequency near 7.5 Hz would have a wavelength of about 40,000 km (recall that wavelength = speed of light / frequency). Because this wavelength equals the circumference of the Earth, the energy is able to circumnavigate the Earth/ionosphere cavity without serious degradation. The 100 or so lightning bolts occurring each second in the 1,000 lightning storms around the world contribute to the energy in the 7.5 Hz portion of the spectrum, which can be measured anywhere on the planet. It is these resonance properties of this global spherical capacitor or resonator) that Schumann predicted over 40 years ago.

In an article published in *Science*, MIT scientist Earle Williams (1992) constructed a powerful argument that links Schumann's resonances to convection and ultimately to widespread tropical and/or global temperature. Williams concluded that a 1°C warming in the tropics should result in a fourfold increase in lightning activity, and he presented empirical data from several locations to support his conclusion. He noted that any measurable parameter nonlinearly related to temperature could be extremely useful in assessing the most subtle changes in global temperature.

Others have presented different sensitivities: Price (1993) concluded that a 1°C warming would increase global lightning activity by 7%; Price and Rind (1994) found a 5-6% increase per 1°C sensitivity; while Reeve and Toumi (1998) found the sensitivity to be near 40% per 1°C. Regardless of the exact sensitivity, all these scientists conclude that lightning increases with even moderate amounts of warming worldwide. More lightning would generate a stronger SR, which may be useful in monitoring planetary temperatures.

The link between SR and the number of lightning strikes is supported by a mean day/night temperature fluctuation pattern. A diurnal pattern of worldwide lightning exists with three maxima recorded regularly due to the large number of mid- to late-afternoon thunderstorms in land areas of Africa, South America, and Southeast Asia and Australia. (Storms are first generated in Asia; later they form in Africa; and later each day they arise in South America.)

Small changes in temperature pump up into large signals in extremely low frequency (ELF) resonances. Long-term monitoring and study of global climate changes via measurements of

ELF electromagnetic waves needs to be conducted more closely. Monitoring the intensity and frequencies of the lightning-induced ELF SR could help monitor changes in the Earth's climate over time.

One Israeli program proposed setting up two or three widely separated ELF field sites. A suggested site for a permanent SR monitoring station was in the Negev Desert in Israel. Members of this proposal want to develop, test and install the appropriate software for the automatic electromagnetic monitoring and preliminary processing of the incoming data. They suggested that simultaneous measurements could be made in Russia and Sweden to test the global nature of the ELF signals measured in Israel. The continuous ELF data measured in Israel could be compared with other ELF data sets from other locations around the world, such as Hungary, USA or Japan. Furthermore, the relevant global climate data sets - such as surface temperature, satellite observations of the global distribution of deep convection, and global atmospheric water vapor measurements - could be used for comparisons with SR data to check the reliability of the "global thermometer" hypothesis.

A systematic study of SR parameters during high-energy particle precipitation events has shown that protons and electrons with energies above 1 MeV ionize the upper boundary of the Earth/ionosphere cavity. This leads to an increase in the resonance frequency and a decrease in the damping of the first Schumann's resonance, as derived from measurements at Arrival Heights, Antarctica. The study used the nine strongest solar proton events of the past Solar Cycle 22 and high-energy electrons emitted periodically from co-rotating interaction regions in the solar wind during 1994-95. The variation of the SR parameters is in qualitative agreement with current SR theories. The study also showed that high-energy particle precipitation (solar ejecta) is not the only relevant source affecting SR parameters. The findings constitute a so far little-explored aspect of solar/terrestrial interaction. (Antarctic Aeronomy and Astrophysics Program)

Discussion: Facilitating Our Potential

In conclusion, we postulate that: (1) we are complex electrodynamic, rather than merely chemical beings, sensitive to natural and artificial EM fields; (2) SR frequencies coincide with human brain waves, affecting subtle and gross brain-wave generation, regulating homoeostasis, healing and psi; (3) there is strong correlation between human behavioral disturbance and geomagnetic field turbulence or isolation from SR frequencies.

