# Enhancement of Theta and Gamma Activity Power Within Fixed Sections of Human Brains Stimulated by Sean Harribance's Electroencephalographic Configuration: Is He Equivalent to a "Universal Donor" for Entanglement?

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**ABSTRACT**

The persistence and proficiency by which Sean Harribance has accessed non-local information about the detailed experiences and histories of other people suggests congruence with intrinsic brain structures. Brain-appropriate (2 μV) voltage levels of the electroencephalographic patterns that had been recorded from Mr. Harribance's frontal, centro-parietal, and temporal regions during his most accurate descriptions were applied by needle electrodes to left and right hippocampal formations, temporal stems, caudates, internal capsules, parahippocampal gyri, and insulas within coronal sections of fixed human brain sections. Spectral analyses obtained by adjacent needle sensors indicated that different components of the Harribance Configuration (HC), particularly temporal (T4), and centro-parietal (C4) regions elicited enhanced spectral power within the grey relative to white matter for the theta (4-7.5 Hz) band while only the HC component from the right temporal (T4) region elicited enhanced power within the gamma (40 Hz) band for both grey and white matter. These enhancements could reflect the presence of intrinsic spatial properties within brain tissue that survive fixation and remain responsive to congruent applied electromagnetic patterns. The conspicuous presence of the fundamental and harmonic components of the Schumann Resonance peak frequencies within the HC and recent real-time measurements of intermittent coherence between living human brains and Schumann activities may relate to the Harribance effect. One interpretation is that his accurate descriptions of the experiences and histories of people he has never met reflect access to a source of non-local information associated with the earth-ionosphere wave guide within which all human beings are immersed.

**Key Words:** Harribance Effect, excess correlation, entanglement, Schumann Resonances, fixed brain sections, QEEG, right hemisphere

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## Introduction

The physical properties of the human cerebrum determine its dynamics. For example, the space constant for the width of a typical axon of a neuron is about 3 to 5 mm, which is the thickness of the cerebral cortices. The time constant for the median values for the neuronal plasma cell membrane (with a width of 10 nm) is about 100 ms or 10 Hz, the centroid for the peak power from the electroencephalogram. In addition, the intrinsic resonance of grey matter derived from its inductance at 1000 Hz (the duration of an action potential, i.e., 1 ms) and its capacitance is within the range of 7-8 Hz (Tsang *et al.,* 2004). When human brains are fixed in ethanol-formalin-acetic acid (pH ~3.5 to 3.8) the intrinsic

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properties would not be expected to change appreciably. This is possible because the actual concentration of protons at this bulk pH can be equivalent to the local pH of ~6.5 to 7.4 which is found immediately adjacent to the living plasma cell membrane (Rouleau and Persinger, 2014). There should be convergence between microstructural properties within specific cerebral regions and optimal responses during application of congruent electromagnetic patterns as punctate (very local) voltages. Here we present compelling evidence that a specific temporal pattern of microcurrents derived from the region within the right hemisphere of Sean Harribance's cerebrum that is most associated with the accuracy of his access to information from other people's experiences generates specific enhancements within sections of fixed human brains.

The explanation for the verifiable capacities for some loci of cerebral activities (the brains of "special people") to access information from other loci of cerebral activities (the general population) through non-local mechanisms has been a recurrent challenge to Science when it relies strictly upon local effects and interpretations of causality. Recent quantitative electroencephalography and imaging techniques such as LORETA (low resolution electromagnetic tomography) have allowed real-time measurements of brain activity while people engage in the behaviours that have been considered manifestations of non-local effects (Scott *et al.,* 2015). Sean Harribance (1994) is one example of a person whose exceptional brain activity is associated with the accurate access of information regarding the personal experiences, memories, and medical histories of others that appear to exceed the limits of locality (Roll *et al.,* 2002). His accuracy has been so consistent and detailed that he has been consulted by leaders of industry and the military as well as people from the general population for decades.

Mr. Harribance has been assessed by multiple experimenters over the last five decades. His accuracy for identifying stimuli hidden within envelopes as well as discerning the health and idiosyncratic history of people sitting near him or individuals known to individuals sitting near him has been verified by multiple authors. A review of this literature has been published previously (Persinger, 2010a). Laurentian University Neuroscience Research Group measured the activity of Mr. Harribance's cerebral activity while he generated his free-associative narratives in response to being presented with pictures of different individuals he had never met. Several strong correlations were found between the accuracies of his statements about these individuals by people who were not near Mr. Harribance and peaks of EEG power over Mr. Harribances's right hemisphere. The activity was primarily over the right frontal and temporal regions. The accuracy of the blind rated statements about individuals was systematically related to the duration of the appearance of this Harribance Configuration (HC) over his right frontal-temporal region. During the HC, which requires his personal preparation to be enhanced, he reports a condition or state associated with a religious context he describes as "an angel" and then a series of images about the person about whom he is concentrating. We have operationally called this his "non-local behaviours" (that he often describes as "readings") because the accuracy of his comments refers to information not present or not nearby at the time of the experiment.

The occurrence of the HC over his right hemisphere was associated with increased photon emissions, as measured by an analogue photomultipier tube. The increased photon flux density during his "non-locality" occurred near his right but not his left temporal lobe while he was sitting in darkness. The photon flux power density, approximately 15 cm from his scalp, was $\sim 10^{-11}\ W \cdot m^{-2}$ or about 10 times the magnitude of the average person we have measured (Dotta *et al.,* 2012). The earth's magnetic field in the same plane systematically decreased as the photon emissions increased during his imagination. The concurrence of photon emissions from his right hemisphere during cognitive images creates the condition for excess correlation, entanglement, and non-locality (Aczel, 2002; Dotta and Persinger, 2012; Vaziri *et al.,* 2002). The absolute value of the diminished quantity of energy associated with the decreased intensity of the geomagnetic field within the volume of space at that distance around his head was equal to the increased energy associated with the enhancement of photon flux densities. Such inverse correlations between ambient changes in the geomagnetic field intensity and photon emissions have recently been demonstrated for cells (Persinger *et al.,* 2015) and may be an intrinsic property of space-time (Vares and Persinger, 2013). The Harribance studies indicated a potential shared variance within the volume of cerebrum between the photon emissions during intention and the superimposed geomagnetic field. A similar inverse relationship but of much less magnitude has been measured for another subject (Persinger *et al.,* 2013) from a mixed Aboriginal Heritage and a sustained history of meditation.

