Case Study

EEG AMPLITUDE, BRAIN MAPPING, & SYNCHRONY IN & BETWEEN A BIOENERGY PRACTITIONER & CLIENT DURING HEALING

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ABSTRACT

A controlled case study was conducted with a bioenergy practitioner and a client during a healing experience. Experimental effects were documented with both participants measured simultaneously using a 24-channel digitized EEG evaluations under four experimental and control conditions: relaxation, meditation, healing-at-a-distance, and healing (client present). Clinical observations and/or ratings of each condition were made by both participants

Brain maps of the bioenergy practitioner across conditions indicated the presence of a strong right hemispheric activation pattern compared to the left. High amplitude alpha rhythms (up to 100 μV) were observed in the left and right occiputs, and high amplitude beta and gamma rhythms were also present in the right occiput and in other areas of the right hemisphere during all conditions, but especially during relaxation and meditation. Healing-at-a-distance and healing (client present) were associated with high frequency, high amplitude beta and gamma rhythms localized in the right frontal area, together with low amplitude left occipital and central theta rhythm.

Intra- and inter-personal synchrony between bipolar electrode pairs was determined for each condition. Beta, alpha, theta, and gamma synchrony in the bioenergy practitioner was higher and less variable than that in the client in all conditions, and was highest and most stable during healing-at-a-distance. Interpersonal synchrony was highest during healing, especially in alpha frequencies between left occipital areas of bioenergy practitioner and client.

KEYWORDS: EEG, synchrony, brain mapping, healing, meditation

INTRODUCTION

Few research studies yet exist that attest to the positive effects of energy medicine.[1] Whether it is even possible to measure crucial mechanisms underlying healing is an open question. As one healer has noted, ". . . the common denominator of all healing methods is unconditional love—a love that respects the uniqueness of each individual client and empowers the client to take responsibility for his or her own well-being. . . . Indeed, technique is actually just a form in which the therapist's unconditional love can be transferred."[2]

To our knowledge no previous studies in the Western literature have examined simultaneous brain electrical events in both bioenergy practitioner and client during the process of healing. The motivation for the present such study was the statement frequently advanced by healers that, during the healing process, there is a "fusion" or "oneness" experience that results in a state of synchrony or simultaneity between bioenergy practitioner and client. Would such a state reveal itself in patterns of brain electrical events? Would the healing process be associated with increased EEG synchrony between bioenergy practitioner and client? What EEG frequencies and which locations, intrapersonal and interpersonal, would show the highest levels of synchrony? These questions are the focus of the current study.

Digitized multi-channel EEG may be used to examine characteristic patterns of brainwave activity in relation to particular tasks.[3-5] EEG activity occurring between electrodes of a montage is estimated by mathematical interpolation in brain electrical mapping.[6-7] Visual evaluation of EEG activity occurring during specific tasks is facilitated by representing areas of given EEG amplitude by specific colors in topographic maps.[8]

The purpose of the present study was (1) to evaluate brain electrical changes occurring separately in, and simultaneously between, a bioenergy practitioner and client during relaxation, meditation, and healing, and (2) to attempt, given an observed increase in EEG synchrony, to determine whether the synchrony increase resulted primarily from EEG changes in the bioenergy practitioner, changes in the client, or changes in both practitioner and client. The model followed in conducting and presenting this report was one of collaborative

single-case investigation of a healing event by a team comprised of investigator (e.g., SF), bioenergy practitioner (e.g., MW) and client (e.g., PP).

METHODS

Bioenergy Practitioner

A 52-year old male bioenergy practitioner with an international reputation, both for his own work and for his ability to teach his methods to students, participated in the current research. He agreed to participate in the various control conditions as well as in tasks such as "healing-at-a-distance" and "healing with the client present."

Client

A 39-year old female with polycystic kidney disease for 23 years also participated in the study. She had been on hemodialysis for the past 1 1/2 years. One year previously, she was diagnosed with cancer of the appendix resulting in surgery and subsequent abdominal complications including adhesions, incisional pain, and numerous obstructive episodes. She had also had restless legs syndrome for four years, initially intermittently and restricted to night-time episodes, but more recently chronic and requiring increasing amounts of medication (Sinemet, 10/100 two or three times per day, and Lorazepam, 3-4 mg. per day). The client signed an Institutional Review Board-approved statement of informed consent for the treatment and research procedures.

Electroencephalogram Recording

A Neurosearch-24 (Lexicor Medical Technology, Inc., Boulder, CO) 24-channel digitizing EEG computer was used to register EEG recordings of bioenergy practitioner and client during the four experimental conditions described below. Data was collected with the 60 Hz notch filter in, but without use of the 2 Hz low-pass filter. Sampling rate was set at 256 samples/second for the standard comparisons, but some data was also collected at 512 samples/second

to allow for examination in frequency ranges up to 128 Hz. Data was stored and analyzed on an IBM 386/33MHz clone computer.

The earlobes of both participants were cleaned with alcohol, rubbed with OmniPrep to reduce electrode resistance, and earclip electrodes were applied. Electrode impedance was tested and the electrodes reapplied as necessary if impedance exceeded 3000 Ohms. The main electrode array (19 channels plus ground) was then applied to the bioenergy practitioner according to the standard 10-20 International System montage using an Electrocap and Electro-Gel. Three Beckman gold cup electrodes were applied to selected parietal and occipital regions of the client (P3, P4, and O1) with Ten20 Conductive EEG Paste. Impedances were tested until satisfactory, with electrodes referred to linked ears.

Measures were then taken from both participants with eyes closed during several tasks described below. Data collection continued with each task until preliminary observation suggested that at least 100 artifact-free epochs had been collected.

Screening for movement artifacts was conducted on each epoch collected, and only artifact-free epochs were used in the analysis. Data was stored on tape for later analysis, including spectral analysis with Fast Fourier Transform of specific EEG segments, and evaluation of topographic brain-maps constructed from EEG activity occurring during specific tasks. With spectral analysis, brief segments of EEG data from a single lead are decomposed into specific frequencies, and EEG amplitude is plotted against EEG frequency for each time segment. The three-dimensional plot of amplitude, frequency and time form a "spectral array" as in Figure 1. Alternatively, EEG amplitude data from multiple leads may be mapped to a representation of the head, with areas of given amplitude ranges represented by specific colors or shades of gray, as in Figure 2. This type of display permits ready comparisons of EEG amplitude across conditions.