As human beings we have extraordinary potentials we have hardly begun to study, much less understand. Creative gifts, intuitions and talents that are unpredictable or emergent may become stabilized in generations to come. Hopefully, we can learn to understand both our emergence from an essentially electromagnetic environment and facilitate our potential for healing, growth and non-local communication.

Further research on these electromagnetic relationships is essential, perhaps even to our psychophysical survival as a species. They affect our minds, the cellular and genetic structure of our bodies, our sleep and dream cycles, our emotions, perhaps even our ‘spirit’. Monitoring and collating effects of atmospheric tampering and their potential influence on the ionosphere and

SR, therefore human brainwaves and health, should be continued. We are currently in Solar Cycle 24, and should use an entire 11 year cycle to acquire accurate data results, as Hainsworth suggested.

A team of researchers and physicists, compiled relevant data under the auspices of the *Journal of Non-Locality and Remote Mental Interactions* (JNLRMI) edited by Lian Sidorov. They hypothesized that EM fields outside of the body are crucial for our consciousness. Physicist Matti Pikanen developed a model of physics, called Topological Geometrodynamics (TGD), highlighting the close relationship of human physiology with SR and other ELF and electromagnetic patterns.

Pitkanen believes that not only global, but interplanetary and interstellar magnetic fields are of great importance for conscious life. His explanations involve magnetic flux tubes, a dipole-like part of a field. A wide range of EM waves, in particular microwaves and radiowaves are likely key elements in homeostasis, remote mental interactions between cells and other structures, and sensory representation, as well as in remote mental interactions both within and outside of the body. He explains that the noise level of Earth's magnetic field must be low for anomalous cognition (also called psi or ESP) to occur.

Allan Frey suggested similar field notions decades ago, speaking specifically of microwave range inputs. His 1962 report, "Human Auditory System Response to Modulated Electromagnetic Energy", describes "microwave hearing", later called 'Synthetic Telepathy' (R. Miller, 2001).

These EM fields are only correlates of consciousness. Still, TGD allows the possibility of assigning someone's field body a topological field quanta identity. Pitkanin also suggests these fields and waves are influential when biological systems perform quantum computation-like processes. His biophysics suggests that neural circuits and molecules are bound by lock and key mechanisms through this process of magnetic circulation (topologically quantized diploar magnetic fields).

Pitkanen even sees Earth's magnetic field as a quantized dipolar magnetic field interaction of knotting, linking, and complex twisting. TGD views the brain and nervous system as a sensory organ for our extended, electromagnetic selves, which have a length scale at least the size of the Earth's diameter. He suggests further that psi phenomena and distant or non-local healing may involve transfer of specific electromagnetic frequencies through Planck-length wormholes and join-along boundaries postulated by TGD, which would allow for the near-instant transfer of information.

[T]he *magnetic sensory canvas hypothesis provides a mechanism for "sharing qualia" associated with distant points on the geomagnetic sphere - essentially a form of cognitive entanglement between operator and target. One clear advantage of TGD over other models of subtle energy transmission is that the EM fields are not directly carried from sender to target, but are simultaneously generated at the two locations by a vacuum (geometrical) current: hence they remain coherent while bypassing the paradox of non-attenuation with distance. . .the illusion of*

our locality is perpetuated by the data fed to us by our senses - that is, those perceptions we are habituated to pay attention to. (Sidorov, *JNLRMI*)

Other research suggests the fundamental interaction of internal and external fields is the right track. Joseph Jacobson (2002) at MIT, found a way to switch cells off and on with radio waves. His team also "unzipped" and manipulated DNA with a radio-frequency pulse. The same approach worked on proteins as well, and proteins orchestrate nearly all cellular chemical processes. Further, physicist Peter Gariaev (2002) has proposed a wave-based genome, whose main information channel is the same for both biophotons and radio waves.