In other procedures where the subject (n=4) sat within 1 m of Mr. Harribance and the QEEG activities of *both* were recorded during his "reading" of the experiences of the subject a conspicuous intercalation was evident. First, there were marked elevations of power within the range of *gamma* activity over the temporal lobes of the subjects compared to baseline when both Mr. Harribance and the subjects sat quietly with their eyes closed. In addition to the general increase in power within left temporal lobes of the participants within the beta-gamma (20 to 40 Hz) range, there was a conspicuous decrease in power within the 1 to 10 Hz range, with the exception of 6-7 Hz over the right temporal and parietal regions compared to the left homologous regions. The power of this specific 1 Hz increment peak (6-7 Hz) was as large as the enhanced gamma activity. Cross spectral analyses of the raw data (20, 2 s samples per participant) revealed increased coherence within the 19-20 Hz and 30-40 Hz band within Mr. Harribance's *right temporal lobe* and the participants' *left temporal lobes* during his interpretations (Hunter *et al.,* 2010). The latter was considered supportive evidence that Mr. Harribance could be "accessing" the information from the region of each participant's cerebrum (the left temporal area) that is associated with experiences of memory as well as their consolidation.

Later, Karbowski et al (2012) digitized the HC as well as the normal EEG pattern that Mr. Harribance displayed over this left hemisphere. The series of quantized voltages from his QEEG record were transformed to serial 3 ms aggregates of numbers from 1 through 256 that were transformed by digital-to-analogue converters (DACs) to between -5 and +5 V (127=0 V). These quantized voltages were then sent to solenoids (relay switches) from which magnetic fields were generated. When the HC pattern and its left hemispheric homologues were applied as three-dimensional magnetic fields (peak to peak intensity ~ 1 μT) with 3 ms point durations to mouse melanoma cells in culture, only the HC pattern slowed the growth of these cancer cells. The growth of the cells that received applications of his left temporal lobe pattern did not differ significantly from that of sham-field controls. Several unpublished studies from well-known institutions known internationally for their research with cancer indicated that the proximity of Mr. Harribance to plates of cancer cells or patients with verified malignancies diminish the aberrant growth.

In one of our pilot studies a person who had been one of the subjects in the yoked QEEG experiments with Mr. Harribance was instructed to simulate his behaviour (report subjective images and impressions) to each of 10 different pictures of different individuals while he wore the Koren Helmet (e.g., Richards *et al.,* 1996) through which the HC was presented across the temporal lobes (right side enhanced) along the horizontal plane with intensities between 1 and 5 μT. He sat in the same chair and chamber in which Mr. Harribance had displayed his non-local behaviours about six months previously. Without the participant's knowledge, although he knew that some trials would be associated with the presentation of a magnetic field, half of the trials (viewing pictures) were associated with presentation of the HC over his right hemisphere (from 30 s before to the end of the narrative). During the other half of the trials, Mr. Harribance's left hemisphere or "normal" pattern was presented. The narrative details were then assessed for accuracy by the person who supplied the photographs of family members but who was not present during the experiment. The numbers of rated correct statements displayed by the subject when he was receiving the HC were significantly increased relative to when he was not. However, the effect size was not as strong as that displayed by Mr. Harribance.

That Mr. Harribance can "access" information presumably maintained within the spaces occupied by the cerebral loci of others suggests there could be common microstructural factors in all human brains that can be interfaced by cerebra that exhibit specific "electromagnetic patterns" or "access codes" (to employ a metaphor). If this universality is related to structure per se then the HC configuration should still differentially affect specific regions of the fixed human brain. We have shown by direct histological microscopic examination at 1000x that the soma and gross structural organization of our human brain collection is still intact even though they have been fixed for decades in EFA (ethanol-formalin-acetic acid). We have employed this fixative for most of our brain samples because it preserves cellular detail and markedly enhances the ease of sectioning and staining paraffin blocks containing processed brain tissue. Here we present evidence that the direct application of different components of the HC to fixed coronal sections of human brain evoked shifts in electrophysiological patterns that could reflect intrinsic properties of human brains and their resonance with complex temporal patterns of cerebral origin from a living human brain.

## Materials & Methods

### *Digitizing Signals & Output*

Eight complex signals (4 left, 4 right hemisphere) were generated by digitizing human quantitative electroencephalographic (QEEG) activity that had been obtained from over the scalp of Mr. Harribance. The digital signals were then converted to 44100 Hz sampling rates. Each complex signal was originally raw data, each obtained over 1 of 19 channels. All samples had been coded in order to mask the origin. They were randomly selected such that the experimenter did not know where over the scalp the stimuli were recorded.

Subsequent to data collection, it was revealed that the signals were originally extracted from sensors F3 & F4 (dorsal frontal), F7 & F8 (lateral frontal), C3 & C4 (central fronto-parietal), and T3 & T4 (anterior temporal). The right hemispheric sensors, F4, F8, C4, T4, were the primary positions that defined the Harribance Configuration (HC) as reported by Hunter et al (2010). The HC occurred for about 20 s once every minute during the periods when Mr. Harribance engaged his non-local behaviours when he was observing photographs of individuals he did not know and were not known to any one immediately proximal to him.

The digital signals for the eight sensor positions during the HC were loaded into a laptop computer. Each signal could be accessed by a coded file name. Signal output was regulated to 2μV or 10% of maximum audio amplitude using a laptop computer. We selected this value because it is within the normal range of what is recorded from the scalp of our participants and patients in this context. In addition, we have observed that maximum or near-maximum outputs from audio-amplifiers frequently distort any signals and produce reduced or no biological effects.

### *Potential Difference Recordings*

Electric potential differences were obtained from coronal sections selected from three different cerebrums in our library. The origin of the human brains were unknown and had been obtained from biological supply houses and from anonymous donors. They were within the normal range in structure, were clearly older ontogenetically, and contained no aberrant masses such as tumors or ectopic forms. The measures were recorded by coupling inserted needle probes (Figure 1) to a Mitsar electroencephalography amplifier and recording within WinEEG software on an HP Envy laptop running Windows 8. Probes were inserted into the left and right parahippocampal gyri, corona radiata, caudate nuclei, hippocampi, temporal stems, insular grey regions, and internal capsules. They were selected because of their activation or proximity to activation when Mr. Harribance was most accurate (Persinger and Saroka, 2012). All probed regions were referenced to the basilar artery. Stimulating and sensing probes were separated by 4 mm (the median cerebral cortical thickness).