Definition of Synchrony. Synchrony in EEG data is at times defined simply as simultaneous occurrence at two electrode sites, either on a single head, or on two separate heads, of brainwaves within a particular frequency band. A more rigorous definition was, however, adopted in this research, based on the

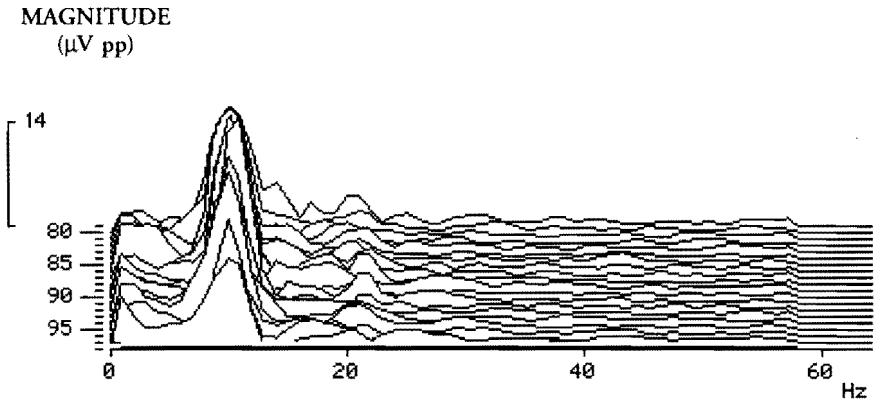

Figure 1. Example of spectral analysis of brainwaves. The large peaks in amplitude at 10 Hz represent alpha activity.

index of synchrony made available with the Biolex V200 software (Lexicor Medical Technology, Boulder, Colorado). This index of synchrony is composed in equal proportion of spectral correlation and of phase-relatedness of brainwaves within a particular brainwave frequency band. Spectral correlation is defined in the Biolex manual as, ". . . the zero-mean Pearson correlation coefficient applied to a selective band range of the frequency magnitude signals. . . computed between bipolar channels and expressed as a percentage." Phase-relation is formally expressed in the Biolex manual as, ". . . percentage in phase (0-100%). 0% represents 180 degrees out of phase and 100% represents 0 degrees out of phase."

Synchrony scores may vary from 0% to 100%, with the former indicating no synchrony between channels and the latter indicating perfect synchrony between channels within a given frequency band. It is important to note that by investigator's choice, the synchrony index selected does not depend upon occurrence of similarity in amplitude, as amplitude may be affected by factors such as skull thickness, depth of subcutaneous fat, number of cells momentarily recruited to fire simultaneously, and the like.

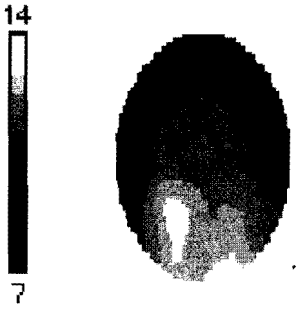

Figure 2. Example of EEG amplitudes (microvolts) in the alpha range mapped to the head. The nose is at the top; the occipital area is at the bottom. Amplitude is low over the left temporal region.

Tasks & Control Procedures

After both participants had electrodes applied, they were seated facing each other and were asked to participate in several mutual tasks. Tasks included (1) Self-Relaxation Baseline period (110 1-second epochs), followed by (2) Meditation Control period (110 epochs), (3) Healing-at-a-Distance Control period (110 epochs), and (4) Healing period, including: (a) Focus on the Head (260 epochs), and (b) Focus on the Abdomen (116 epochs). Instructions for the first task, the self-relaxation period, were for both participants to relax without meditating; during the second task both were asked to meditate. During the third period, both participants were asked to think about healing a third person not present. Finally, both were asked to participate in "a healing process" with regard to the client who was present.

Task (1) Self-Relaxation was considered to provide baseline data, while task (2) Meditation provided for controlled comparison of healing with what was expected to be a similar altered state, but in the absence of *intent to heal.* Task (3) Healing-at-a-Distance added an intent to heal, but with the intent not focused on the client who was present, providing a control for the direction of intent. Actual experimental focus was on tasks (4a) Healing with a focus on the head, and (4b) Healing with a focus on the abdomen of the client.

Task Ratings

Following the tasks, both participants were asked to rate their experiences with the following instructions: (1) **Relaxation:** "On a scale from 1 = the most relaxed you ever were, to 100 = the most tense you ever were, how relaxed were you during the relaxation period?", (2) **Meditation:** "On a scale from 1 = the deepest, most complete, most satisfying meditation that you

ever experienced, to 100 = the least complete, satisfying, deep meditation that you ever experienced, how deep was the meditation during the meditation period?", (3) **Confidence in healing another**: "On a scale from 1 = the most confident that you have ever been of the likelihood that your thinking of another's healing would help, to 100 = the least confident of the likelihood that your thinking of another's healing would be helpful, how confident were you that your thoughts of the person you were asked to heal "at a distance" were likely to have helped?", and (4) **Confidence in healing client present**: "On a scale from 1 = the most confident that you have ever been of the likelihood that treatment would help, to 100 = the least confident of the likelihood that treatment would be helpful, how confident were you that treatment here was likely to be helpful?"

Healing Process

During meditation, healing-at-a-distance and the client-present healing process, the bioenergy practitioner engaged in a breathing meditation reported to increase healing energy. He moved his hands approximately one to two inches over the client's head and body without touching her while reportedly sensing problem areas and applying bioenergy to these. First he checked the client's energy field around the brain, and then scanned the rest of the body. He subsequently reported that on the basis of his evaluation he would be able to bring the client's energy field back to balance, with an expected improvement in her physical and emotional condition.

Hypotheses

The first null hypothesis was that no difference would be detectable between any of the four conditions, either within participants or between them. The experimental hypothesis was that during healing a "fusion" or "oneness" experience associated with a state of synchrony or simultaneity between bioenergy practitioner and client would occur. It was hypothesized that this state would produce detectable differences between the two healing conditions that would separate them from the baseline (relaxation) pattern and from one or both control conditions. Specifically, it was hypothesized (a) that greater intra- and interpersonal synchrony in alpha, and theta frequencies would occur during the two healing conditions than during healing-at-a-distance or meditation, and

that synchrony would be greater during healing-at-a-distance or meditation than during relaxation. The second null hypothesis was that within each frequency band, no difference in level of synchrony would be observable between bioenergy practitioner and client, and no difference in level of synchrony would be observed interpersonally compared with that seen intrapersonally within these individuals. The experimental hypothesis was that within each frequency band greater synchrony would be apparent in the bioenergy practitioner than in the client, and greater synchrony would occur in the client than between practitioner and client.