In 1973, Miller, Webb and Dickson described DNA as a holographic projector. In other words, genes encode and express themselves via light and radio waves, or acoustical holography (Miller, Miller and Webb, 2002). Delocalized interference patterns create calibration fields (blueprints) for our bodies' space-time organization. The system works as a biocomputer -- a wave biocomputer. DNA can also function as a gel-like liquid crystal, emitting a weak laser-like light that can be converted into an electro-acoustic signal. Later research by Peter Gariaev, Mae Wan Ho, and others substantiated electromagnetic models of life.

Conclusions

Much like water bouncing off rocks and other submerged objects, this non-specific SR frequency is absorbed and re-radiated in unique interference patterns by all objects it encounters. This interference pattern is a composite of external and internal properties, as the constituent atoms, molecules and their global assembly all re-transmit this energy according to their specific configurations. The “sounding waves” can be frequency and pattern modulated by conscious intent in order to yield specific information (interference patterns). Decoded by the brain they return almost instantly on the “back” of the Schumann Resonance. Once recaptured, the patterns are then decoded by the brain.

In this Fourier-type transformation the information is translated into conscious data, much like other sensory processing. Conversely, specific effects may be imprinted as bioinformation and made to exercise a "mysterious action at a distance", once the signal wave reaches the target. That pattern, in turn, may, under the right ("pre-requisite") global conditions, avoid routine dissipation and become instead coupled to the dominating ("state-of-consciousness") standing wave that is picked up and carried by the Schumann resonance. Mental intent may function as a variable window of transmission/reception in the exchange of extrasensory information. Tuned into the Schumann resonance, it may carry such bio-regulating information to distant targets and act as a primitive, radar-type sensory interface.

In conclusion, we postulate, along with colleagues that:

1. The organization of all biological systems is established by complex electrodynamic fields. We are fundamentally electromagnetic, rather than chemical beings. Wave interaction is a key determinant of biological structure and optimal functioning. Biosystems are sensitive to natural and artificial electromagnetic fields. Perturbations in environmental fields can induce changes in

organisms informed by those fields. Field frequencies and amplitudes affect our biodynamic state.

2. ELF frequencies of Schumann's Resonance are intimately linked with those of human brainwaves. Natural or artificially induced changes in SR could affect subtle and perhaps gross brainwave generation. In particular, it could lead to changes in patterns and frequencies of resonance and resulting phenomena such as homeostasis, REM, psi, and healing.

For a decade, Robert Beck researched the brain wave activity of healers from all cultures and religious backgrounds (he enumerates psychics, shamans, dowsers, Christian healers, seers, ESP readers, kahuna, Santeria, wicca practitioners and others). Independent of their belief systems, each exhibited "nearly identical EEG signatures" during their "healing" moments: a 7.8-8Hz brainwave activity, which lasted from one to several seconds and which was "phase and frequency-synchronized with the earth's geoelectric micropulsations - the Schumann resonance". (Sidorov, JNLRMI)

Liquid crystals (DNA, brain ventricles, and cellular structures) in the human body may operate as antennae for detecting and decoding such global and local ELF signals. Beal (1996) proposes that liquid crystals (which are an intrinsic part of cell membranes) act as a detector/amplifier/memory storage device for ELF EM patterns in the environment. Proteins, tend to orient themselves in the 10-Hx resonant EMF, so would be extremely sensitive to ELF changes in the 10Hz region. A coherent wave-field may emerge from the body's own liquid crystal (LC) matrix.