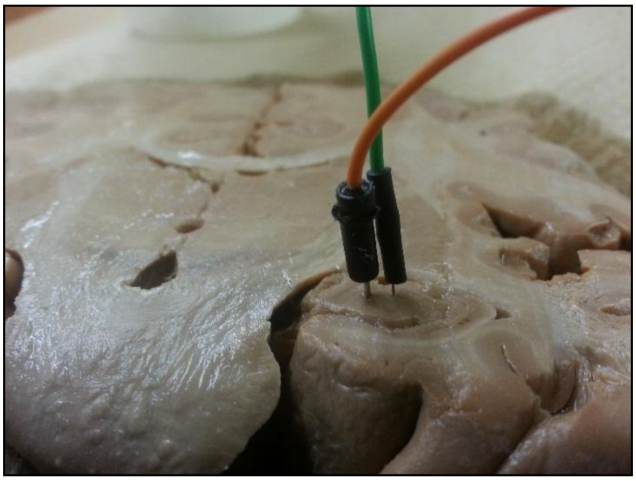

**Figure 1.** Right hippocampal body is simultaneously stimulated (orange lead) and probed (green lead).

The electrophysiological measurement device was configured to record 250 samples per second with two applied notch filters within the

50 Hz-70 Hz and 110 Hz-130 Hz band ranges in order to exclude 60Hz electrical artifacts and the associated harmonic frequencies. Frequencies below 1.6 Hz and above 50 Hz were excluded from the final analysis. Each spectral power density (SPD) value was computed from 30s of data with 2s epochs within the WinEEG platform across delta (1.5 Hz – 4 Hz), theta (4 Hz – 7.5 Hz), alpha (7.5 Hz – 14 Hz), beta1 (14 Hz – 20 Hz), beta2 (20 Hz – 30 Hz), and gamma (30 Hz – 40 Hz) frequency bins.

### *Testing Procedure*

Prior to each trial, coronal sections were coated with ethanol-formalin-acetic acid (EFA). Electrophysiological recordings were obtained for 30 seconds, during which time no stimulus was applied. This recording period served as a baseline. Subsequent 30 second recording periods consisted of sequential presentations of the complex stimuli. Each trial lasted 150 s with counterbalancing of stimulus presentation sequence so as to eliminate intrinsic ordering effects.

## Results

### *Signal Processing*

The results of the spectral analyses for each of the "raw signal" patterns (before they were applied to brain tissue) from Mr. Harribance's QEEG from the locations over the right hemisphere that were most correlated with his accuracy of responses are shown in Figure 2. These areas included F4, F8, C4, and T4. The left hemispheric equivalents are displayed in Figure 3. In order to directly compare the spectral profiles from each of the four sensors the raw data had been standardized. The spectral profiles of the four right hemispheric regions were visually different. F8, which reflects activity over the more rostral right prefrontal region, exhibited peaks around 14 Hz and 25 Hz. The peaks for F4 were around 5 Hz and 20 Hz. The relative peaks for T4 were around 8 Hz, 14 Hz, and 25 Hz.

Except for a relative peak around 16 Hz C4's power spectral over the range was less variable. These peak powers within the frequencies that define the harmonics of the Schumann Resonance, that is 7-8 Hz, 13-14 Hz, 19-20 Hz, and 25-25 Hz defined the QEEG spikes in power within recordings from Mr. Harribance's right hemisphere when he was most accurate about the memories and experiences of others even when they were not proximal to him. Left hemispheric sensors displayed alternative spectral characteristics. F3 displayed a pronounced 9-10 Hz peak. This is typical of the normal brain (Saroka and Persinger, 2014) in addition to lesser peaks at 15 Hz, 20 Hz, and 25 Hz, etc. F7 did not display any major spectral peaks. C3 was associated with relative spectral power increases around 6Hz, 9-12 Hz, and 14-22 Hz. Lastly, the T3 signal displayed a single peak around 7Hz with minor, non-specific perturbations within the 14-24 Hz band.

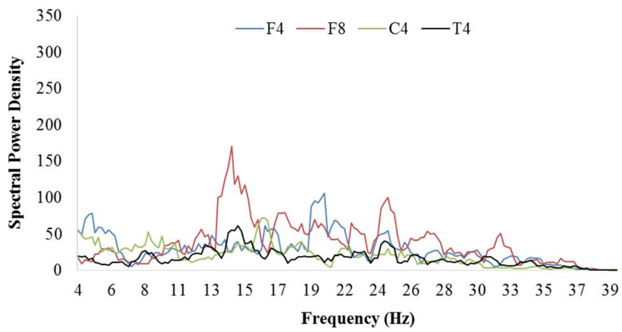


**Figure 2.** Spectral power density for frequencies ranging between 4Hz and 40Hz within complex signals F4, F8, C4, and T4.

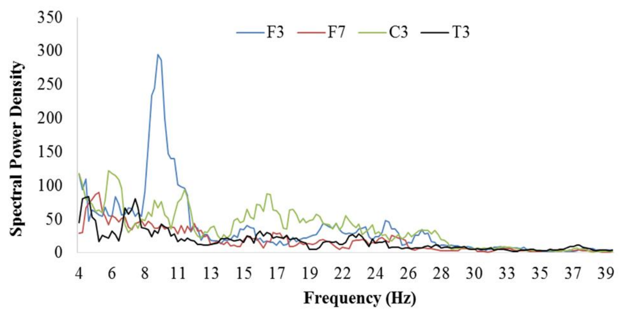


**Figure 3.** Spectral power density for frequencies ranging between 4Hz and 40Hz within complex signals F3, F7, C3, and T3.