Data Analyses

It should be noted that one current problem in analysis of single case data on EEG synchrony is the absence of any normative database to provide a standard of comparison by which to decide just how significant a given level of synchrony might be. Venneman[9] has suggested a theoretical solution to this problem based on a binomial probability model that does not apply in situations where synchrony is defined on the basis of phase-relatedness of brainwaves as well as of frequency. Fahrion and Coyne present further details with regard to analysis of brainwave synchrony data.[10]

A second problem in analyzing single case data is that *analysis of variance (ANOVA) techniques, univariate or multivariate, are inappropriate*, due to likelihood of high serial correlation in repeated measures taken from the same individual. Use of such procedures can under-estimate the error variance because there is a good deal less difference between observations from the same subject than there would be from independent subjects. A number of years ago Chassin and some of the first writers on single-case studies[11] thought that such analyses could be done. Now a growing literature indicates that conventional t-tests, ANOVA's and MANOVA's cannot be used with single-case studies.[12] Significance levels become highly inflated because of highly inflated numbers of degrees of freedom. It is now recognized that, while the magnitude of *correlations* in single-case studies does have meaning, the significance level is incorrect. In contrast, however, *F-tests*, which should be based on error terms from independent observations, do *not* have meaning. It is likely that F-tests will be inflated since the error term will be reduced due to correlation among observations from the same subject. This problem points to the need to use

techniques such as interrupted time series analysis[13] or the "split middle technique."[14,15]

Selection of Electrode Pairs for Analysis—Interrupted time series analysis requires experience and skill in model selection.[16] It is also extremely time-consuming to conduct such comparisons. The 19 channels of EEG data taken on the bioenergy practitioner would allow 171 combinations of bipolar electrode pairs to be studied just within that one individual, without taking into account the bipolar pairs within the client (3 pairs), and those between client and practitioner (57 pairs). Therefore practical as well as statistical considerations (inflation, due to the number of comparisons made, of the probability of Type I error, e.g., of detecting an effect when, in fact, it did not exist) dictated that some strategy be employed for determining *a priori* which limited electrode sets would be examined in tabular inspection, and which even more limited sets that would be compared using interrupted time series analysis.

Since only three electrodes were placed on the client, there was no need to limit tabular evaluation of these sites, and data from all three sites are presented for each of the five conditions. It was decided to select electrode sites from the bioenergy practitioner for tabular presentation in two ways: (1) Sites that were homologous with those used on the client were selected to allow appropriate comparisons between practitioner and client, and (2) Supplementary sites were selected to allow examination of patterns in synchrony along the practitioner's midline (right-left pairs) from occipital to frontal areas. These two criteria together limited examined sites to seven electrode pairs as will be seen below.

With regard to practitioner/client electrode pairs, two guidelines were also used: (1) Sites that were homologous on the two heads were selected based on a hypothesized identity of effect in practitioner and client between brain areas affected by each given task, and (2) Supplementary sites were selected that allowed comparison of the level of synchrony *between* these individuals with that *within* these individuals, as will be seen below.

Time Series Analysis—Finally, the investigator elected to perform interrupted time series analysis only on data from the visual projection area (O1) under the following conditions: (1) Relaxation/Meditation, (2) Relaxation/Healing-at-

a-Distance, (3) Relaxation/Healing (Head), and (4) Relaxation/Healing (Abdomen). As these analyses were performed separately for (a) the practitioner, the client, and the practitioner/client dyad, and for (b) alpha and theta frequencies, this selection procedure required twenty-four interrupted time series analyses to be performed.

Interrupted time series analysis was done with Box-Jenkins ARIMA models,[17] including intervention techniques[18] using an automatic procedure.[19] Missing data was replaced using distribution means. In no case was replacement of two successive periods required. Time series analyses were based on at least 110 data points (one-second epochs) per period, or 220 data points per analysis, representing EEG synchrony determinations for each epoch of each period.

OVERALL SUMMARY OF RESULTS

For the interested reader who is unconcerned with the complex details that follow, the overall results may be summarized:

1. Qualitative comparison of synchrony levels between bioenergy practitioner, client, and interpersonal synchrony indicates a progressive relationship obtains, with synchrony observed to be *highest within the bioenergy practitioner, lowest between practitioner and client, and intermediate within the client.* The statistical significance of this overall pattern could not be determined due to the fact that intercorrelation of multiple scores taken from the same individuals violates basic assumptions underlying t-tests or sign tests. Nonetheless, simple inspection of the data suggests that a consistent pattern does exist.

2. Within each individual, and within the pair of participants, there was notable *consistency* in the brainwave *frequencies* and the *locations* showing highest synchrony.

3. Time series analysis permitted observation of a statistically significant difference between Relaxation and Abdominal Healing within the practitioner in the Alpha (8-13 Hz.) range; the difference between

Relaxation and Healing-at-a-Distance under the same condition approached significance. In each case synchrony increased from Relaxation to the healing condition.

4. Within the *bioenergy practitioner*, synchrony was highest, across all conditions measured, within the left hemisphere (P3-01) in the Very High Beta (30-40 Hz.) and Extra High Beta (40-50 Hz.) ranges.

5. Within the *client*, in contrast, highest synchrony across all conditions was seen between left and right parietal areas (P3-P4), primarily in Theta (4-8 Hz.), and secondarily in the Alpha (8-13 Hz.) range.

6. *Between participants*, synchrony was highest across all conditions and locations primarily in the Beta (16-20 Hz.) range, and secondarily in the Theta (4-8 Hz.) range.

Summarized in Table I is synchrony (in percentage) between the bipolar electrode pairs, across the three sites that were in common in bioenergy practitioner, client, and between these two individuals; data is tabulated separately for each of the four conditions. Data presented in this table are repeated in appropriate sections below to allow ready comparison between these bipolar paired locations and others also presented below that were not shared between the two individuals.

Results are presented below in four sections: (1) Relaxation, (2) Meditation, (3) Healing at a Distance (client absence), and (4) Healing (client present), followed by the interrupted time series comparisons and qualitative analyses.

Ratings of Conditions by Practitioner & Client

On the 1-100 scales described above, these tasks were rated by the bioenergy practitioner as: (1) **Relaxation**: 20 ("not totally relaxed because electrodes were hurting my head"), (2) **Meditation**: 20 ("same reason—new experience: meditation with pain"), (3) **Confidence in healing another**: 1 ("am always confident that my work will help"), and (4) **Confidence in healing client present**: 1 ("full confidence").

Table 1

Synchrony between bipolar electrode pairs across four conditions and three sites within the bioenergy practitioner, the client, and between the two.

Relaxation

Electrode Pair	EXHBeta (40-50)	VHBeta (30-40)	HBeta (20-30)	Beta (16-20)	Alpha (8-13)	Theta (4-8)
			Frequency (Hz)			
P3-P4						
Pract.	95.5	96.0	93.1	90.5	86.7	88.6
Client	87.7	87.8	86.5	90.0	94.4	94.5
Pr.-Cl	58.2	57.0	60.0	62.4	57.9	64.5
P3-01						
Pract.	96.8	96.7	91.6	88.0	92.5	88.6
Client	76.9	73.5	69.6	71.3	67.5	79.9
Pr.-Cl.	61.1	58.9	57.2	61.9	55.2	62.2
P4-01						
Pract.	94.5	94.7	87.6	81.7	81.4	82.3
Client	72.8	68.8	65.2	71.2	65.4	79.4
Pr.-Cl.	57.7	59.7	58.4	64.7	57.2	63.5

Meditation

Electrode Pair	EXHBeta (40-50)	VHBeta (30-40)	HBeta (20-30)	Beta (16-20)	Alpha (8-13)	Theta (4-8)
			Frequency (Hz)			
P3-P4						
Pract.	95.8	96.3	94.8	93.1	88.4	90.2
Client	85.3	87.4	86.4	90.7	93.1	94.5
Pr.-Cl.	59.7	58.2	59.8	63.5	58.2	63.1
P3-01						
Pract.	97.9	97.7	94.4	91.9	92.4	89.0
Client	71.9	72.2	71.1	71.4	70.3	80.0
Pr.-Cl.	59.7	58.2	59.8	63.5	58.1	64.6
P4-01						
Pract.	96.0	96.3	91.5	88.2	85.0	84.9
Client	67.2	68.8	65.6	68.9	68.1	77.5
Pr.-Cl.	59.9	60.4	57.8	65.0	60.0	63.2

Table I (cont.)