The very structure and organization of living tissues is, however, itself regulated by that master molecule, the DNA. The genetic system (consisting, to be more accurate, of an equidirectional translation function which may start equally well with DNA, RNA or protein) reveals itself as a complex, multidimensional code with both local (codon) and global (context), material (nucleotide) and field-like (EM hologram) parameters, all of which are mutually interdependent and at the same time subject to external, environmental influences. (Sidorov, JNLRMI)

3. There is a strong correlation between behavioral disturbances in humans and periods of solar and geomagnetic field turbulence. Conversely, studies show that subjects living in isolation from geomagnetic rhythms over long periods of time developed increasing irregularities and chaotic physiological rhythms - which were dramatically restored after the introduction of a very weak 10Hz electrical field. Early astronauts suffered until SR generators were installed in their spacecrafts.

4. Geomagnetic anomalies (tectonic strain, earthlights, geomagnetic field perturbations) can induce some forms of anomalous cognition - such as auditory and visual hallucinations, and TLTs (temporal lobe transients or small seizures). Also, one of the effects of meditation is to "quiet the mind" as a method of allowing the "free-run" (or silent thalamic periods) to become entrained by natural geophysical rhythms. This form of tuning or "magnetoreception" is mediated by the pineal gland, (30% of its cells are magnetically sensitive), and organic magnetite-containing tissues. Persinger (1989) points out that deep temporal lobe activity exists in equilibrium with the global geomagnetic condition. When there is a sudden decrease in

geomagnetic activity, there appears to be an enhancement of processes that facilitate psi reception, especially telepathy and clairvoyance. Increases in geomagnetic activity may suppress pineal melatonin levels and contribute to reductions of cortical seizure thresholds. Indeed, melatonin is correlated with temporal lobe- related disorders such as depression and seizures. (Krippner)

5. Optimal global ELF (calm night; low sunspot activity; low EM pollution) conditions can facilitate anomalous cognitions, including psi such as ESP, remote viewing, and remote healing. [P]si is always present in space and time, waiting to be accessed by crisis, emotion, or by optimal laboratory stimulus parameters. Geomagnetic activity may affect the detection capacity of the brain for this information, especially the neural pathways that facilitate the consolidation and conscious access to this information. Without this geomagnetic activity, awareness of the psi stimulus might not be as likely and the brain's "latent reserve capacities" would not be utilized. (Krippner)

Sidorov (2001) and others have suggested that human intent functions as a variable window of transmission/reception in the exchange of extrasensory information, possibly within the range of ELF electromagnetic frequencies. Brain synchronization with Schumann's Resonance of both sender and receiver facilitates psi, or "therapeutic entrainment," amplifying, re-radiating coherent waveforms derived from the environment, simulating the wave pattern of the environment.

Sidorov further hypothesizes:

[B]rainvawes (particularly in the alpha range) can be transmitted along the perineural system (or via Frohlich excitation) to any distal parts of the body, and even to adjacent organisms, via ELF EM waves. These frequencies can be amplified by closely-related Schumann resonance waves, or by feedback mechanisms typical of the body's physiological pathways (akin to immunologic and neuroendocrinologic cascades). In turn, these basic frequencies can re-activate stalled healing processes, enhance growth, accelerate immune responses, and generally "jump-start" functions inherent to the body's tissues, by "rebalancing its energies" (according to Oriental medicine) or (in Beal's terminology) by re-configuring the liquid crystal orientation of cell membrane components and thus triggering specific intracellular responses.(Sidorov)

This article concurs with Pitkanin and Sidorov, that the Schumann resonance may be the substrate for a radar-type extrasensory perception mechanism common to all living beings.

In a prior, "first-thoughts" essay discussing the presence of Schumann frequencies in the EEG during various healing practices we had proposed that mental intent might function as a variable window of transmission/ reception in the exchange of extrasensory information, which tuned into the Schumann resonance to carry such bio-regulating information to distant targets and acted as a primitive, radar-type sensory interface (Sidorov 2001). However, pursuing this line of thought soon lead to the landmark experiments of Robert Becker - who, it became evident, had not only reached somewhat similar conclusions based on his own body of evidence, but had gone beyond them to suggest that such subtle currents could reach far deeper into our genetic and consciousness control mechanisms. After nearly eight decades of EEG and other brain imaging studies, it is sobering to realize that we still can't tell with certainty where EEG voltages come

from (Becker 1985, pp 88). It is conceivable that Becker's perineural system and/or the LC - liquid crystal matrix of the organism (including, but not limited to, connective tissues, cell membranes and DNA) might act as a full-body array of sensory receptors for Pitkanen's magnetic sensory canvas signals, with specific excitations patterns coding for different types of information.