The results of the spectral power density profiles recorded by the QEEG directly from the different brain sites of the coronal sections from three different human brains when the HC components were applied as discrete voltages are shown in Figure 4. ANOVAs revealed significant differences in theta power displayed within grey matter as a function of the applied complex stimulus [$F(8,218) = 2.89$, $p = .005$, $\eta^2 = .09$]. White matter exposed to the same stimuli did not demonstrate the effect ($p > .05$). Application of the C4 and T4 component of the HC resulted in differentially more microvolt power within the *theta* band within the grey matter compared to the white matter as indicated by the absence of overlap between the standard errors of the means (SEMs). This may be relevant to the results of previous simultaneous QEEG measurements when Mr. Harribance and each of four subjects were separated by about 1 m. There was a conspicuous increase in theta activity (6 to 7 Hz) within the right temporal and parietal regions of the participants near Mr. Harribance despite the markedly diminished values below and above this range until the interval of beta and gamma activity. These results indicate that the HC specifically enhances theta power in grey matter within the central (adjacent parietal) and temporal regions even in fixed brain tissue. Two homogeneous subsets were isolated wherein the major source of variance was a significant increase in theta power in grey matter exposed to the T4 signal (M= 91.72 SE= 3.42) relative to the F8 signal (M= 75.50, SE= 4.07), $t(42)= 3.05$, $p<.005$, $r^2=.18$. Left hemispheric sensors did not produce similar grey-white differences ($p>.05$).

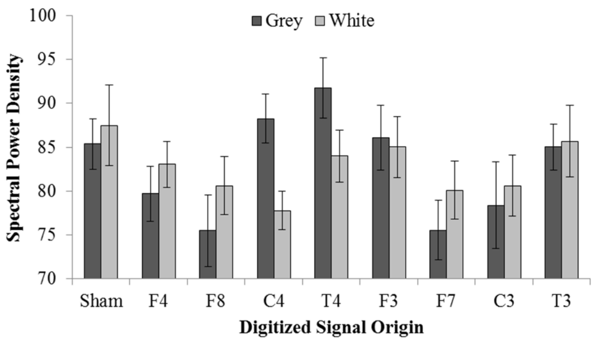


**Figure 4.** Signal-dependent differences in theta (4Hz – 7.5 Hz) power within white and grey matter. The statistically significant effects occurred for the C4 and T4 components of the Harribance Configuration.

The second major effect of applying the four different components of the HC to the selected tissue occurred within the *gamma* range. This is significant because as Bear (1996) has suggested and direct measurements have indicated 40 Hz ripples associated with awareness and consciousness during cerebral cortical activity are superimposed upon the theta range outputs of the hippocampus (Buzsaki, 2002). ANOVAs revealed statistically significant increases in gamma power within grey and white matter as a function of the applied complex stimulus. The effect size for the differential response to components of the HC for the two types of brain tissue [$F(8,199) > 7.50$, $p<.001$] were 24% and 30%, respectively. In both cases, the T4 signal (M= 5.28, SE= 1.25) was identified as the primary source of variance with increased gamma power relative to all other conditions ($p<.05$). These results are presented in Figure 5. Stated alternatively the right temporal component of the HC that was associated with his accuracy for non-local information and details enhanced gamma activity within the grey and white tissue more or less equally throughout the region sampled within the fixed brains.

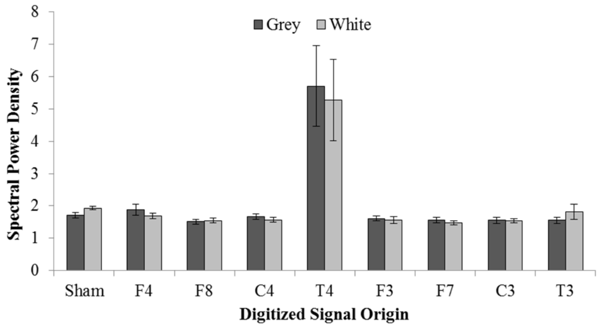


**Figure 5.** Signal-dependent differences in gamma (30Hz – 40Hz) power within white and grey matter.

The results in general reflected enhanced power differentially within the grey and white matter within the theta range or comparably within grey and white matter for the gamma range when the T4 component of Mr. Harribance's unique cerebral pattern was applied to the fixed brain tissue. There was no differentiation with respect to the type of tissue from the loci that were sampled. Close examination of the statistically significant three-way interaction as a function of the structure (locus) within the brain, the hemisphere, and the component of the HC for beta2 power [$F(24, 208)= 1.85$, $p<.05$, $\eta^2= .18$] could be revealing.

Significantly increased beta2 power was identified within the left caudate nucleus (M= 4.27, SE= .09) relative to right caudate nucleus (M= 3.80, SEM= .06) when exposed to the T4 signal, [$t(4)= 4.43$, $p<.05$, $r^2=.83$]. These differences were not observed when stimulated with T3 ($p>.05$). Beta2 SPD increased within the left hippocampal body (M= 4.43, SEM= .09) relative to right hippocampal body (M= 3.73, SEM= .25) when exposed to the F8 component of the HC [t(4)= 4.12, $p<.05$, $r^2$=.81]. The left hemispheric equivalent, F7, did not produce this laterality ($p>.05$). Third, beta2 SPD increased within the white matter of the right temporal stem (M= 4.50, SE= .15) relative to left temporal stem (M= 3.80, SEM= .10) when exposed to the F4 component, t(4)=3.83, $p<.05$, $r^2$=.79. The F3 component did not produce similar hemispheric differences ($p>.05$). Other structures did not display these effects. Consequently, the primary source of interactions between different components of the HC occurred within the 20 to 30 Hz band. This was the specific band that was enhanced over F8 and T4 of Mr. Harribance's right hemisphere (which defined the HC) when he was engaging in non-local ideation and experiencing the presence of the entity to whom he attributed his accuracy.

### *Complex-Schumann Investigations*

Bivariate correlations were identified between the range around the fundamental Schumann band and spectral power densities within the 6Hz – 10Hz band and F4 (r= -.48, $p<.05$, rho= -.59, p=.01), F3 (r= -.56, rho = -.58, $p<.05$), F8 (r= -.73, p=.001, rho= -.84, $p<.001$), C3 (r= -.51, rho= -.59, p=.01), and T4 (r= .52, $p<.05$, rho= .53, $p<.05$) complex signals. Schumann and paired sensor relationships are visualized in Figure 6. The Schumann-T4 scatter shows the only statistically significant positive relationship identified (Figure 7, top right). Symmetrical partial correlations revealed that the Schumann-T4 relationship was dependent upon F8 (r= .32, $p>.05$). The Schumann-F8 relationship remained significant when controlling for T4 (r= -.65, $p<.005$).