Healing-at-a-Distance

Electrode Pair	EXHBeta (40-50)	VHBeta (30-40)	HBeta (20-30)	Beta (16-20)	Alpha (8-13)	Theta (4-8)
			Frequency (Hz)			
P3-P4						
Pract.	96.0	96.7	95.4	92.5	92.5	89.9
Client	88.8	87.9	88.6	87.8	93.3	95.2
Pr.-Cl.	56.2	58.4	59.2	66.8	58.6	62.9
P3-01						
Pract.	98.2	98.0	95.1	93.5	90.5	89.3
Client	75.3	73.4	75.8	74.3	72.1	80.1
Pr.-Cl.	59.3	59.5	58.2	64.7	62.1	63.6
P4-01						
Pract.	96.4	96.3	93.2	89.9	86.2	85.4
Client	70.6	73.5	72.3	70.5	69.9	78.5
Pr.-Cl.	61.1	61.2	58.9	64.6	61.8	63.3

Healing (Head)

Electrode Pair	EXHBeta (40-50)	VHBeta (30-40)	HBeta (20-30)	Beta (16-20)	Alpha (8-13)	Theta (4-8)
			Frequency (Hz)			
P3-P4						
Pract.	94.3	94.6	92.2	89.1	92.3	91.1
Client	87.4	87.9	87.5	89.4	92.5	93.9
Pr.-Cl.	60.3	60.2	57.7	64.4	58.3	64.6
P3-01						
Pract.	94.9	95.3	91.9	89.3	91.6	90.0
Client	72.3	74.0	73.6	74.0	70.4	81.2
Pr.-Cl.	60.0	58.0	57.2	65.5	58.9	62.3
P4-01						
Pract.	93.0	92.7	88.2	83.2	87.9	86.8
Client	70.3	72.2	69.8	71.0	68.8	79.1
Pr.-Cl.	60.1	58.6	58.4	64.2	59.1	63.3

Table I (cont.)

Healing (Abdomen)

Electrode Pair	Frequency (Hz) EXHBeta (40-50)	VHBeta (30-40)	HBeta (20-30)	Beta (16-20)	Alpha (8-13)	Theta (4-8)
P3-P4						
Pract.	95.6	96.5	95.4	93.3	92.3	91.1
Client	88.3	87.7	87.8	89.3	92.5	93.9
Pr.-Cl.	57.8	57.4	60.2	64.5	59.2	61.5
P3-01						
Pract.	96.7	97.0	94.8	93.9	90.8	89.8
Client	70.8	70.3	73.6	71.7	70.4	81.2
Pr.-Cl.	59.3	58.9	57.2	65.1	59.1	62.1
P4-01						
Pract.	94.4	94.9	92.2	91.1	89.0	86.8
Client	68.0	68.7	68.8	70.9	68.8	79.1
Pr.-Cl.	58.9	59.1	57.7	64.9	60.1	64.0

The tasks were rated by the client as: (1) **Relaxation**: 25 ("not the most relaxed I have ever been, but comfortable under the circumstances"), (2) **Meditation**: 15, (3) **Confidence in healing another**: 50, and (4) **Confidence in healing client present**: 3 ("I believe that this kind of work can be helpful. I hoped that he could help with the abdominal pain, but did not expect the condition of my kidney or the restless legs to change").

RELAXATION

Examination of brain mapping in the bioenergy practitioner indicates the presence of the following features: (a) prominent alpha frequency activity averaging 66 μV peak-to-peak, and with individual waves of up to 100 μV, centered in the left occiput (O1), (b) prominent activation of the right hemisphere as a whole compared to the left as indicated by high amplitude gamma frequencies (35-60 Hz) centered in the right temporal (T4) and right occiput (O2), (c) prominent activation of the right hemisphere compared to the left is also seen in the beta (13-25 Hz.) range, centered in the right occiput (O2), as well as in the high frequency beta (25-35 Hz.) range, centered in the

Table II

Synchrony between bipolar electrode pairs within the bioenergy practitioner during relaxation.

	Electrode Pair						
	01-02	P3-P4	C3-C4	F3-F4	F7-F8	P3-01	P4-01
Frequency(Hz)							
EXHBeta (40-50)	94.7	95.5	93.1	92.5	89.0	96.8	94.5
VHBeta (30-40)	95.7	96.0	94.2	93.9	92.1	96.7	94.7
HBeta (20-30)	89.4	93.1	93.4	94.7	89.8	91.6	87.6
Beta (16-20)	88.0	90.5	92.4	95.3	89.6	88.0	81.7
Alpha (8-13)	90.7	86.7	89.6	96.0	88.2	92.5	81.4
Theta (4-8)	87.2	88.6	88.6	91.8	71.8	88.6	82.3

same general area (T6 and O2), and (d) low amplitude (14uV average) delta rhythm centered in the fronto-temporal region (F8) but extending to right frontal (FP2) and to central (CZ) locations.

Within-bioenergy practitioner synchrony data (Table II) was examined for seven electrode pairs in six frequency ranges: (1) extra high frequency beta (40-50 Hz.), (2) very high frequency beta (30-40 Hz.), (3) high frequency beta (20-30 Hz.), (4) beta frequency (16-20 Hz.), (5) alpha (8-13 Hz.) and (6) theta (4-8 Hz.). Greatest synchrony in the two highest frequency bands occurred in the left hemisphere between parietal and occipital areas (P3-O1). Highest synchrony in the remaining four frequency bands was observed between right and left frontal (F3-F4). Brain maps of the client could not be constructed due to the small number of monitoring channels available. Within-client alpha and theta synchrony during relaxation was observed to be highest between left and right parietal regions (P3-P4). (See Table III). Higher levels of within client synchrony were seen in theta compared to alpha and beta frequencies across all sites.

Table III

Synchrony between bipolar electrode pairs within the client during relaxation.

	Electrode Pair		
	P3-P4	P3-01	P4-01
Frequency (Hz)			
EXHBeta (40-50)	87.7	76.9	72.8
VHBeta (30-40)	87.8	73.5	68.8
HBeta (20-30)	86.5	69.6	65.2
Beta (16-20)	90.0	71.3	71.2
Alpha (8-13)	94.4	67.5	65.4
Theta (4-8)	94.5	79.9	79.4

When synchrony between bioenergy practitioner and client was examined while both individuals were under instructions to relax, greatest synchrony was observed at the two highest frequencies between the practitioner's parietal areas and the client's left occiput (P3-O1 and P4-O1). With the four lower frequencies maximal synchrony was seen between the practitioner's and the client's parietal areas: High Frequency Beta, P4-P4; Beta, P4-P4; Alpha, P4-P3; and Theta, P3-P3. (See Table IV). Synchrony in Theta and in Beta was greater than that in alpha for all electrode pairs.