[T]he body's ubiquitous liquid crystal arrays and their almost infinite configuration possibilities make them a top candidate for the primary sensory receptors parapsychology has been looking for. It is even conceivable that DNA phase-conjugation properties (see Popp and Chang, 1998) allow it to function as a multi-mode antenna, altering its function according to surrounding signal fields and possibly acting not just as a regulatory program, but also an element of "extrasensory" perception. (Sidorov)

As human beings we have extraordinary potentials we have hardly begun to study much less understand. Creative gifts, intuitions, and talents that are unpredictable or emergent may become stabilized in generations to come. Hopefully, we can learn to understand both our emergence from an essentially electromagnetic environment and facilitate our potential for healing, growth and non-local communication.

References

Adey, W. Ross, "Electromagnetic fields, the modulation of brain tissue functions - A possible paradigm shift in biology", in International Encyclopedia of Neuroscience Third Edition; B. Smith and G. Adelman, editors. Elsevier, New York. http://www.emrnetwork.org/pdfs/adey_encneuro_emfs.pdf

Adey, W.R., 1990: "Electromagnetic fields and the essence of living systems". In "Modern Radio Science", J Bach Anderson Ed., Oxford University Press, 1990, pp 1-37.

Antarctic Aeronomy and Astrophysics Program,
http://www.nsf.gov/geo/plr/antarct/treaty/opp04001/astroaero.html

Beal, J.B. (1996). "Biosystems liquid crystals and potential effects of natural and artificial electromagnetic fields (EMFs). Second Annual Advanced Water Sciences Symposium, Exploratory Session 1, Dallas, TX.

Becker, Robert, (1985), Electromagnetism and Life. State University of New York Press, Albany 1982.

Becker, Robert, The Body Electric. Electromagnetism and the Foundation of Life (with Gary Selden). Morrow, New York,

Becker, Robert, (1990), Cross Currents. The Promise of Electromedicine, the Perils of Electropollution. Torcher, Los Angeles.

Bentov, Itzhak, Stalking the Wild Pendulum, E.P Dutton, 1977, Destiny Books (February 1, 1988).

Cherry, N.J., 2002: "Schumann Resonances, a plausible biophysical mechanism for the human health

effects of Solar/Geomagnetic Activity". Natural Hazards 26: 279 – 331. for the human health effects of Solar/Geomagnetic Activity, http://www.neilcherry.com/documents/90_n1_EMR_Schumann_Resonance_paper_1.pdf

Derr, J.S. (presented) & Persinger, M.A. Luminous phenomena, earthquake lights and tectonic strain. Presented at the 4th Annual Meeting of the Society for Scientific Exploration (Princeton University, October 29-31, 1985).

Ertel, Suitbert, (1997), "Bursts of creativity correlate with solar activity", cited https://docs.google.com/document/d/1XVAYMYMXH8_94t3o8k-TTFJan4UaEZYimNN514vbEck/edit?pli=1

Frey, Allan, (1962), Human Auditory System Response to Modulated Electromagnetic Energy. http://www.thatte.net/frey.pdf

Frey, Allan H., (1962). "Human auditory system response to modulated electromagnetic energy". Journal of Applied Physiology 17: 689–692.