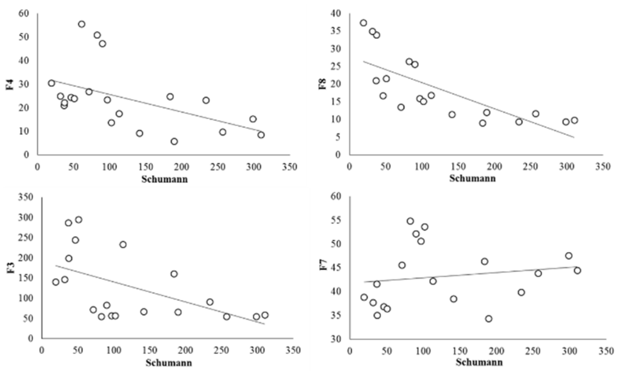


**Figure 6.** Standardized spectral power density within the 6 Hz-10 Hz band for Schumann plotted against F4 (upper left), F3 (bottom left), F8 (top right), and F7 (bottom right) complex signals.

Further analysis revealed that if the spectral power densities for all right hemispheric signals were lagged by a single 0.5 Hz increment and net differences were computed relative to the original signal spectra, significant relationships were maintained between Schumann and F8 spectra (r= -.19, $p<.001$) as well as Schumann and T4 spectra (r= -.23, $p<.001$). Symmetrical partial correlations revealed that the relationships were independent. Stated alternatively the controlling feature for the HC was the right prefrontal activity which has been shown to be central to the organization of the "reconstruction" of episodic and autobiographical memory. This would suggest that Mr. Harribance has some potential discretionary influence for the information that is accessed. In addition, because global geomagnetic activity (Mulligan *et al.,* 2010) and its experimental simulation (Mulligan and Persinger, 2012) specifically affects the right prefrontal and right temporal regions, interactions between these variables could differentially affect his interpretations.

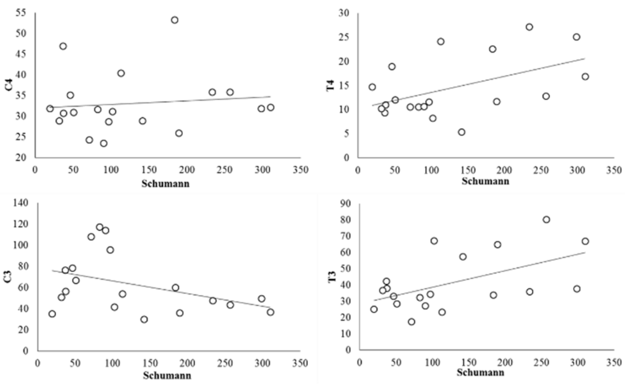


**Figure 7.** Standardized spectral power density within the 6Hz-10Hz band for Schumann plotted against C4 (upper left), C3 (bottom left), T4 (top right), and T3 (bottom right) complex signals.

## Discussion

The results of this experiment indicated that the spectral power profiles of varying potential differences as measured from needle probes inserted directly into either white or grey matter within parahippocampal gyrus, hippocampi, temporal stems, insular grey, caudate nucleus, internal capsule and corona radiata (the white matter below the cerebral cortices) responded differentially to applied patterns of weak electrical stimulation that simulated the effective activity from Mr. Harribance's cerebrum. These areas within the fixed human brain had been selected because they were most activated when Mr. Harribance's statements about non-local information were most accurate according to LORETA analyses (Hunter *et al.,* 2010; Persinger and Saroka, 2012). This pattern had been defined as the Harribance Configuration (HC) that involved primarily the right frontal, central, and temporal lobes. When it occurred over his cerebrum the accuracy of his impressions and "access to information" about others nearby or inferred by looking at photographs of people was significantly greater than when it did not.

Application of the eight (4 left, 4 right hemisphere) components as 2 μV inputs to the regions of the fixed brains showed differentially elevated increase in power within the *theta* range for the grey matter compared to the white matter that was induced only by the component of the HC that had been obtained from Mr. Harribance's *right* central and temporal regions. The fact that the discrepancy occurred for only two of the patterns within the right hemisphere and not those from the right prefrontal region or from the four left hemispheric patterns strongly suggests the effect was not an artefact of simple current induction within the adjacent needle sensor that measured the QEEG responses. On the other hand, only the HC component from his right temporal (T4) region produced the enhanced power within the *gamma* range. The effect occurred within both grey and white matter. If the fixed tissue were homogeneous in its physical properties such as impedance, conductance or capacitance, the differential effects measured by the sensors adjacent to the stimulation point would not have occurred. The sensor needle would have been "driven" by the needle through which the pattern was delivered. The complexity of the measurements strongly indicate that physical properties of brain remain even after years of fixation that are sufficient to produce interference patterns with the externally applied voltages.

The prominence of the effect within the gamma range for the right temporal component of the HC configuration for both white and grey tissue and within the theta range for the right central and temporal component for the grey matter preferentially is consistent with the organization of the dynamics of the human brain. The inductance (L) per meter of cortical grey matter at 1 kHz (equivalent to the action potential's duration of 1 ms) is $\sim 10^{-2}$ Henrys. The permittivity of grey matter (C) is $2 \cdot 10^{-1}$ Farads·m$^{-1}$. Application of the equation:

$$f = [(2\pi \cdot (LC)^{-1/2}]^{-1} \quad (1),$$

results in a resonance frequency for an implicit circuit of ~ 7 Hz. The 7-8 Hz pattern is relevant because it is the solution for the recurrent waves of potential that move in a rostral to caudal direction once every 20 to 25 ms (Edelman, 1989; Llinas and Ribardy, 1993). This is equivalent to the 40Hz pattern associated with consciousness (Jeffreys *et al.,* 1996). Assuming a bulk velocity of 4.5 m·s$^{-1}$ and a median cerebral circumference of 60 cm, the standing resonance frequency would be about 7 to 8 Hz (Nunez, 1995).