MEDITATION

Examination of brain mapping in the bioenergy practitioner revealed the same basic patterns seen with relaxation including: (a) prominent alpha frequency activity averaging 69 μV peak-to-peak, again with individual waves of up to 100 μV, centered in the left occiput (O1), (b) prominent activation of the right hemisphere as a whole compared to the left, as indicated by high amplitude gamma frequencies (35-60 Hz) centered in the right temporal region (T4), (c) activation of the right hemisphere compared to the left in the beta (13-25 Hz.) range, centered in the right occiput (O2), as well as in the high frequency beta (25-35 Hz.) range, centered in the same general area (T6 and

Table IV

Synchrony between bipolar electrode pairs sited on bioenergy practitioner and client during relaxation. The first listed site in each pair represents the practitioner and the second site represents the client.

	Electrode Pair						
	01-01	P3-P3	P4-P4	P3-P4	P4-P3	P3-01	P4-01
Frequency (Hz)							
EXHBeta (40-50)	58.9	56.7	58.1	58.2	56.0	61.1	57.7
VHBeta (30-40)	57.3	56.3	58.0	57.0	56.7	58.9	59.7
HBeta (20-30)	59.5	59.3	60.3	60.0	60.2	57.2	58.4
Beta (16-20)	63.0	62.6	65.5	62.4	65.0	61.9	64.7
Alpha (8-13)	54.1	59.7	59.9	57.9	61.4	55.2	57.2
Theta (4-8)	62.6	64.9	64.7	64.5	64.7	62.2	63.5

O2), (d) low amplitude (17 μV average) delta rhythm centered in the fronto-temporal region (F8) but extending to right frontal (FP2) and, to a lessor extent, to central (CZ) locations, and (e) an "earmuff" pattern of high frequency (80-90 Hz.) activation over both temporal regions (T3 and T4) appears in the presence of a 512 samples/second sampling rate.

Within-bioenergy practitioner synchrony data (Table V) was again examined for seven electrode pairs in six frequency ranges: (1) extra high frequency beta (40-50 Hz.), (2) very high frequency beta (30-40 Hz.), (3) high frequency beta (20-30 Hz.), (4) beta frequency (16-20 Hz.), (5) alpha (8-13 Hz.) and (6) theta (4-8 Hz.). As with relaxation, greatest synchrony was observed in the two highest frequency bands, with highest synchrony in the remaining four occurring in the left hemisphere between parietal and occipital areas (P3-O1). Highest synchrony in the remaining four frequency bands was observed for the right and left frontal site (F3-F4). Synchrony was observed to be higher in alpha than in theta for all but the parietal site (P3-P4), with the difference especially notable for the frontal site F7-F8.

Table V

Synchrony between bipolar electrode pairs within the bioenergy practitioner during meditation.

	Electrode Pair						
	01-02	P3-P4	C3-C4	F3-F4	F7-F8	P3-01	P4-01
Frequency (Hz)							
EXHBeta	95.7	95.8	93.9	93.1	91.4	97.9	96.0
VHBeta	96.4	96.3	95.2	94.8	93.9	97.7	96.3
HBeta	91.8	94.8	94.9	95.5	93.2	94.4	91.5
Beta	90.0	93.1	94.9	96.1	92.8	91.9	88.2
Alpha	90.7	88.4	91.6	96.5	91.1	92.4	85.0
Theta	88.4	90.2	89.9	93.4	75.7	89.0	84.9

Within-client alpha and theta synchrony during relaxation was observed to be highest between left and right parietal regions (P3-P4). (See Table VI). As with relaxation, higher levels of within client synchrony were again seen at bilateral parietal sites (P3-P4), and, at this location, percentage synchrony was negatively correlated with frequency, with the highest synchrony occurring in theta frequencies.

When synchrony between bioenergy practitioner and client was examined while both individuals were under instructions to meditate, at the two highest frequencies synchrony increased from that observed with relaxation at all sites except between the practitioner's left parietal area and the client's left occiput (P3-O1); synchrony in alpha and theta did increase at P3-O1 from relaxation to meditation. With the four lower frequencies maximal synchrony was seen in the same locations as during relaxation (between the practitioner's and the client's parietal areas): High Frequency Beta, P4-P4; Beta, P4-P4; Alpha, P4-P3; and Theta, P3-P3. (See Table VII). Synchrony in Theta and in Beta was greater than that in Alpha for all electrode pairs.

Table VI

Synchrony between bipolar electrode pairs within the client during meditation.

	Electrode Pair		
	P3-P4	P3-01	P4-01
Frequency (Hz)			
EXHBeta	85.3	71.9	67.2
VHBeta	87.4	72.2	68.8
HBeta	86.4	71.1	65.6
Beta	90.7	71.4	68.9
Alpha	93.1	70.3	68.1
Theta	94.5	80.0	77.5

Table VII

Synchrony between bipolar electrode pairs sited on bioenergy practitioner and client during meditation. The first listed site in each pair represents the practitioner and the second site represents the client.

	Electrode Pair						
	01-01	P3-P3	P4-P4	P3-P4	P4-P3	P3-01	P4-01
Frequency (Hz)							
EXHBeta	59.8	59.0	60.0	59.7	60.1	59.7	59.9
VHBeta	60.5	59.9	58.3	58.2	59.9	58.2	60.4
HBeta	59.0	60.2	60.9	59.8	60.2	59.8	57.8
Beta	65.5	63.4	63.2	63.5	64.3	63.5	65.0
Alpha	56.9	58.8	59.4	58.2	60.1	58.1	60.0
Theta	64.7	63.6	64.1	63.1	64.0	64.6	63.2

Table VIII

Synchrony between bipolar electrode pairs within the bioenergy practitioner during healing at a distance.

	Electrode Pair						
	01-02	P3-P4	C3-C4	F3-F4	F7-F8	P3-01	P4-01
Frequency (Hz)							
EXHBeta	96.1	96.0	93.9	92.9	91.8	98.2	96.4
VHBeta	96.2	96.7	95.4	94.5	94.2	98.0	96.3
HBeta	93.4	95.4	95.2	95.5	94.2	95.1	93.2
Beta	91.9	92.5	94.7	96.4	93.8	93.5	89.9
Alpha	93.5	92.5	93.9	97.2	92.6	90.5	86.2
Theta	91.1	89.9	88.1	90.6	77.7	89.3	85.4

HEALING AT A DISTANCE

Examination of brain mapping revealed the same basic patterns seen with relaxation and meditation including: (a) prominent alpha frequency activity averaging 56 μV peak-to-peak, again with individual waves of up to 100 μV, centered in the left occiput (O1), (b) prominent activation of the right hemisphere as a whole compared to the left, as indicated by high amplitude gamma frequencies (35-60 Hz) centered in the right occipital-temporal region (O2-T6), (c) activation of the right hemisphere compared to the left in the beta (13-25 Hz.) range, centered in the right occiput (O2), as well as in the high frequency beta (25-35 Hz.) range, centered in the same general area (T6), (d) low amplitude (23 μV average) delta rhythm centered in the fronto-temporal region (F8) but extending to right frontal (FP2), and (e) low amplitude (13 μV) theta rhythm focused in the left occiput (O1), but also at CZ and F8.