Frey, Allan, (1968) Biological Function as Influenced by Low Power Modulated EF Energy. http://www.dtic.mil/cgi-bin/GetTRDoc?AD=AD0716044&Location=U2&doc=GetTRDoc.pdf

Gariaev, Peter, et al. (2002), The spectroscopy of biophotons in non-local genetic regulation, JNLRMI (Vol. 1, No. 3), http://www.emergentmind.org/gariaevI3.htm

Grimalsky, V. and S. Koshevaya, A. Kotsarenko, and R. Perez Enriquez, (2005), Penetration of the electric and magnetic field components of Schumann resonances into the ionosphere, Annales Geophysicae, 23, 2559–2564, 2005, European Geosciences Union. http://www.ann-geophys.net/23/2559/2005/angeo-23-2559-2005.pdf

Hainsworth, Lewis B., The Effect of Geophysical Phenomena on Human Health, Speculations in Science and Technology, Vol. 6, No. 5.

Hainsworth, Lewis B., (1987) Appendix 2, Electrical Technology and Human Evolution, 1987, Speculations in Science and Technology, Vol. 11, No. 2, p. 101.

Jacobson, Joseph, (2002), http://web.mit.edu/newsoffice/2002/bio-radio.html

Krippner, Stanley. "Psi research and the human brain's reserve capacities." DynaPsych. www.dynapsych.org

Krippner, S. and Persinger, M.A., (1993). Enhancement of accuracy of telepathic dreams during periods of decreased geomagnetic activity: The William E. experiments. Proceedings of the 36th Annual Parapsychological Association 36th convention (pp. 126-131). Toronto, Canada.

Krippner, Stanley, M. A. Persinger, (1989), Dream ESP experiments and geomagnetic activity, The Journal of the American Society for Psychical Research, Vol. 83.

Lonetree, Benjamin and Iona Miller, Schumann Resonance, http://sedonanomalies.weebly.com/schumann-resonance.html

Ludwig, H.W., Electromagnetic multiresonance - the basis of homeopathy and biophysical therapy. in Proceedings 42nd Congress Int. Homeopathic Med League, Am. Institute Homeopathy, Washington, D.C. and personal communication with Dr. Ludwig by Dr. Smith, as cited in C.W. Smith, op cit., p. 211.

Lysak, R.L., University of Minnesota and A. Yoshikawa, Kyushu Universit, Resonant Cavities and Waveguides in the Ionosphere and Atmosphere, http://ham.space.umn.edu/~bob/Lysak_waveguide_paper_final.pdf

Lysak, R.L., Feedback instability of the ionospheric resonant cavity, J. Geophys. Res.,96(A2), 1553-1568, 1991.

Lysak, R.L., Generalized model of the ionospheric Alfvén resonator, Auroral Plasma Dynamics I, in Geopyhys. Monograph Ser., vol. 80 (R.L. Lysak, ed.), pp. 121-128, American Geophysical Union, Washington, D.D., 1993.

Miller, Webb, Dickson, Holographic Concept of Reality and Embryonic Holography, 1973,

Miller, Richard Alan, (2001), "Synthetic Telepathy", Presented at the Consciousness Technologies Conference, July 20th, 2001.

Miller, R., Miller, I. and Webb B., (2002), Quantum Biohology raphy, JNLRMI, Vol. 1, No. 3, http://www.emergentmind.org/MillerWebbI3a.htm

A Review of the Field from 1973 - 2002

Miller, Richard Alan and Miller, Iona, The Diamond Body, http://zero-point.tripod.com/diamondbody/dbodytoc.html

Nickolaenko, A.P. and M. Hayakawa (2002), Resonances in the Earth-Ionosphere Cavity, Kluwer Academic Publishers.

Oschman, Energy Medicine, Churchill Livingstone; 1 edition (June 15, 2000).

Persinger, M.A. (1989). Psi phenomena and temporal lobe activity: the geomagnetic factor. In L.A. Henkel & R.E. Berger (Eds.), Research in parapsychology 1988 (pp. 121-156). Metuchen, NJ: Scarecrow Press.