The intrinsic relationship between the theta and gamma ranges is optimally represented within the hippocampal formation, the gateway to memory. As shown by direct electrophysiological measurements the defining theta range displayed by the hippocampal cells contains a ~40 Hz superimposed ripple (Buzsaki, 2002). It may be relevant that the source of these two frequency bands may originate from "pacemaker" cells within the septum that are located towards the center of the cerebral mass adjacent to the lateral ventricles. According to Bear (1996) this 7-40 Hz superposition may set the condition for interaction between the hippocampal process associated with memory consolidation and retrieval and its integration with information represented within the entire cerebral cortical manifold.

Although the EFA may have fixed the intrinsic properties within the brain sections, there was the additional component of enhanced acidic pH and hence the presence of more free protons. Rouleau and Persinger (2014) had demonstrated non-random variations in electroencephalographic profiles from a synthetic three-shell realistic head model composed of conductive dough. The effect was very precise when the pH was within a narrow range that would be equivalent to the enhanced concentration of protons adjacent to the surface of the living plasma membrane. The enhancement of this gradient near surfaces is consistent with the properties of interfacial water (Pollack, 2003; Pollack *et al.,* 2009) whereby the resulting thin shell of protons would be sufficient to actually generate the resting membrane potential (Zheng *et al.,* 2006).

## *Explaining Proximal Effects*

These measurements and interpretations could explain how Mr. Harribance's brain and body would affect the brains of those sitting nearby. Hunter et al (2010) had shown that when Mr. Harribance engaged in his non-local behaviours there was a reduction in the intensity of the earth's magnetic field along the horizontal plane that was measurable up to 1 m from his head. This was the distance our MEDA magnetometers' sensitivities (1 nT) were no longer sufficient for discernment. The diminishment of the earth's magnetic field around his brain only occurred during the periods when there were enhanced photon emissions from his right hemisphere. The energy diminished from the geomagnetic field was equivalent to the energy emitted from his brain.

Consequently, the energies could have intercalated with the cerebrums of the subjects sitting nearby. According to the equation:

$$E=[B^2\cdot(2\mu)^{-1}]\cdot m^3 \quad (2),$$

the energy associated with a magnetic field within a volume ($m^3$) is equal to the square of the applied magnetic field strength divided by twice the magnetic permeability (μ) of the space. Assuming only 1 nT, the energy within the volume ($10^{-3}$ $m^3$) of the participant's cerebrum would be $10^{-15}$ J per implicit second. Within 10 s the cumulative energy would be $\sim 10^{-14}$ J or the equivalent rest mass of an electron. It may be relevant that the median latency from the onset of cognition for the photon emissions from his brain and the proximal geomagnetic field to diminish proportionally was about 10 s. However, from the perspective of brain activity, where each action potential is associated with a quantity of $\sim 10^{-20}$ J (Persinger, 2010b; 2015a), this energy would be equivalent to about 1 million action potentials. If Mr. Harribance's brain could access the information within these potentials reversibly from the brain volume of the participant there would be sufficient information to constitute a "percept" (Rouleau and Dotta, 2014) within his brain space. Given there are only about $10^7$ neurons with the human hippocampus (Gloor, 1997), the effect would be enhanced if it were localized more precisely within this structure of the participant's brain.

The three-way interactions between the brain structure, the particular component from the HC and the frequency could reflect the internal dynamics that occurs within the brains of people who are near Mr. Harribance when he is engaging in non-local processes. The increases in power for these interactions when the HC was applied as weak voltages only occurred for the beta2 range (20 Hz). When he was sitting near participants in the Hunter et al (2010) experiments, there was a duration-dependent increase in the degree of cross-spectral coherence within the 19-20 Hz band (and the 30 to 40 Hz band) between *Mr. Harribance's right temporal lobe and the participants left temporal lobes* during his "perceptions" of their experiences, medical histories and significant events in their lives. The most parsimonious explanation was that this coherence facilitated his access to information that was represented within the left temporal lobes of the participants of which they were aware and were coupled with memory.

This would suggest that some component of the individualized neurocognitive patterns within the brain volume associated with the experiences of "memory" about the self has a general component that is interpretable potentially to other brains nearby. There are commonalities among all human brains. For example, there are entoptic images associated with right hemispheric stimulation that can be found in the art forms of all human cultures that have been assessed for these phenomena. There are implicit understandings from percepts of spatial patterns or signs for conveyance and locations of human species significance (such as rest stops) that have replaced words in many countries.

Bokkon's (2005) hypothesis of visual imagery would accommodate the Harribance phenomena. Bokkon has suggested that the photons are emitted during the activity of neuronal arrays within the cerebrum when the person reports visual imagery. Dotta et al (2012) supported his contention by measuring increases and decreases in photon emissions from the right side of the heads of volunteers who were sitting in hyperdarkness as they imagined white light and or not imagine white light. Bokkon (2005) and later Bokkon and his colleagues (Salari *et al.,* 2011; Wang *et al.,* 2011), have accumulated data that at least some visual images associated with percepts and imagination are actual photon fields. In other words, the percept of visual imagery is the response to the actual creation of photon fields within brain space. The involvement of photons in the Harribance phenomena allows the conditions for excess correlation and entanglement to occur. If Mr. Harribance is detecting the photon fields of proximal brains than the rate limiting step for his accuracy is the fidelity of the transformation into his linguistic symbols. Ingo Swann (Persinger, 2015b), who, with Hal Puthoff, Russell Targ, and Ed May, developed the remote viewing paradigm, described this as the primary limit due to the "errors from analytical overlay". From a neuroscience perspective it is the expected consequence of the translation of right hemisphere patterns into left hemispheric equivalents that are strongly correlated with self-awareness and consciousness.

That information from the right hemisphere is mediated into the left hemisphere (with which awareness or "consciousness" is strongly correlated) primarily by the corpus callosum is a classic interpretation in neuroscience. This massive interhemispheric interface is composed of about 250 million fibers. Because there are about 20 to 25 billion neurons within the human cerebral cortices this means that only about 1 in 100 neurons' axons traverse to the other hemisphere. Although timing could accommodate this discrepancy there will still be substantial types of information that would be restricted from left hemispheric awareness and subject to transformational errors. If the inferior and middle temporal gyri of the temporal lobes are involved the interhemispheric connections would more involve the anterior commissure rather than corpus callosum per se.