Within-bioenergy practitioner synchrony data was examined for the same seven electrode pairs in six frequency ranges as with relaxation and meditation. (See Table VIII). As with relaxation and meditation, greatest synchrony was seen

Table IX

Synchrony between bipolar electrode pairs within the client during healing at a distance.

	Electrode Pair		
	P3-P4	P3-01	P4-01
Frequency (Hz)			
EXHBeta	88.8	75.3	70.6
VHBeta	87.9	73.4	73.5
HBeta	88.6	75.8	72.3
Beta	87.8	74.3	70.5
Alpha	93.3	72.1	69.9
Theta	95.2	80.1	78.5

in the two highest frequency bands, and in the left hemisphere between parietal and occipital areas (P3-O1). Highest synchrony in the remaining four frequency bands, except Theta, was observed for the right and left frontal site (F3-F4), with Theta highest in synchrony at O1-O2. Synchrony was observed to be higher in alpha than in theta for all sites, with the difference again especially notable for the frontal site F7-F8.

During healing at a distance, higher levels of within-client synchrony were again seen at bilateral parietal sites (P3-P4), and as with relaxation and meditation at this location, the highest synchrony occurred in theta frequencies. (See Table IX).

When synchrony between bioenergy practitioner and client was examined while they were instructed to "heal a client not present, someone at a distance," highest synchrony in the two highest frequencies occurred at different sites from those observed highest with relaxation and with meditation: highest synchrony in Extra High Frequency Beta was between the practitioner's right parietal and the client's left occipital region (P4-O1); highest synchrony in Very High Frequency Beta was between both the practitioner's and the client's right parietal regions (P4-P4). Highest synchrony in Beta occurred between the practitioner's

Table X

Synchrony between bipolar electrode pairs sited on bioenergy practitioner and client during healing at a distance. The first listed site in each pair represents the practitioner and the second site represents the client.

	Electrode Pair						
	01-01	P3-P3	P4-P4	P3-P4	P4-P3	P3-01	P4-01
Frequency (Hz)							
EXHBeta	59.9	56.2	60.8	59.3	58.0	59.3	61.1
VHBeta	60.0	58.4	61.8	58.6	60.9	59.5	61.2
HBeta	57.9	59.2	60.5	60.4	59.9	58.2	58.9
Beta	64.4	66.8	66.3	66.7	63.9	64.7	64.6
Alpha	60.5	58.6	60.5	59.4	58.6	62.1	61.8
Theta	61.6	62.9	61.3	63.2	61.1	63.6	63.3

and client's left parietal areas (P3-P3). Maximal synchrony in Alpha and in Theta was seen between the practitioner's left parietal area and the client's left occipital area (P3-O1). (See Table X). Synchrony in Theta and in Beta was again greater than that in Alpha for all electrode pairs.

HEALING

Subjective Reports—The bioenergy practitioner reported experiencing pain in his hands whenever he moved them to the areas that were indicating energy imbalance. In areas where he sensed the client's organs were out of balance from an energy point of view, the bioenergy practitioner reported feeling a change in the vibrations of the same organs within himself. While checking the client's energy field around the brain, he reported finding that the energy in the organs of her abdomen might be out of balance. While scanning the rest of her body with special attention to the Solar Plexus area, he reported finding confirmation of the previous diagnosis: the energy field around her solar plexus was seriously out of balance.

When his hands were close to her body, he reported the degree of pain to be less than when he was further away, which indicated to him (based on previous experience) that her energy imbalance had an emotional basis. The nature of the imbalance suggested to him that there could be emotional problems within the so-called "family circle" (family member, best friends, lovers, close people from her place of work). He reported feeling much more congested energy when he was working on the abdomen than when he was working around the head. At one point he reported intense pain traveling up his arm, which produced neck and shoulder muscle tension that was visible in the EEG recording.

The client reported that during the healing period her hands as they rested on her legs became very hot; she reported she could feel them "almost 'searing' me through heavy jeans." She also noticed a hot tingling sensation in each of the parts of her body, especially the abdomen and head, as the bioenergy practitioner's hands moved over that area, as well as a "quickening of energy" throughout the body. She described experiencing physical lightness of form (vs. heaviness), imagery of translucent, floating bubbles moving toward her, encompassing her, and breaking lightly upon her. Psychologically she was very calm, with a sense of acceptance, safety, and perfection. She felt herself receiving energy from the practitioner, could sense his movements and presence, and felt herself drawing on his energy. She realized later that she had not placed any attention on her medical condition at all.

Focus on the Head—Examination of brain mapping during healing with a focus on the head revealed some similarities but also substantial change from the basic patterns seen with relaxation, meditation, and healing of a client at a distance, including: (a) prominent alpha frequency activity averaging 54 μV peak-to-peak, again with individual waves of up to 100 μV, centered in the left occiput (O1), (b) prominent activation (averaging 36 μV) in the right hemisphere with a strong focus only in the right frontal area (FP2), but with subordinate foci in the right occiput (O2) and in the left temporal regions (T3) as indicated by high amplitude gamma frequencies (35-60 Hz.), (c) activation of the right hemisphere compared to the left in the beta (13-25 Hz.) range, centered in the right occiput (O2), as well as in the high frequency beta (25-35 Hz.) range, centered in the right frontal area (FP2), (d) low amplitude (23 μV average) delta rhythm centered in the fronto-temporal region (F8) but

Table XI

Synchrony between bipolar electrode pairs within the bioenergy practitioner during healing with a focus on the head.

	Electrode Pair						
	01-02	P3-P4	C3-C4	F3-F4	F7-F8	P3-01	P4-01
Frequency (Hz)							
EXHbeta	94.4	94.3	92.3	89.5	85.6	94.9	93.0
VHBeta	94.3	94.6	93.1	91.2	86.8	95.3	92.7
HBeta	90.0	92.2	92.9	92.2	88.9	91.9	88.2
Beta	86.5	89.1	92.3	94.4	89.9	89.3	83.2
Alpha	92.3	92.3	93.6	96.2	89.3	91.6	87.9
Theta	91.4	91.1	88.3	91.7	75.9	90.0	86.8

extending to right frontal (FP2), and (e) low amplitude (14 μV) theta rhythm focused in the left occiput (O1), but also at CZ and F8.