Persinger, M.A., & Krippner, S. (1989). Dream ESP experiments and geomagnetic activity. Journal of the American Society of Psychical Research, 83, 101-106.

Persinger, M. and S. Krippner (1989), Dream ESP experiments and geomagnetic activity, The Journal of the American Society for Psychical Research, Vol. 83.

Persinger, M.A. The tectonic strain theory of luminosities (UFO reports): determining optimal temporal, spatial and intensity parameters. Pursuit, 1983, 1, 21-35.

Persinger, M.A. Geophysical variables and human behavior: XV. Tectonic strain luminosities (UFO reports) as predictable but hidden events within pre-1947 Central U.S.A. Perceptual and Motor Skills, 1983, 57, 1227-1234.

Pitkanen, Matti (2002). "A model for remote mental interactions." JNLRMI, Vol.1 Nr. 2., May 2002.

Pitkanin, M, (2013) Comments on the Recent Experiments by the Group of Michael Persinger, Journal of Nonlocality Vol II, Nr 1, June 2013.

Pitkanin, M. (2013), "Are dark photons behind biophotons?", Journal of Nonlocality Vol II, Nr 1, June 2013.

Pitkanin, M. (2013), "Two Attempts to Understand PK", Journal of Nonlocality Vol II, Nr 1, June 2013.

Pitkanin, M. (2013), "Quantum Model for the Direct Currents of Becker", Journal of Nonlocality Vol II, Nr 1, June 2013.

Roffey, Leane, The Bioelectronic Basis for "Healing Energies: Charge and Field Effects as a Basis for Complementary Medical Techniques. JNLRMI, Vol. IV **(1).**

Sentman, D.D., and B.J. Fraser, Simultaneous observations of Schumann resonances in California and Australia: Evidence for intensity modulation by the local height of the D region, J. Geophys. Res., 96, 15,973-15984, 1991.

Sidorov, Lian, et al, moderators (2013), "The tip of the iceberg: placebo, experimenter expectation and interference phenomena in subconscious information flow, Journal of Nonlocality, Vol. II, Nr. 1, June 2013.

Sidorov, Lian (2002). "The imprinting and transmission of mentally-drected bioinformation.." JNLRMI, Vol.1 No.1, Jan. 2002. www.emergentmind.org/sidorov_I.htm

Sidorov, Lian (2001). "On the possible mechanism of intent in paranormal phenomena.", Journal of Theoretics , July 2001. www.emergentmind.org/sidorovII.htm

Sidorov, Lian (2002). "Control systems, transduction arrays and psi healing: an experimental basis for human potential science." JNLRMI, Vol. I No.2, May 2002 www.emergentmind.org/sidorovI2.htm

Simões, Fernandoo, Robert Pfaff, Henry Freudenreich, Observation of Schumann Resonances in the Earth's Ionosphere, http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20120000051_2011023798.pdf

Tchijevsky, A.I., (1926) "Index of Mass Human Excitability".
http://www.carolmoore.net/articles/sunspot-cycle.html#Tchijevsky

Volland, Hans (1995), Handbook of atmospheric electrodynamics, CRC Press. Resonant Cavities and Waveguides in the Ionosphere and Atmosphere.

Williams, E., 1985: Large scale charge separation in thunderstorms. J. Geophys. Res., 90, 6013–6025.
, 1989: The tripole structure of thunderstorms. J. Geophys. Res., 94, 13 151–13 167.

, 1992: The Schumann resonance: A global tropical thermometer. Science, 256, 1184–1187.

, 1994: Global circuit response to seasonal variations in global surface air temperature. Mon. Wea. Rev., 122, 1917–1929.

Yoshikawa, A., Kyushu University http://ham.space.umn.edu/~bob/Lysak_waveguide_paper_final.pdf
The strong inhomogeneities in plasma parameters in the ionosphere and adjacent regions can trap waves in the upper end of the ULF range (Pc1/Pi1).