However, what is less known is the fact that in the human brain the dorsal hippocampal commissure situated within the anterior portion of the splenium of the corpus callosum is particularly developed in human brains and allows direct subcortical access between the two hippocampal formations and the parahippocampal gyri, *without* the involvement of the corpus callosum and the anterior commissure. Direct measurements of stereoelectroencephalography in patients with complex partial seizures indicated that the median latency for this intercalation is about 20 s. In less electrically sensitive brains this suggests that "memory" information acquired through the right hippocampal area could be acquired from extrinsic sources and be mediated to the left hippocampal region to be consolidated as "memories" without the person's awareness. The highest probability, when the person would become "aware" of the images associated with this anomalously acquired "memory," would occur during the nocturnal REM (rapid eye movement) episodes when the consolidation process is represented within dream imagery.

The specific structures involved with the three-way interaction within the fixed brain sections suggest what could have happened within the living participants' brains. Increase activity within the left caudate compared to the right caudate was measured in the fixed brains when exposed to the T4 component of the HC. Similar increases within this region have been measured in normal populations (Linden, 2005) when they were exposed to changes in stimuli, such as subtle changes in the syntax structure of sentences, about which the percipient is "not aware". Portions of the brain volume responded even though "awareness" was not engaged. The increase of activity within the left hippocampus compared to the right hippocampus of the fixed brains, if similar changes had occurred in the living brains, could be associated with experiences of personal memory related to language concepts. Finally, the increased activity within the white matter of the right temporal stem compared to the left temporal stem in the fixed brains, if comparable changes had occurred in the living brains, would be consistent with increased photon emissions as well as greater sensitivity to small changes within the earth magnetic field, such as during geomagnetic activity (Saroka *et al.,* 2014).

This specific change within the white matter of the right temporal stem, which is a conduit between the parahippocampal gyrus and the entire cerebral cortices, would indicate that the entire cortical manifold would be potentially accessible. This ventral structure has been considered the "locality" where the different codes or "languages" from different sensory modalities are transformed into a single "language" based upon frequency and frequency patterns (Gloor, 1997; John, 1967). There are many interpretations of brain function that model it as an aggregate of different spatially bounded frequencies within which there are phase shifts from which consciousness could emerge. Such phase shifts could create the conditions for the prominence of the A-vector or vector potential of magnetic fields that are not easily shielded and display the properties to allow excess correlations over distance. Structurally the human hippocampal formation is two interlocking C-shaped structures that are congruous geometrically with a smaller spherical condenser wrapped and partially interdigitated with a larger spherical condenser (Gloor, 1997). The spatial arrangement is similar to a toroid with a gap that allows a discrete leakage of magnetic flux. It is strongly affected by the phase vector of a magnetic field that can be matched with intensities found within both the geomagnetic field and the Schumann Resonance.

The cortical organization within the parahippocampal gyrus that integrates this function is the entorhinal cortices. As masterfully described by Gloor the entorhinal cortices contain cellular islands within layer II that result in small formed bumps on the cortical surface known as *verrucae gyri hippocampi*. The axons of these cells descend as components of the perforant pathway which is the main source of cortical input to the hippocampus. The fibers originating in Layer II terminate in the dentate gyrus that is the primary afferent to the hippocampus proper. Fibers exiting the soma within layers II and III are distributed throughout the cerebral cortices. Direct measurements of the stellate cells within layer II of the entorhinal cortices indicate they exhibit continuous subthreshold oscillations of ~8 Hz (Alonso and Klink, 1993). The small voltages when multiplied by the unit charge and by the frequency result in quantities of $\sim 10^{-20}$ to $10^{-21}$ $J \cdot s^{-1}$. The latter exact value is almost identical to the quantity of energy gained or loss from or to entropy with one bit of information according to the Landauer Limit. This frequency is the standing wave of the cerebral volume according to Nunez (1995) and is the fundamental harmonic of the Schumann Resonance (Nickolaenko and Hayakawa, 2014).

## *Explaining Non-Proximal Effects and Information*

This potential mechanism to explain how the HC could access information from proximal individuals would not accommodate Mr. Harribance's established capacity to accurately discern individual's medical and personal histories at a distance even though he never met them. His brain would require access to a more pervasive source or repertoire of information. The occurrences of the peak spectral powers of direct measurements from Mr. Harribance's brain that define the Schumann Resonances could be revealing. The Schumann Resonance, with a fundamental of between 7-8 Hz and harmonics (increasing $\Delta f \sim 6$ Hz) at 14 Hz, 20 Hz, 26 Hz, etc are generated within the spherical wave-guide cavity between the surface of the earth and the ionosphere. They are the direct consequences of the global occurrence of lightning which occurs at approximately 40±5 Hz which is the median transcerebral frequency associated with human consciousness. The major component of the HC displays peaks within the fundamental and the harmonics of the Schumann Resonance. To accommodate the entirety of the Schumann fundamental and harmonics all of the components of the HC from the frontal, central and temporal regions of his right hemisphere (Figure 2) must be accommodated. In other words, although specific regions of his right hemisphere may peak at particular Schumann harmonics, his entire hemisphere must be integrated to display the major harmonics. Conditions that fragment the functional integration of his right hemisphere could diminish his accuracy. Possible stimuli could involve maintained exposure to volatile solvents, such as from a toxic spill or fire, which would influence white matter preferentially.

In the present experiment the HC was applied as 2 μV potentials in order to simulate what we measured from the scalp of a normal person during QEEG. This selection was also based upon theoretical formulations developed by Persinger and Saroka (2015). First, the potential difference of 2 μV per 2 Ω·m for the resistivity of extracellular fluid in the brain is $\sim 10^{-6}$ $A \cdot m^{-1}$ and when applied across the average distance of the cerebral hemispheres (0.1 m) is about $2 \cdot 10^{-7}$ A. Assuming a resistivity of 2 Ω·m for extracellular (interstitial) fluid in the brain and when multiplied by the magnetic susceptibility the result is a diffusivity term with a value of $1.7 \cdot 10^{6}$ $m^2 \cdot s^{-1}$. If the median voltage of $2 \cdot 10^{-6}$ V is divided by the diffusivity term, the resulting magnetic field strength is $\sim 10^{-12}$ T or a picoTesla which is the same operational magnitude displayed by the cerebral cortices during "cognition". The magnetic component of the fundamental and harmonics of the Schumann Resonance usually range between 1 and 3 pT.