Within-bioenergy practitioner synchrony data was examined for the same seven electrode pairs in six frequency ranges as above. (See Table XI). As with relaxation, meditation and healing at a distance, greatest synchrony in the two highest frequency bands was observed in the left hemisphere between parietal and occipital areas (P3-O1). In contrast to the previous conditions, however, the highest synchrony observed during healing was not in the two highest frequency bands. Highest synchrony in the remaining four frequency bands, except High Frequency Beta, was observed for the right and left frontal site (F3-F4), with High Frequency Beta highest in synchrony at C3-C4. Synchrony was observed to be higher in alpha than in theta for all sites, with the difference again especially notable for the frontal site F7-F8; synchrony during healing with a focus on the head was highest overall in Alpha at F3-F4.

As with the previous conditions, during healing (head), higher levels of within-client synchrony were seen at bilateral parietal sites (P3-P4), and, at this location, the highest synchrony again occurred in theta frequencies. (See Table XII).

Table XII

Synchrony between bipolar electrode pairs within the client during healing with a focus on the head.

	Electrode Pair		
	P3-P4	P3-01	P4-01
Frequency (Hz)			
EXHBeta	87.4	72.3	70.3
VHBeta	87.9	74.0	72.2
HBeta	87.5	73.6	69.8
Beta	89.4	74.0	71.0
Alpha	92.5	70.4	68.8
Theta	93.9	81.2	79.1

When synchrony between bioenergy practitioner and client was examined while the bioenergy practitioner was instructed to "heal the client who is present, with a focus on the head area," highest synchrony in the two highest frequencies occurred at different sites from those observed highest with relaxation, meditation and healing at a distance: highest synchrony in Extra High Frequency Beta was between the practitioner's and the client's left occipital region (O1-O1); highest synchrony in Very High Frequency Beta was between the practitioner's left parietal and the client's right parietal regions (P3-P4). Highest synchrony in High Frequency Beta and in Alpha also occurred between the practitioner's and client's left occipital areas (O1-O1); maximal synchrony in Theta was seen between the practitioner's and the client's right parietal areas (P4-P4). (See Table XIII). Synchrony in Theta and in Beta was again greater than that in Alpha for all electrode pairs.

Focus on Abdomen——Examination of brain mapping during healing with a focus on the abdomen revealed substantial similarities with healing focused on the head, but with differences from the basic patterns seen with relaxation, meditation, and healing of a client at a distance, including: (a) prominent alpha frequency activity averaging 54 μV peak-to-peak, again with individual waves of up to 100 μV, centered in the left occiput (O1), (b) prominent activation

Table XIII

Synchrony between bipolar electrode pairs sited on bioenergy practitioner and client during healing with a focus on the head. The first listed site in each pair represents the practitioner and the second site represents the client.

	Electrode Pair						
	01-01	P3-P3	P4-P4	P3-P4	P4-P3	P3-01	P4-01
Frequency (Hz)							
EXHBeta	61.3	59.3	58.8	60.3	58.9	60.0	60.1
VHBeta	58.5	58.3	58.8	60.2	57.5	58.0	58.6
HBeta	58.6	57.6	57.6	57.7	57.6	57.2	58.4
Beta	64.2	63.4	63.8	64.4	62.8	65.5	64.2
Alpha	60.5	59.0	59.5	58.3	60.4	58.9	59.1
Theta	62.1	63.2	65.0	64.6	64.1	62.3	63.3

(averaging 36 μV) in the right hemisphere with a strong focus only in the right frontal area (FP2), but with subordinate foci in the right occiput (O2) and in the left temporal regions (T3) as indicated by high amplitude gamma frequencies (35-60 Hz), (c) activation of the right hemisphere compared to the left in the beta (13-25 Hz.) range, centered in the right occiput (O2), as well as in the high frequency beta (25-35 Hz.) range, centered in the right frontal area (FP2), (d) low amplitude (23 μV average) delta rhythm centered in the fronto-temporal region (F8) but extending to right frontal (FP2), and (e) low amplitude (14 μV) theta rhythm focused in the left occiput (O1), but also at CZ and F8.

Within-bioenergy practitioner synchrony data was examined for the same seven electrode pairs in six frequency ranges as above. (See Table XIV). As with relaxation, meditation, healing at a distance and healing (head), greatest synchrony during healing (abdomen) in the two highest frequency bands was observed in the left hemisphere between parietal and occipital areas (P3-O1). Once again, as with relaxation, meditation, and healing at a distance (but in contrast to healing, head), the highest synchrony observed during healing

Table XIV

Synchrony between bipolar electrode pairs within the bioenergy practitioner during healing with a focus on the abdomen.

	Electrode Pair						
	01-02	P3-P4	C3-C4	F3-F4	F7-F8	P3-01	P4-01
Frequency (Hz)							
EXHBeta	95.3	95.6	92.8	90.7	86.9	96.7	94.4
VHBeta	95.8	96.5	94.6	92.7	88.8	97.0	94.9
HBeta	94.1	95.4	95.0	93.8	91.1	94.8	92.2
Beta	91.4	93.3	94.2	95.5	89.5	93.9	91.1
Alpha	92.3	92.3	93.7	96.7	89.3	90.8	89.0
Theta	91.4	91.1	89.4	92.9	75.9	89.8	86.8

(abdomen) was observed in these two highest frequency bands. Highest synchrony in the remaining four frequency bands, except High Frequency Beta, was observed for the right and left frontal site (F3-F4), with High Frequency Beta highest in synchrony at P3-P4. Synchrony was observed to be higher in alpha than in theta for all sites, with the difference again especially notable for the frontal site F7-F8.

As with the previous conditions, during healing (abdomen), higher levels of within-client synchrony were seen at bilateral parietal sites (P3-P4), and, at this location, the highest synchrony again occurred in theta frequencies. (See Table XV).

When synchrony between bioenergy practitioner and client was examined while the bioenergy practitioner was instructed to "heal the client who is present, with a focus on the abdominal area," highest synchrony in Extra High Frequency Beta occurred at the same site observed highest with healing (head): the practitioner's and the client's left occipital areas (O1-O1). Highest synchrony in Very High Frequency Beta was similar to that in relaxation and meditation: between the practitioner's right parietal and the client's left occipital regions (P4-O1). Highest synchrony in

Table XV

Synchrony between bipolar electrode pairs within the client during healing with a focus on the abdomen of the client.

	Electrode Pair		
	P3-P4	P3-01	P4-01
Frequency (Hz)			
EXHBeta	88.3	70.8	68.0
VHBeta	87.7	70.3	68.7
HBeta	87.8	73.6	68.8
Beta	89.3	71.7	70.9
Alpha	92.5	70.4	68.8
Theta	93.9	81.2	79.1

High Frequency Beta, like that of healing at a distance, occurred between the practitioner's left parietal and the client's right parietal areas (P3-P4). Maximal synchrony in Beta and in Theta was seen between the practitioner's right parietal area and the client's left occipital area (P4-O1); maximal synchrony in Alpha was seen in the practitioners and the client's occipital areas. (See Table XVI). Synchrony in Theta and in Beta was again greater than that in Alpha for all electrode pairs.