Second, the cross product of $V \cdot m^{-1}$ and H ($A \cdot m^{-1}$) for the magnetic field vector component would be ($2 \cdot 10^{-5}$ $V \cdot m^{-1}$) · ($1 \cdot 10^{-6}$ $A \cdot m^{-1}$) or $2 \cdot 10^{-11}$ $W \cdot m^{-2}$. This irradiative flux density is almost exactly the magnitude of the peak photon flux densities emitted from Mr. Harribance's right cerebrum during his non-local experiences. The emergence of this term is important because the Lorenz Lemma states that any two electromagnetic fields can intercalate if they are: the same frequency, 2) outside of the source, and 3) in a linear isotropic medium. Both the Schumann [S] and human cerebral cortices [C] meet these conditions. If the two fields are harmonic in time, which was shown empirically by Saroka and Persinger to occur in real time for about 0.5 s once every 30 s, then trans-spatial and possible entanglement-related "superposition" of information becomes possible. According to the Lorenz Lemma,

$$del \cdot (\mathbf{E_C} \times \mathbf{H_S}) = del \cdot (\mathbf{E_S} \times \mathbf{H_C}) \qquad (3),$$

where **E** refers to the electric vector component, **H** refers to the magnetic field ($A \cdot m^{-1}$), *del* is the operator and C and S refer to the sources.

Our spectral analyses of the separate components of the HC partitioned the harmonics of the Schumann Resonance. As shown in Figure 2, the spectral profile from the pattern over Mr. Harribance's right temporal lobe (T4) displayed the fundamental Schumann Resonances at the 8, 14, and 25-26 Hz band. However, by far the greatest peaks occurred for F8 for the 14 Hz second harmonic of the Resonance. F4 displayed the largest peak around 20 Hz. Because his right hemisphere would be integrated electrophysiologically he would have potential superimposition capacities with all of the first four harmonics. According to traditional neurological interpretations his visual experiences would appear to occur more frequently along the peripheral left visual field particularly within the upper left quadrant. Mr. Harribance has reported this propensity.

The obvious implication of this congruence between Mr. Harribance's right hemisphere pattern (HC) and the Schumann profile with respect to his remarkable accuracy is that there is some proportion of information concerning every person on the planet represented within a source strongly correlated with the Schumann Resonances that permeate the earth-ionosphere wave guide. Some brains, such as Mr. Harribance, would exhibit the properties to intermittently interact with this source to access specific information. The fact that all he required was holding a picture of a person that was not present to accurately describe the detailed medical and personal history of that person (but only when the HC was present over the right hemisphere) would be consistent with a non-locality process. The source of this process is unclear. However, in one of our experiments (Hunter *et al.,* 2010) with Mr. Harribance the pictures of people were degraded in terms of pixel density. The accuracy decreased as the pixel density decreased. This suggests that relevant information about the person within the paragraph is contained within the density of pixels or point-bits that contribute to his non-local perception.

The possibility that a proportion of information about every individual is represented within an accessible space by some individuals is contained within the philosophy of many cultures and includes metaphors such as "Akashic Record", "St-Peter's Book" and the "Chamber of Souls". Persinger (2008) has suggested that during the approximately 20 to 30 min labile period of memory consolidation when the dynamic inductions from experience are being transformed to the newly formed patterns of dendritic spines, that a portion of the information is represented within space as electromagnetic energies. This was considered a logical extension of the simultaneity or duality of matter and energy as molecular spatial patterns and electromagnetic temporal patterns. This may be reflected at the most fundamental source of magnetism, the single orbit of an electron. Quantification of the relationship between quantum Casimir energies and macroscopic magnetic field intensities solve for approximately ½ of the single orbit to be displayed with properties of particles while the other half would display energetic phases (Persinger, 2015a).

Assuming the activity of $10^7$ cortical neurons per second, each "firing" on average ~10 Hz, and each action potential with an energy of ~$10^{-20}$ J, the energy per brain per second would be about $10^{-12}$ J per s or about $10^{-11}$ $W \cdot m^{-2}$. The energy density for the entire cerebrum ($10^{-3}$ $m^3$) would be about $10^{-9}$ $J \cdot m^{-3}$, a universal consant, derived from energy equivalence in the universe ($10^{69}$ J) divided by a median volume ($10^{78}$ $m^3$). This means that in a person's life time of about 2 or 3 Gigaseconds, the total energy involved with "thinking" would be in the order of 1 J. The amount of energy contained within the space within the volume of the earth's magnetic field occupied by the Schumann Resonances is in the order of $10^{18}$ J. This would be sufficient, if the spatial parameters were appropriate, to represent the electromagnetic 0,1 point information of the cognitions and memories of every human brain that has presumably existed. However that does not necessarily indicate that all experiences would be "represented" equally. Those which activated the hippocampal-amygdaloid loop would be expected to be more proportionally represented.

The concept is not any more or less credible than the statement that all or most of a person's physical and disease history as well as the residuals of his or her ancestors are contained in a very local space within any cell with the nucleus. This is the contemporary interpretation of the DNA record contained within the approximately 3 billion base pairs per cell nucleus. Accessing components of that record, in short segments of about 27,000 base pairs, can be revealing and is often labelled as a "gene". To be discerned at perceptible levels its correlates or compliments must be "amplified" with some fidelity such as by polymerase chain reactions. All of these procedures may have analogues within the processes that allow the Harribance effect to occur.

Persinger and Saroka (2015) found that the coherence between the cerebral cortical spectral profiles of several dozen volunteers and the local Schumann Resonance activity as well as its measurement in Italy occurred for about 0.5 seconds once every 30 s. They argued that if the "signalling" was similar to computer-based packets for the transferring information through the WEB and Internet, that each 30 s interval containing the 0.5 s coherence would allow approximately 1 MByte of exchange under optimal conditions with the $10^7$ primary neurons in the human hippocampus. That would be sufficient to generate, at least in electronic systems, vivid images and pictures. These calculations and inferences do not prove these are the mechanisms and processes by which Mr. Harribance accesses the information from others. However, they offer testable possibilities within the laboratory.

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