Interrupted Time Series Analysis

Differences in synchrony across periods within the practitioner, within the client, and between practitioner and client based on time series analysis are seen in Table XVII. Significance of differences were evaluated first between the Relaxation condition and the two control conditions (Meditate, and Heal-at-Distance). Since significant differences were not observed between Relaxation and control conditions, comparison of the two Healing conditions (Head, and Abdomen) with the two control conditions was not performed in the interest of reducing Type I error. A significant difference in synchrony was observed in the practitioner, in the alpha band at O1-O2. With regard to this

Table XVI

Synchrony between bipolar electrode pairs within bioenergy practitioner and client during healing with a focus on the abdomen. The first listed site in each pair represents the practitioner and the second site represents the client.

	Electrode Pair						
	01-01	P3-P3	P4-P4	P3-P4	P4-P3	P3-01	P4-01
Frequency (Hz)							
EXHbeta	60.5	57.1	58.0	57.8	58.8	59.3	58.9
VHBeta	58.7	54.1	57.5	57.4	55.0	58.9	59.1
HBeta	58.3	58.3	59.9	60.2	58.4	57.2	57.7
Beta	64.8	64.4	63.9	64.5	63.4	65.1	64.9
Alpha	60.5	59.2	60.3	59.2	60.6	59.1	60.1
Theta	61.1	62.0	62.1	61.5	63.1	62.1	64.0

Table XVII

Differences in alpha and theta synchrony between periods.

	Ratios					
	Practitioner		Client		Pract./Client	
	Alpha	Theta	Alpha	Theta	Alpha	Theta
Periods						
Relax/Meditate	-0.66	-0.01	0.58	0.01	0.96	0.93
Relax/Heal-at-Distance	1.92	1.27	1.71	0.32	1.13	0.96
Relax/Heal (Head)	0.94	0.84	1.49	0.73	1.12	0.96
Relax/Heal (Abd.)	2.02*	1.76	1.59	-0.37	1.14	0.96

* $p < .05$

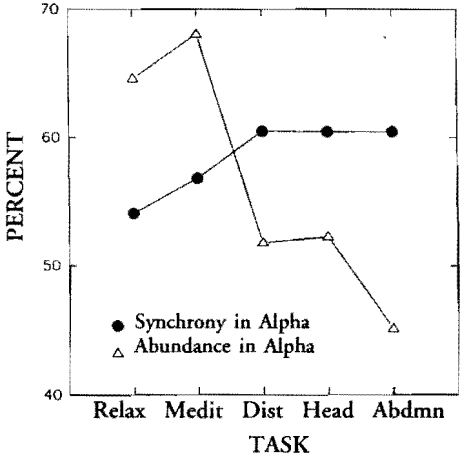

Figure 3. Synchrony in Alpha is not related to alpha abundance.

finding, it may be of some importance to note that synchrony in alpha was not simply a matter of increased alpha abundance, and in fact, these two indices of brainwave activity were unrelated (Figure 3).

DISCUSSION

The observed results provide some confirmation of reports by healers of a state of consciousness during the healing process that is different from that seen during relaxation and meditation. Some elements of the bioenergy practitioner's EEG pattern were seen across all tasks, such as the high amplitude occipital alpha rhythms of 100 μV peak-to-peak, an amplitude which to our knowledge has been reported previously only in the classic studies of Kasumatsu and Hirai with experienced Zen meditators,[20] and in that of Anand, China and Singh[21] with yogis. Another common element across all tasks was a right brain activation pattern of a consistency and intensity most unusual in our experience; such a pattern might be expected in association with an integrative (as opposed to analytic) and a spatial (as opposed to sequential) non-verbal pattern-recognizing capability. Finally, the bioenergy practitioner demonstrated a

consistency in locations and frequency bands showing maximal synchrony across all tasks. These locations and bands of highest synchrony were quite different from those observed in the client, which themselves were also quite consistent across tasks. The consistency of these patterns across tasks and frequency bands suggests that something of more than ephemeral nature is being measured by the index of synchrony.

Some other elements of the bioenergy practitioner's pattern were specific to the healing process and were present both with healing-at-a-distance and while working with the client who was present. These elements included the high-amplitude, high frequency pattern seen in the right frontal area (but not the left) that might be hypothesized to be associated with nonverbal direction or intentionality of behavior.

Only one of 24 time series analysis t-tests was significant at the .05 level, a result that could be accounted for by chance. (One additional t-test of the 24 [Relax/Healing-at-a-Distance] also approached significance at this level.) A factor which could have reduced differences in the time series analyses between relaxation, control conditions and healing conditions was that, by self-report, it was difficult for the practitioner to avoid assuming the states he associates with healing while in the presence of a client with documented physical problems. It is possible that he may already have inadvertently begun to engage in healing activity during the relaxation period, reducing differences between relaxation and putative healing conditions. From a strictly physiologic standpoint (law of initial values), the high level of synchrony seen within the practitioner during baseline would also likely limit differences between states. That is, there was limited range for increase in synchrony during healing given the high levels observed during the baseline relaxation condition.

While, in the absence of a control group, it cannot be proven that the EEG measures taken during healing, in comparison to baseline and control observations, were not simply the product of passage of time, placebo, or Hawthorne or other nonspecific effects, several factors mitigate against such a conclusion. The client had engaged in an effective relaxation procedure, physiologically monitored thermal, muscle and brainwave biofeedback, over a period of years. The effectiveness of this practice is indicated by the fact that she had successfully brought her blood pressure under

control with these procedures, and had avoided the need for kidney dialysis for two years beyond expectations.

The client had also engaged in meditative practice assisted by alpha/theta biofeedback training over more than a year, and had successfully developed a degree of body awareness that allowed her to correctly detect two intestinal blockages due to adhesions days before they could be seen with radiography. In addition, she had had multiple previous treatments without success for abdominal pain, including surgery on three occasions, medications, several hospitalizations for partial blockages, and practice of visualization of intended results during deep relaxation. Similarly, her problem with restless legs had first appeared four years previously, and had been treated unsuccessfully over a period of two years with medications as well as by extending the duration of her dialysis treatments. Her improvement in these conditions began immediately at the time of the bioenergy practitioner's work with her, and continued over four months after the session (restless legs) and to the present, nearly a year after the session (abdominal pain).

Nonetheless, we can not evaluate long-term efficacy with these conditions at this point; we only wish to indicate through report of the clinical data that the healing process had face validity: the client did experience an improvement in two difficult-to-treat problems in direct association with the experimental "healing" process. Thus there is preliminary indication that the observed EEG changes were associated with an actual "healing" process.

To the extent that synchrony is a product of simultaneous occurrence of brain rhythms within a particular frequency range, e.g., alpha or theta, it is important to recognize that studies repeatedly examining EEG variables in various populations have reported that no significant changes in alpha and theta occurred over periods of up to three years.[22,23] Although increased EEG alpha production in accord with instructions has been reported, the level of non-specific changes in alpha has been quite small[24,25] in contrast to those observed here. In summary, while nonspecific effects cannot be ruled out as contributing factors in these results, it is unlikely that the changes observed are merely the result of such factors.

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